Corporate Bankruptcy as a Filtering Device: Chapter 11 Reorganizations and Out-of-Court Debt Restructurings

Michelle J. White

Journal of Law, Economics, & Organization, Vol. 10, No. 2 (Oct., 1994), 268-295.

Stable URL:
http://links.jstor.org/sici?sici=8756-6222%28199410%2910%3A2%3C268%3ACBAAFD%3E2.0.CO%3B2-N

Journal of Law, Economics, & Organization is currently published by Oxford University Press.

Corporate Bankruptcy as a Filtering Device: Chapter 11 Reorganizations and Out-of-Court Debt Restructurings

Michelle J. White
University of Michigan

This article uses a game theoretic model of Chapter 11 bankruptcy and out-of-court debt restructuring to evaluate the economic efficiency of U.S. bankruptcy procedures. The model assumes that there are two types of failing firms: economically inefficient firms that should liquidate and economically efficient firms that should be saved. From an efficiency standpoint, the goal of corporate bankruptcy procedures is to liquidate the former under Chapter 7 and save the latter by reorganization under Chapter 11—that is, to filter out inefficient firms. However, it is difficult to identify which failing firms are inefficient, so bankruptcy procedures may operate with error. The model shows that a pooling equilibrium may occur in which both efficient and inefficient failing firms reorganize under Chapter 11. Adding restructuring as a bankruptcy alternative appears to make things worse, since the transactions cost savings in restructuring compared to reorganization makes the inefficient equilibrium more likely to occur.

1. Introduction

Chapter 11, the U.S. procedure for rehabilitating failing firms, has come under attack recently. Critics claim that its high costs drain troubled firms of resources, that it saves some firms that ought to shut down, and that it fails to save many of the firms that attempt to use it. Despite Chapter 11's favorable treatment of failing firms, two recent studies suggest that only 6 to 12 percent of firms that file under it are still in operation when the bankruptcy process is over. Perhaps due to these failings, out-of-court debt restructurings are becoming more popular as an alternative to Chapter 11, but less than half of all firms that attempt to restructure are able to avoid a bankruptcy filing.[1]

I am grateful to Barry Adler, David Brown, Avery Katz, Steve Salant, Larry Weiss, the referees, and particularly to Howard Chang and Alan Schwartz for helpful comments and discussion. Previous versions of the paper were presented at seminars at the Universities of Bonn, Chicago, Florida, Michigan, Munich, Tilburg, and Wisconsin. Parts of the paper were written while I was a visitor at the Center for Economic Research at KUB, Tilburg, the Netherlands, and at the Center for the Study of the Economy and the State at the University of Chicago.

1. See Flynn (1989) and Jensen-Conklin (1992) for data and Bradley and Rosenzweig (1992) and Weiss (1992) for criticisms of Chapter 11. The Flynn and Jensen-Conklin data are for all firms that file under Chapter 11, not just large firms.

In this article, I present a model of why things go wrong in Chapter 11. The model assumes that there are two types of firms in financial distress: those that should liquidate since they are economically inefficient and those that should remain in operation since they are economically efficient. From an efficiency standpoint, the goal of corporate bankruptcy procedure is to shut down the former while saving the latter—that is, to filter out inefficient firms. In the U.S., Chapter 7 is intended to liquidate economically inefficient firms in bankruptcy, while Chapter 11 is designed to allow firms that are economically efficient despite their financial distress an opportunity to be saved by reorganizing in bankruptcy. However, it is difficult to identify which firms are which. As a result, bankruptcy procedures operate with error: Type I error occurs if inefficient firms are saved in Chapter 11, while Type II error occurs if efficient firms shut down in Chapter 7. The dilemma in bankruptcy is that, given imperfect information, it may be impossible to save all efficient failing firms and also shut down all inefficient failing firms. Any policy designed to shut down inefficient failing firms will also shut down some efficient but failing firms. And any policy designed to save efficient but failing firms will also save some inefficient firms.

In the article I present a game theoretic model of the bankruptcy process that explores the filtering properties of the combined U.S. Chapter 7/Chapter 11 bankruptcy policy. Managers of failing firms have the right to choose between filing under Chapter 7 or Chapter 11. Managers are assumed to know whether their firms are efficient or inefficient, but creditors do not. There are two possible outcomes: perfect filtering and filtering failure. Perfect filtering occurs if there is a separating equilibrium under which all efficient firms file under Chapter 11 and all inefficient firms file under Chapter 7. Filtering failure occurs if there is a pooling equilibrium under which some or all inefficient firms file under Chapter 11 along with the efficient firms. Filtering failure may occur because efficient firms benefit from appearing to be less efficient than they actually are and inefficient firms benefit from appearing to be more efficient than they actually are. Efficient firms benefit from appearing to be inefficient since this allows them to pay less to creditors in reorganization; inefficient firms benefit from appearing to be efficient since this allows them to obtain the benefits of reorganizing. The model is also extended to consider the filtering properties of out-of-court debt restructurings (workouts).

Section 2 of the paper describes two types of failing firms: efficient versus inefficient. It also considers the deadweight costs of bankruptcy and the costs of Type I and Type II error in bankruptcy. In Section 3, the model of filtering failure in bankruptcy is presented, starting with an example. Section 4 extends the model to consider out-of-court debt restructurings. Section 5 discusses public policy implications of the analysis.

2. Inefficient and Efficient Failing Firms and the Cost of Bankruptcy Error

Failing firms can be divided into two broad categories: economically inefficient firms that should shut down versus economically efficient firms that should continue to operate.

2.1 Inefficient Failing Firms

Firms that are economically inefficient as well as having financial difficulties are referred to as *inefficient failing firms*, or *IF* firms. Figure 1 illustrates the characteristics of what I assume to be a typical *IF* firm. The firm's revenues at time t, denoted $R(t)$, are declining over time, perhaps because its technology is becoming outmoded or its product is going out of style. The firm's alternate net revenues $A(t)$ indicate what its revenues would be if its capital were invested in the best alternate use, net of the cost of conversion. The firm's expenses at time t are denoted $E(t)$. They include the costs of wages and materials, tax liabilities, and interest and principal payments. For simplicity, expenses are assumed to be constant over time and are assumed to be the same under either the existing or the alternate use of the firm's capital. At approximately time t_1, the firm begins to lose money. At time t_2, it becomes economically efficient for the firm to either convert to the alternate use or shut down and be liquidated, in which case its assets will be sold and the new owners will presumably make the conversion.

As an example, suppose the firm is a chain of Mexican restaurants, when the latest restaurant fad is Jamaican cuisine. $R(t)$ represents the firm's revenues as a restaurant chain with a Mexican theme, while $A(t)$ represents revenues were the restaurant to have a Jamaican theme, net of the cost of conversion. Since the conversion is profitable, in general we expect the firm's existing managers to undertake it. However, in some cases managers will not invest, perhaps because their human capital is unsuited to operating the firm in its new use (the managers may be Mexican food specialists) or because the managers are unable to borrow funds to finance the conversion. Lenders may be unwilling to lend, particularly on an unsecured basis, because their claims would rank behind those of existing creditors and would be very risky.[2]

Suppose for the moment that the only bankruptcy procedure is liquidation under Chapter 7.[3] Under Chapter 7, the bankruptcy judge appoints a trustee who displaces managers, the trustee shuts the firm down if it has not shut down already, the trustee locates and sells whatever assets of the firm are worth selling, and the proceeds are paid to creditors according to the absolute priority rule. If managers of an *IF* firm do not invest in a conversion, then suppose the firm files for bankruptcy under Chapter 7 and shuts down at time t_3 in Figure 1, after losses have persisted for several periods. At this point, its assets are sold and its new owners undertake the investment needed to convert to the best alternate use. For these firms, deadweight costs are incurred

2. If new loans are used to buy new equipment, then lenders can take a security interest in the equipment, which reduces the riskiness of the loan. However, in the example, new funds would be used to redecorate the restaurants and to hire a consultant to develop a new menu, creating assets that do not provide valuable collateral to a lender.

3. In theory it would be possible to sell failing firms as going concerns in Chapter 7, thus leaving the choice of whether to shut them down or continue their operations to the new owners. A number of writers, such as Baird (1986), have proposed this. But it is not the practice under current U.S. law. Many failing firms have already shut down by the time they file under Chapter 7.

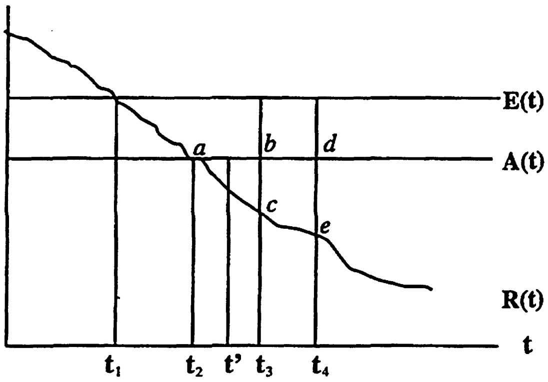

Figure 1. Characteristics of an inefficient failing (IF) Firm.

between times t_2 and t_3, since the firm is economically inefficient but continues to operate. This cost is the area between the $A(t)$ and $R(t)$ curves from time t_2 to time t_3, or the area *abc* in Figure 1. Suppose the present value of this cost as of time t_1 is denoted D_{abc}. Also suppose the present value as of time t_1 of the transactions costs of liquidation is denoted C_L. (Because different costs occur at different times, all costs are given in terms of their present values as of time t_1, which is when managers are assumed to make their strategy decisions.) The deadweight cost per firm of *IF* firms liquidating is therefore $D_{abc} + C_L$.

The specifics of the bankruptcy procedure influence the length of the interval during which Type I error occurs. Since managers lose their jobs in Chapter 7, they have an incentive to delay filing for bankruptcy as long as possible. Managers may be able to delay filing by using the firm's assets to pay current expenses. Creditors whose loans come due may be offered a security interest in some free asset of the firm in return for renewing their loans or extending new ones. This may make them willing to lend even though the firm is failing, since the collateral makes their loans less risky (Schwartz, 1981). In addition, managers can simply not pay the claims of unsecured creditors, since these creditors must sue the firm for repayment and such suits are time consuming. On the other hand, creditors have a variety of means of forcing the firm either to repay debt or to shut down, such as by initiating legal action against the firm at an early stage, repossessing their collateral, or initiating an involuntary bankruptcy filing.[4] In general, managers' ability to delay filing for bankruptcy depends on how vigilant creditors are

4. See Scott (1986) for discussion of the role of creditors who take floating liens on the firm's inventory and accounts receivable in monitoring the firm's financial condition and deciding when to repossess their collateral.

in monitoring the firm and how quickly they take action against it when it begins to fail.[5]

Now suppose that reorganization in bankruptcy exists. (Details of the reorganization procedure are discussed below.) Suppose that if *IF* firms file under Chapter 11, they are saved, but only temporarily, because the bankruptcy filing does not alter the fact that they are economically inefficient. Assume that if *IF* firms reorganize successfully, they continue to operate until time t_4 in Figure 1, where $t_4 > t_3$. In this case the deadweight cost per firm of *IF* firms reorganizing under Chapter 11 is the area between the $A(t)$ and $R(t)$ curves from time t_2 to time t_4, or *ade* in Figure 1. Suppose the present value as of time t_1 of this cost is denoted D_{ade}. In addition, *IF* firms that file to reorganize incur two sets of transactions costs: that of reorganizing initially and that of liquidating at time t_4. Suppose the present value as of time t_1 of the costs of reorganization is denoted C_R. Thus the deadweight cost of reorganizing an *IF* firm is $D_{ade} + C_R + C_L$. The cost of Type I bankruptcy error is the difference between the deadweight costs of liquidating versus reorganizing an *IF* firm, or $D_{bced} + C_R$, where $D_{bced} = D_{ade} - D_{abc}$. In economic terms, the cost of Type I bankruptcy error is economic stagnation: inefficient firms remain in operation longer under Chapter 11 than they would under Chapter 7, tying up resources that would otherwise move to higher value uses.

2.2 Efficient Failing Firms

Firms that are economically efficient despite their financial difficulties are referred to as *efficient failing firms* or *EF* firms. Consider a typical *EF* firm situation, shown in Figure 2. Here revenues $R(t)$ are constant rather than declining. Alternate net revenues are again $A(t)$ and, again, expenses $E(t)$ are assumed to be the same under both the existing and the alternate use of the firm's capital. The firm's variable costs, which are also assumed to be constant, are $V(t)$. The firm is economically efficient, since revenues exceed alternate net revenues $A(t)$, but it is in financial difficulties because revenues are less than expenses $E(t)$. Firms of this type should continue to operate because their capital has no higher value use and their revenues exceed variable costs. But their expenses are high, so they make losses. Examples might include firms that were subject to takeovers financed with large junk bond issues or firms whose capital is very specialized. Suppose the firm in Figure 2 shuts down at time t_3. The shutdown could occur as part of a Chapter 7 bankruptcy filing or it could occur under Chapter 11 because negotiations over the reorganization plan fail. The resulting deadweight cost depends on what happens after the shutdown. Suppose a new owner buys the firm's assets and

5. Bankruptcy law in the U.S. discourages creditors from initiating involuntary bankruptcies; in 1981, only 0.2 percent of Chapter 11 bankruptcy filings were involuntary (see Administrative Office of the U.S. Courts, 1981: Tables F2A and F2B). However, many bankruptcy filings are voluntary in name only, since managers file for bankruptcy just ahead of creditors who would otherwise force the firm to shut down.

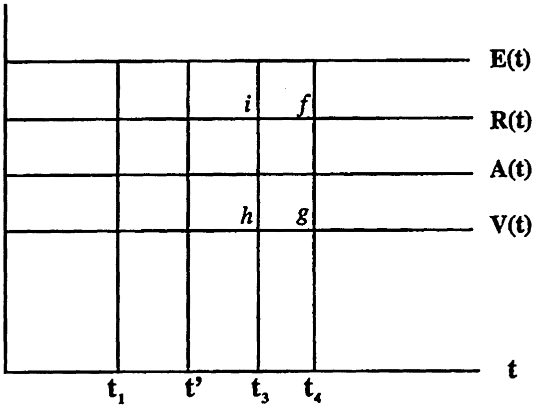

Figure 2. Characteristics of an efficient failing (EF) Firm.

reopens the firm at time t_4 in Figure 2. Then the deadweight cost of liquidation is the transactions cost C_L plus the value of lost production, which equals the area between the $R(t)$ and the $V(t)$ curves from time t_3 to t_4, or *fghi* in Figure 2. Suppose the present value of this amount as of time t_1 is denoted D_{fghi}. Alternately, suppose the firm files for bankruptcy under Chapter 11 and adopts a reorganization plan which makes it profitable in the future. In this case the deadweight cost per firm of reorganization is just the transactions cost, C_R. The cost of Type II bankruptcy error when an *EF* firm liquidates is the difference between these two deadweight costs, or $D_{fghi} + C_L - C_R$.

The cost of Type II bankruptcy error thus depends on how long it takes for an *EF* firm that liquidates in bankruptcy to be reopened. One view is that the costs of shutting down and reopening the firm are low, so the period of shutdown would be short. The alternate view is that transactions costs are high, because shutting a firm down disrupts the nexus of relationships between the firm and its suppliers and customers. Also, specialized training is lost when workers take other jobs. Under this view, *EF* firms are unlikely to reopen once they shut down, so the cost of Type II error is high.[6]

2.3 Comparison of *IF* versus *EF* Firms

Inefficient failing firms (IF firms), characterized in Figure 1, give rise to Type I error in bankruptcy, since they continue to operate when it is economically efficient for them to shut down. Efficient failing firms (EF firms), characterized in Figure 2, give rise to Type II error in bankruptcy if they shut down, since it is economically efficient for them to continue operating. Clearly, the cases depicted in Figures 1 and 2 do not exhaust all possible failing firm types. In addition, it is not strictly true that only *IF* firms give rise to Type I

6. See Williamson (1975) for discussion of the high-cost view.

bankruptcy error and only *EF* firms give rise to Type II bankruptcy error.[7] But taking account of these possibilities would not change the model in the next section.

One distinction between *IF* and *EF* firms concerns the role of debt. Higher debt means higher expenses and vice versa. For *IF* firms, the higher is $E(t)$, the earlier these firms begin to experience losses and financial distress. Assume that firms shut down after a few periods of financial distress. This means that the higher is $E(t)$, the earlier *IF* firms shut down and the lower the cost of Type I bankruptcy error. On the other hand, higher expenses for *EF* firms have the opposite effect. In Figure 2, the higher is $E(t)$, the higher are firms' losses and the more likely they are to shut down. Thus higher debt is associated with a higher probability of Type II bankruptcy error occurring. This means that for *IF* firms, higher debt has a social benefit in addition to its effect on the firm, since it reduces Type I bankruptcy error; while for *EF* firms, higher debt has a social cost in addition to its effect on the firm, since it increases Type II error. For both types of firms, the optimal level of debt would be the level that causes $E(t)$ to equal $A(t)$. In this case, paying the firm's expenses would force its managers to take into account the social cost of tying up the firm's capital in its current use.[8]

An important point concerning failing firms is that whether they are economically efficient or inefficient is difficult to observe. The crucial distinction between them is that *IF* firms' revenues are less than their alternate net revenues and will remain so in the future; while *EF* firms' revenues are greater than their alternate net revenues and will remain so in the future. But future revenues and alternate net revenues are unobservable for both types of firms. What can be observed are firms' financial records, and here *EF* and *IF* firms look alike, because both are making losses. Thus there is likely to be genuine uncertainty concerning a failing firm's type. In the model discussed below, I assume that managers know whether their firms are *IF* or *EF*, but creditors do not. Since managers control the flow of information to creditors, they can pass on information that supports their position and hold back information that undermines their position, so long as they comply with formal disclosure rules. Further, a bankruptcy filing by the firm does little to clarify the situation if managers remain in control.

3. A Model of Filtering in Bankruptcy

In this section I develop a game theoretic model of bankruptcy that determines whether Type I bankruptcy errors or not. The model is first illustrated with an example.

---

7. As an example, the firm in Figure 1 could give rise to Type II bankruptcy error if it shut down before time t_2. But this seems unlikely under U.S. bankruptcy rules.

8. The finance literature has discussed a number of related roles played by debt, such as managers bonding themselves to pay out the firm's earnings rather than retain the earnings (Jensen, 1986) and managers signaling that the firm has a valuable investment opportunity by issuing debt rather than equity to finance it (Myers and Majluf, 1984).

3.1 An Example

The example is shown in Figure 3. At the top, a chance event (N, or Nature) determines whether failing firms are *EF* or *IF*, where all firms of each type are assumed to be identical. The probability that failing firms are *EF* is .4.[9] The top left node shows the decision made by managers of *EF* firms. I assume that they always file under Chapter 11 rather than Chapter 7, because under Chapter 11 they remain in control of a potentially viable firm, whereas under Chapter 7 the firm is liquidated and they lose their jobs. Once in Chapter 11, they must choose between offering a reorganization plan that involves a high payment to creditors or a plan that involves a low payment to creditors. The top right node shows the decision made by managers of *IF* firms. They may file under Chapter 11 and offer either a low- or a high-payment reorganization plan or avoid bankruptcy as long as possible and file eventually under Chapter 7. However I assume that managers of *IF* firms always find it more favorable to file under Chapter 7 than to offer high-payment plans under Chapter 11.

Creditors are all assumed to be identical. They know the characteristics of both *EF* and *IF* firms, but they cannot tell whether individual firms are *EF* or *IF*. Now suppose managers offer high-payment reorganization plans. Since managers of *IF* firms never offer high-payment plans, creditors learn that all firms making these offers are *EF*. I assume that creditors always accept high-payment plans (see below for discussion). Now suppose that managers offer low-payment reorganization plans. Then creditors must decide whether to accept or reject without knowing the firm's type (their decision is shown by the two central nodes connected by the dashed line). If creditors accept low-payment plans, then the plans go into effect and the game ends. If creditors reject low-payment plans, then I assume that managers are replaced and firms are offered for sale as going concerns on the open market. Creditors receive the proceeds of sale net of costs. If the firm is *EF*, then I assume that the proceeds of sale are higher and creditors receive more than if the firm is *IF*. Finally, if *IF* managers file under Chapter 7, then creditors have no decision to make.

Figure 3 shows the payoffs to managers and creditors, respectively, in parentheses at each terminal node in the game. Consider first the managers of *EF* firms. They receive 3 with certainty if they offer high-payment plans, but they gamble if they offer low-payment plans, since they receive 4 if creditors accept but only 2 if creditors reject. Now consider managers of *IF* firms. They receive 1 with certainty if they choose Chapter 7 and <1 with certainty if they offer high-payment plans under Chapter 11, so they always prefer the former to the latter. But they gamble if they offer low-payment plans under Chapter 11, since they receive 2 if creditors accept but only .5 if creditors reject. (The

9. Other models have considered the possibility that the bankruptcy system could itself affect the probability of firms being efficient versus inefficient. See Aghion, Hart, and Moore (1992); Bebchuk (1991); and Gertner and Picker (1992) for discussion of the effects of bankruptcy procedures on managers' investment behavior.

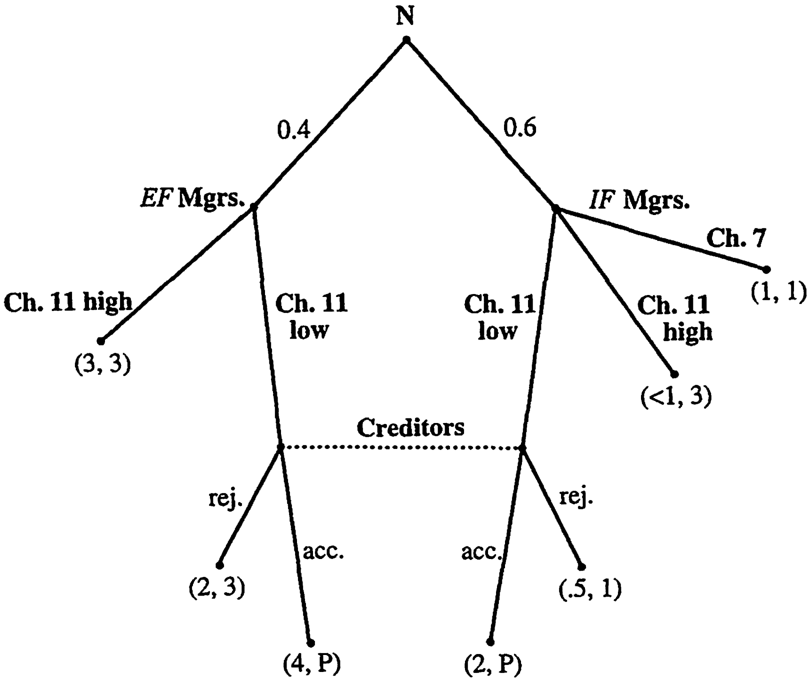

Figure 3. The bankruptcy game: an example.

payoffs of 2 and .5 to managers of *EF* and *IF* firms, respectively, when creditors reject low-payment plans represent the values to managers of running these firms until the plan is rejected.) Finally, consider the creditors. If managers of *IF* firms liquidate under Chapter 7, then the creditors' payoff is 1. If managers offer high-payment plans under Chapter 11, then the creditors' payoff is 3. Now suppose managers offer low-payment plans. Creditors receive a certain payoff of *P* if they accept. But they gamble if they reject, since they receive 3 if the firm turns out to be *EF*, but only 1 if the firm turns out to be *IF*.

The solution to the game shown in Figure 3 is a pure pooling equilibrium. Creditors' expected return if they reject low-payment reorganization plans is $.4(3) + .6(1) = 1.8$.[10] Therefore they always accept these plans as long as the low-payment amount *P* exceeds 1.8. But if creditors always accept low-payment plans, then managers always choose to offer them. Managers of *EF* firms offer low-payment plans since their payoff of 4 when creditors accept these plans exceeds their payoff of 3 if they offer high-payment plans. And managers of *IF* firms offer low-payment plans since their payoff of 2 when creditors accept these plans exceeds their payoff of 1 if they file under Chapter

10. All parties are assumed to be risk neutral.

7. This type of equilibrium—referred to as a *filtering failure equilibrium*—is economically inefficient because *IF* firms reorganize under Chapter 11 when they should liquidate under Chapter 7.[11] The pooling equilibrium occurs because managers of both types of firm benefit when creditors cannot distinguish between them: managers of *EF* firms benefit because creditors accept a lower payment in reorganization than they would be willing to accept if they knew that the firm were *EF;* while managers of *IF* firms benefit because they are able to reorganize in the first place.

However if we change the example in Figure 3 slightly, a separating equilibrium results. Suppose the probability that failing firms are *EF* rises from .4 to .6. Now creditors' expected return if they reject low-payment plans is .6(3) + .4(1) = 2.2, while their return if they accept low-payment plans is *P*. Therefore it is in the creditors' interest to reject these plans unless *P* exceeds 2.2. But since *P* cannot take such a high value (see note 11), creditors always reject low-payment plans. Therefore managers of *EF* firms never offer low-payment plans since their payoff of 3 if they offer high-payment plans exceeds their payoff of 2 if they offer low-payment plans that creditors reject. And managers of *IF* firms never offer low-payment plans since their payoff of 1 if they file under Chapter 7 exceeds their payoff of .5 if they offer low-payment plans that creditors reject. As a result, managers never offer low-payment Chapter 11 plans. This type of equilibrium—referred to as a *perfect filtering equilibrium*—is the best that can occur in bankruptcy from the standpoint of economic efficiency, since all *IF* firms liquidate under Chapter 7 while all *EF* firms have the opportunity to be saved in Chapter 11.

Turn now to the formal model on which this example is based. Although the model is fairly stylized, I argue below that it incorporates many—although not all—of the important features of U.S. bankruptcy law. The next three subsections discuss the decisions of managers of *EF* firms, managers of *IF* firms, and creditors; the last subsection discusses results. Figure 4 shows the general model.[12]

3.2 Managers of *EF* Firms

Managers of *EF* firms have the right to choose between filing under Chapter 11 or Chapter 7, but I assume that they always choose Chapter 11 since it leaves them in control of firms that are viable despite their financial distress.

11. An additional condition on *P*, that $P < 2$, results from the fact that managers of both types of firm must prefer to offer low-payment plans under Chapter 11 than to pursue their alternate strategies (see note 24 below). Any value of *P* greater than 1.8 and less than 2 is consistent with a pure pooling equilibrium.

12. There are several other studies that use the assumption of imperfect information to explore aspects of the bankruptcy process, but they focus on other questions. Giammarino (1989) examines when firms may rationally choose to incur high bankruptcy costs, and Bebchuk (1991) and Gertner and Picker (1992) examine the efficiency of investment incentives by managers given bankruptcy. There are also several game theory models of bankruptcy that focus on how the value of the firm in reorganization or restructuring is divided between managers and creditors (see Brown, 1989; Baird and Picker, 1991; Bebchuk and Chang, 1992; and Schwartz, 1993).

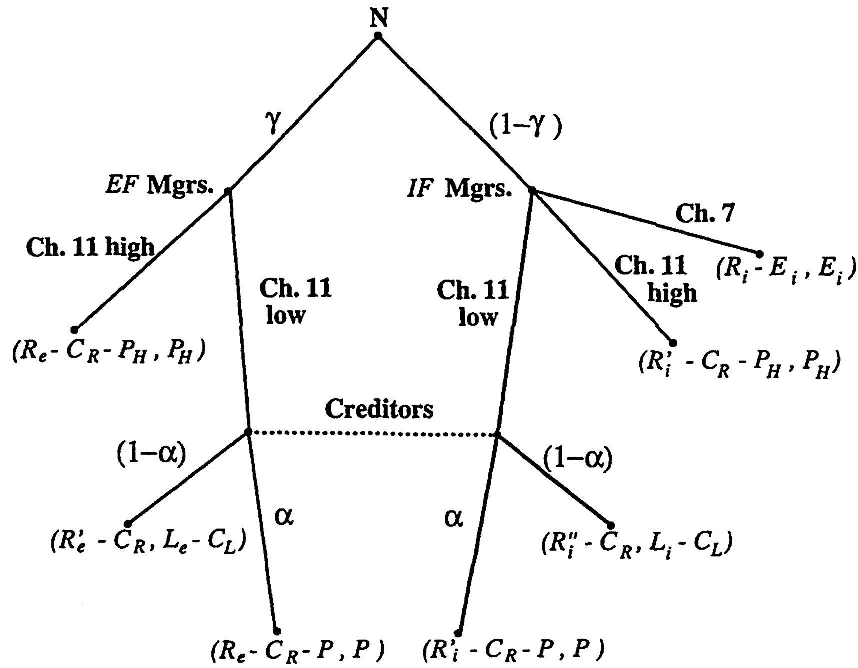

Figure 4. The bankruptcy game: general model.

They make their decisions as of time t_1 in Figure 2. Once in Chapter 11, managers have the exclusive right to offer a reorganization plan. In deciding what type of plan to offer, managers are assumed to maximize the present value of resources under their control while they remain in charge.[13]

One possibility is that managers offer a reorganization plan that involves a high payment to creditors. Define P_H to equal the value of the high-payment amount evaluated as of time t_1. (As in the previous section, all variables are given in terms of their present value as of time t_1.) Assume that P_H is paid in the form of a lump sum at the time the plan is approved. P_H is determined exogenously and equals the minimum amount that creditors would accept if they knew that the firm making the offer were *EF*. Thus when high-payment reorganization plans are offered, creditors always accept them. The value of P_H reflects the bargaining rules prevailing in Chapter 11, such as the manag-

13. In making the bankruptcy decision, managers are assumed to act in their own interests rather than in the interest of equity. However, managers' interests are still generally aligned with those of equityholders, since equity benefits when the firm is saved, and managers wish to save the firm—and their own jobs—as long as possible. It might be argued that the managers' interest in this situation is to leave the firm. However, if one set of managers leaves, then the new managers still have an incentive to behave as hypothesized here.

ers' exclusive right to offer the reorganization plan and their ability to delay offering their plan by obtaining extensions of the exclusivity period.

Define R_e to be the present value as of time t_1 of future revenues of *EF* firms, assuming that the managers' reorganization plan is adopted and they remain in control indefinitely. Thus R_e equals the value of the area under the $R(t)$ curve in Figure 2 from time t_1 onward. R_e includes the value of any subsidies that firms in Chapter 11 might receive from the government during reorganization.[14] Firms filing under Chapter 11 must pay the transactions costs of reorganizing. Since creditors always accept high-payment reorganization plans, managers' and creditors' payoffs when high-payment reorganization plans are offered are, respectively, $R_e - C_R - P_H$ and P_H, where $R_e - C_R - P_H > 0$.

Alternatively, managers of *EF* firms might offer reorganization plans involving payoffs lower than P_H because of the possibility of pooling with *IF* firms. The low payoff amount is denoted P, where $P < P_H$. Like P_H, P is paid in the form of a lump sum at the time the plan is approved. Unlike P_H, P is determined endogenously and can take a range of values. If creditors accept low-payment reorganization plans, they receive P and managers receive $R_e - C_R - P$. Now suppose that creditors reject low-payment plans. In this case managers will be displaced, and the displacement is assumed to occur at time t' in Figure 2. Define R_e' to be the present value as of time t_1 of future revenues of *EF* firms from time t_1 to t', or the value of the area under the $R(t)$ curve in Figure 2 from t_1 to t'.[15] R_e', like R_e, includes the value of any subsidies that firms in Chapter 11 might receive from the government, although the relevant time period is shorter. When managers are displaced, I assume that the firm is sold on the open market as a going concern, still in Chapter 11. The sale proceeds net of transactions costs, evaluated as of time t_1, are assumed to be $L_e - C_L$. Therefore when creditors reject low-payment plans, the managers' payoff is $R_e' - C_R$, where $R_e' - C_R > 0$, and the creditors' payoff is $L_e - C_L$. Since managers are assumed to gamble when they offer low-payment reorganization plans, $R_e' - C_R < R_e - C_R - P_H < R_e - C_R - P$.

The structure of the model reflects the fact that in most Chapter 11 reorganizations, creditors never have an opportunity to offer a reorganization plan. This is because bankruptcy judges extend the exclusivity period either until

14. One substantial government subsidy that some firms receive when they file for bankruptcy is that the Pension Benefit Guaranty Corporation (PBGC)—a government agency—takes over their pension plans, which are likely to be underfunded. This has particularly benefited firms in the airline and steel industries. (Pension funds are also transferred to the PBGC when firms file under Chapter 7, but in that case managers do not benefit.) Firms also receive various tax benefits from filing under Chapter 11, including—subject to a number of conditions—keeping their accumulated net operating loss carryforwards and not being liable for taxes on cancellation of indebtedness under the reorganization plan. See White (1994b) for estimates of the size of these subsidies.

15. Note that if *EF* firms shut down, the shutdown is assumed to occur at t_3, after managers are displaced.

the managers' plan is accepted or until the firm is sold on the open market. Note that regardless what type of plan managers offer, they have an incentive to delay making the offer as long as possible, because delay reduces the creditors' payoff and increases that of managers.

Now consider the strategy of managers of *EF* firms. Creditors are assumed to accept low-payment plans with probability α, so the managers' payoff if they offer low-payment plans is $\alpha(R_e - C_R - P) + (1 - \alpha)(R'_e - C_R)$. The managers' payoff if they offer high-payment plans is $(R_e - C_R - P_H)$. Suppose *EF* managers' probability of offering low-payment plans is denoted ϱ_e. Managers follow a pure strategy of always offering low-payment plans ($\varrho_e = 1$) if

$$\alpha(R_e - C_R - P) + (1 - \alpha)(R'_e - C_R) > R_e - C_R - P_H. \tag{1}$$

Managers follow a pure strategy of offering high-payment plans ($\varrho_e = 0$) if (1) is reversed, and they follow a mixed strategy ($0 < \varrho_e < 1$) if (1) holds as an equality.[16]

3.3 Managers of *IF* Firms

Managers of *IF* firms are assumed to maximize the present value of resources under their control while the firm remains in operation. They make their strategy decisions as of time t_1 in Figure 1. Suppose first that they choose to remain out of bankruptcy as long as possible and to file under Chapter 7 at time t_3 in Figure 1, at which point the firm shuts down. The value as of time t_1 of the firm's future revenues is the area under the $R(t)$ curve from t_1 to t_3, plus the value of the firm's free assets (since assets can be used to pay creditors). This amount is denoted R_i. Define E_i to be the present value at time t_1 of the minimum amount that managers can pay creditors consistent with remaining out of bankruptcy until t_3. E_i is less than the area under the $E(t)$ curve in Figure 1 from time t_1 to t_3, since managers of failing firms do not pay all of the firm's liabilities in full. Thus managers' payoff under the strategy of filing for Chapter 7, evaluated at time t_1, is $R_i - E_i$, where $R_i - E_i > 0$. Creditors' payoff under this strategy, also evaluated at time t_1, is E_i. Note that creditors receive all of their payoff before the firm files for bankruptcy. Because managers are assumed to use up many of the firm's assets before filing under Chapter 7, all remaining assets after the filing are used to pay transactions costs.[17]

Managers may instead file under Chapter 11, in which case they may offer either high-payment or low-payment reorganization plans. Consider low-payment plans first and suppose creditors accept these plans. In that case, managers are assumed to remain in charge and the firm continues to operate. But since the firm is *IF*, it is assumed to shut down at time t_4 in Figure 1,

16. I ignore the possibility that managers might mix over different values of P.

17. See White (1989) for data on firms filing under Chapter 7 which suggests that these firms are essentially shells that have been stripped of their assets before filing.

despite having successfully reorganized under Chapter 11. Define R_i' to be the present value as of time t_1 of the firm's future revenues until time t_4, or the area under the $R(t)$ curve in Figure 1 from t_1 to t_4. R_i' exceeds R_i both because filing under Chapter 11 improves the firm's financial situation, so that it remains in operation longer, and because firms in Chapter 11 may receive subsidies from the government. Managers' payoff if creditors accept low-payment plans is $R_i' - C_R - P$ and creditors' payoff is P.

Now suppose managers offer low-payment plans but creditors reject. Then managers are displaced and the bankruptcy judge orders that the firm be offered for sale as a going concern. Suppose managers are displaced at time t' in Figure 1, where t' occurs earlier than t_4 but may be either earlier or later than t_3. Also suppose that R_i'' equals the present value as of time t_1 of the firm's future revenues from t_1 to t'. The managers' payoff when they file under Chapter 11 and offer a reorganization plan that creditors reject is $R_i'' - C_R$. I assume that $R_i'' - C_R$ is less than the managers' payoff when they remain out of bankruptcy and file eventually under Chapter 7, so that $R_i'' - C_R < R_i - E_i$. This may be either because time t' occurs before time t_3, so that the managers' period of control is shorter when they file under Chapter 11, or because the opportunities for managers to appropriate assets are reduced in Chapter 11, since the bankruptcy judge must approve any actions by managers that are out of the ordinary course of business. Now turn to the creditors' payoff. When creditors reject low-payment reorganization plans, the firms are sold on the open market as going concerns. Suppose the sale value of an *IF* firm, evaluated as of time t_1, is L_i. The creditors' payoff is therefore $L_i - C_L$.

Thus when creditors reject low-payment reorganization plans, managers are displaced and firms are sold on the open market. *IF* firms sell for L_i and *EF* firms sell for L_e. Assume that $L_i \neq L_e$, so that creditors learn the firm's type. There are two ways in which information could be revealed. First, creditors could learn the firm's type because the official (trustee or examiner) appointed by the bankruptcy judge to oversee the sale makes more information available than the managers did. Second, creditors could acquire information from the sale itself. Buyers, having their own money at stake, have an incentive to devote resources to investigating the firm, the industry, and alternate uses of the firm's assets. Buyers have a stronger incentive than creditors to devote resources to the investigation, since their interest in the firm (if they buy it) is greater than that of most creditors and, unlike creditors, they do not face free-rider problems. Buyers are assumed to be willing to pay more for *EF* than *IF* firms, because buyers are likely to continue operating *EF* firms indefinitely, while they are likely to shut down *IF* firms in the near future. Thus, $L_i < L_e$.[18]

Finally consider the possibility that managers offer high-payment plans. The high-payment amount P_H was assumed above to equal the minimum

18. Bidders may make mistakes in identifying the firm's type, so that information revelation could be incomplete even when firms are sold on the open market. This possibility, which is not considered in the model, would mean that even a separating equilibrium is not completely efficient.

amount that creditors would accept if they knew that the firm making the offer was EF. Suppose P_H is high enough that managers of IF firms prefer the Chapter 7 option over offering high-payment plans under chapter 11, that is, $R_i' - C_R - P_H < R_i - E_i$. Therefore managers of IF firms never choose to offer high-payment plans under Chapter 11. As already noted, this means that when a high-payment plan is offered, creditors learn that the firm making the offer is EF.[19]

Now consider the strategy of managers of IF firms. They choose between offering low-payment Chapter 11 plans or filing eventually under Chapter 7. Offering low-payment reorganization plans is assumed to be a gamble: managers are better off doing so than filing under Chapter 7 if creditors accept and worse off doing so than filing under Chapter 7 if creditors reject. This implies that $R_i'' - C_R < R_i - E_i < R_i' - C_R - P$. The first inequality also implies that

$$(R_i' - R_i) + (E_i - P) > C_R. \tag{2}$$

The first term in (2) is the increase in the firm's revenues under Chapter 11 relative to Chapter 7, assuming that a low-payment reorganization plan is accepted. The increase includes both the extra revenues from the firm operating longer and the value of government subsidies to firms in Chapter 11, if any. The second term is the difference, evaluated as of t_1, between what the firm pays creditors under Chapter 7 versus what it pays creditors when they accept a low-payment reorganization plan. Assuming that $(E_i - P)$ is positive, it measures the value of subsidies that firms in Chapter 11 receive from creditors. P is likely to be less than E_i because of provisions that favor managers of firms in Chapter 11, such as the right of managers to retain secured creditors' collateral, to offer superpriority to a new lender, and to delay offering a reorganization plan. The condition for managers of IF firms to file under Chapter 11 rather than Chapter 7 (assuming that their plans are accepted) is that the sum of revenue increases in Chapter 11 plus subsidies from creditors in Chapter 11 exceed the transactions costs of reorganizing. Note that if the revenue increase term in (2) is high enough, then managers may choose to file under Chapter 11 even if subsidies from creditors are negative. But if the revenue increase term in (2) is zero or negative, then managers file under Chapter 11 only if subsidies from creditors are positive.

Since creditors accept low-payment plans with probability α, managers' expected return from offering low-payment plans is $\alpha(R_i' - C_R - P) + (1 - \alpha)(R_i'' - C_R)$. Suppose IF managers' probability of offering low-payment plans is denoted ϱ_i. Managers follow a pure strategy of offering low-payment plans ($\varrho_i = 1$) if their expected return under this alternative exceeds their return when they file under Chapter 7, or

$$\alpha(R_i' - C_R - P) + (1 - \alpha)(R_i'' - C_R) > R_i - E_i. \tag{3}$$

19. Without this assumption or some alternative assumption, there would be no separating equilibrium in the model, since managers of IF firms would always file under Chapter 11. (An alternative assumption having the same effect would be that the costs of reorganization C_R are very high.)

They follow a pure strategy of always filing under Chapter 7 ($\varrho_i = 0$) if (3) is reversed, and they follow a mixed strategy ($0 < \varrho_i < 1$) if (3) holds as an equality.

3.4 Creditors

Now consider creditors. Creditors are all assumed to be identical.[20] Their only choice is whether to accept or reject low-payment plans and they must make this decision without knowing the firm's type. If they accept, then their payoff is P. If they reject, then they receive $L_e - C_L$ if the firm is *EF* or $L_i - C_L$ if it is *IF*. We have already assumed that $L_e > L_i$. Assume also that $P > L_i - C_L$ and that $P < L_e - C_L$. The first assumption is necessary for creditors ever to accept low-payment plans (since they must receive more when they accept than their minimum payoff when they reject), and the second assumption is necessary for creditors ever to reject low-payment plans. Together these assumptions imply that creditors gamble when they reject low-payment plans.

Since managers know whether their firms are *IF* or *EF*, creditors gain information from whether managers choose to offer low-payment plans. Suppose γ denotes the unconditional probability that a failing firm is *EF* and γ' denotes the probability that a failing firm is *EF* conditional on managers offering a low-payment reorganization plan. Creditors know γ and they use Bayes' law to update their beliefs concerning γ'. Thus,

$$\gamma' = \frac{\varrho_e \gamma}{\varrho_e \gamma + \varrho_i (1 - \gamma)}. \tag{4}$$

Creditors' return when they accept low-payment plans is P, and their return when they reject low-payment plans is $\gamma'(L_e - C_L) + (1 - \gamma')(L_i - C_L)$. Using these expressions and Equation (4), we find that creditors prefer to follow a pure strategy of accepting low-payment plans ($\alpha = 1$) if

$$P > \frac{\varrho_e \gamma (L_e - C_L) + \varrho_i (1 - \gamma)(L_i - C_L)}{\varrho_e \gamma + \varrho_i (1 - \gamma)}, \tag{5}$$

and they prefer to follow a pure strategy of rejecting low-payment plans ($\alpha = 0$) if (5) is reversed. Creditors follow a mixed strategy ($0 < \alpha < 1$) if (5) holds as an equality.

Finally, consider the information structure of the game. All *IF* and all *EF* firms are assumed to be identical and their characteristics are assumed to be known to all parties. Therefore R_i, R_i', R_i'', E_i, R_e, R_e', C_R, C_L, L_i, L_e, P_H, and γ are exogenously determined and are common knowledge. On the other hand, the low-payment amount P and the strategy choices of the three groups of players—α, ϱ_e, and ϱ_i—are endogenous. I discuss below both the range of values that P can take and the value of P that is preferred by managers.

20. The model ignores the fact that most firms have several types of creditors, who are grouped into separate classes depending on their priority and on whether they are secured.

3.5 Results

Since managers of *EF* firms, managers of *IF* firms, and creditors each have choices among two pure strategies and a mixed strategy, the model has many possible strategy combinations. Table 1 shows the nine combinations of pure and mixed strategies for managers of both types and the best response of creditors in each case.

Examine possibility 1 first. It is a separating equilibrium in which managers of *EF* firms offer only high-payment reorganization plans under Chapter 11 and managers of *IF* firms always file under Chapter 7. This requires that Inequalities (1) and (3) both be reversed. Suppose creditors never accept low-payment plans, or $\alpha = 0$. This combination of strategies is a Nash equilibrium, because if creditors never accept low-payment reorganization plans, then the best response of both types of managers is never to offer them. And if managers never offer low-payment plans, then creditors never accept them. Possibility 1 is also a perfect Bayesian equilibrium if rejecting low-payment plans is the creditors' best strategy given their beliefs. Creditors must believe that if a low-payment plan were offered, the probability is reasonably high that an *EF* firm has offered it, so they should reject it. This requires creditors to believe that $P < \gamma'(L_e - C_L) + (1 - \gamma')(L_i - C_L)$ or that $\gamma' > (P - (L_i - C_L))/(L_e - L_i)$.

There are two other possibilities that involve separation, labeled 2 and 3 in Table 1, but neither is an equilibrium. In both, all managers of *IF* firms choose Chapter 7, but managers of *EF* firms may either offer only low-payment plans or play mixed strategies. However in both, creditors learn that low-payment

Table 1. Managers' Strategy Combinations and Creditors' Best Responses

	EF Firms		
IF Firms	Low Payment	Mixed	High Payment
Chapter 7	**2** $\varrho_i = 0$ $\varrho_e = 1$ $\alpha = 0$	**3** $\varrho_i = 0$ $0 < \varrho_e < 1$ $\alpha = 0$	**1** $\varrho_i = 0$ $\varrho_e = 0$ $\alpha = 0$
Mixed	**8** $0 < \varrho_i < 1$ $\varrho_e = 1$ $0 < \alpha < 1$	**9** $0 < \varrho_i < 1$ $0 < \varrho_e < 1$ $0 < \alpha < 1$	**5** $0 < \varrho_i < 1$ $\varrho_e = 0$ $\alpha = 1$
Low payment	**6** $\varrho_i = 1$ $\varrho_e = 1$ $0 < \alpha \leq 1$	**7** $\varrho_i = 1$ $0 < \varrho_e < 1$ $0 < \alpha < 1$	**4** $\varrho_i = 1$ $\varrho_e = 0$ $\alpha = 1$

Note: The boldface numerals serve as labels for the nine strategy combinations.
$0 < \alpha \geq 1$
$0 < \varrho_i < 1$

reorganization plans are offered only by *EF* firms. Therefore their best response is always to reject these plans, so $\alpha = 0$. But if creditors never accept low-payment plans, then the best response of managers of *EF* firms is never to offer them, so ϱ_e must be zero rather than positive. This means the only possible separating equilibrium is possibility 1, where all *IF* firms file under Chapter 7 and all *EF* firms offer high-payment reorganization plans under Chapter 11.

Because creditors can identify firms' type in a separating equilibrium, such an equilibrium requires (a) that managers of *EF* firms offer high-payment plans, because creditors would reject any plans paying less than P_H; and (b) that managers of *IF* firms choose Chapter 7, because if they chose Chapter 11 instead, creditors would accept offers below P_H and then managers of *EF* firms would gain by pooling with *IF* firms. These strategies form a perfect Bayesian equilibrium if creditors' out-of-equilibrium beliefs are such that they would reject a low payment reorganization plan if a firm offered one. This requires that creditors believe that any firm offering a low payment plan is likely to be an EF firm, which means that creditors should reject the offer.[21]

Possibilities 4 and 5 in Table 1 can also be ruled out. These involve managers of *EF* firms offering only high-payment plans and managers of *IF* firms either offering only low-payment plans or playing mixed strategies. In both, creditors learn that only *IF* firms offer low-payment plans. As a result, their best response is always to accept these plans, so $\alpha = 1$. But if creditors always accept low-payment plans, then the best response of managers of *EF* firms is to offer them, so ϱ_e must be positive rather than zero.

Finally, possibilities 6–9 are all pooling or hybrid pooling equilibria involving filtering failure. For a pooling equilibrium to exist, there must exist some value of P less than $(L_e - C_L)$ and greater than $(L_i - C_L)$ such that creditors accept reorganization plans paying P with positive probability. If the probability of acceptance is high enough, then managers of *IF* firms prefer to offer these plans rather than file under Chapter 7 and managers of *EF* firms prefer to offer these plans rather than offer plans paying P_H. Because the purpose of the model is to demonstrate that a pooling equilibrium exists, I focus on the pure pooling equilibrium of possibility 6. Under possibility 6, managers of both types of firm always offer low-payment plans, but creditors may accept either some or all of these plans.[22] Assuming that creditors accept all low-payment plans ($\alpha = 1$), a condition that is both necessary and sufficient for the existence of a pooling equilibrium[23] is

21. From (1) and (3), necessary conditions for a separating equilibrium in terms of exogenous parameters are that $R_i'' - C_R < R_i - E_i$ and that $R_e' < R_e - P_H$.

22. Creditors' acceptance rate must satisfy the condition

$$1 \geq \alpha \geq \max\left[\frac{(R_e - C_R - P_H) - (R_e' - C_R)}{(R_e - C_R - P) - (R_e' - C_R)}, \frac{(R_i - E_i) - (R_i'' - C_R)}{(R_i' - C_R - P) - (R_i'' - C_R)}\right].$$

23. Conditions for the other pooling equilibria are slightly different.

$$\gamma(L_e - C_L) + (1 - \gamma)(L_i - C_L) < (R_i' - C_R) - (R_i - E_i). \tag{6}$$

Now consider what level of P managers would choose in a pure pooling equilibrium. From (6), any value of P that satisfies the condition $\gamma(L_e - C_L) + (1 - \gamma)(L_i - C_L) < P < (R_i' - C_R) - (R_i - E_i)$, where $(R_i' - C_R) - (R_i - E_i) < P_H$, will support a pure pooling equilibrium.[24] It is in the joint interest of managers of both types of firm to offer the lowest value of P that satisfies this condition. Thus managers prefer to offer a value of P, denoted P_L, that is just slightly above $\gamma(L_e - C_L) + (1 - \gamma)(L_i - C_L)$. Managers prefer P_L to any higher value of P, because higher values cost more but have no benefit, that is, they are dominated by P_L for managers of both types of firms.

The pooling equilibrium in this model involves a different pattern of deception than in many similar game theory models, since managers of both types of firm gain when pooling occurs, rather than one type of manager gaining and the other type losing.[25] Managers of *IF* firms have an incentive to claim that their firms' financial condition is better than it actually is, in order to obtain the benefits of reorganizing. Managers of *EF* firms have an incentive to claim that their firms' financial condition is worse than it actually is, in order to pay less to creditors in reorganization. Both types of managers prefer to offer low-payment reorganization plans—assuming that these plans are likely to be accepted—than to pursue their alternative strategies. As a result, managers of both types of firms have an incentive to claim that their firms are in the same financial condition.[26]

The major conclusion of the model is that a filtering failure equilibrium exists in bankruptcy, which is economically inefficient. Under the pure pooling equilibrium of possibility 6, no information concerning firms' types is revealed and all *IF* firms reorganize under Chapter 11 rather than liquidate under Chapter 7. Under the hybrid pooling equilibria of possibilities 7–9, partial information is revealed, and some but not all *IF* firms reorganize under Chapter 11. These equilibria are inefficient because some or all *IF* firms—which should liquidate in bankruptcy—instead reorganize. A perfect filtering equilibrium also exists in bankruptcy in which all firms' types are revealed. In

24. In the example in Figure 3, $R_i' - C_R - P = 2$, $R_i - E_i = 1$, and $P_H = 3$. If we substitute these expressions into the condition $R_i' - C_R - (R_i - E_i) < P_H$, we find that $P < 2$, the equilibrium condition discussed in connection with Figure 3 (see note 11).

25. In many signaling models, one type benefits from pooling while the other type benefits from separating. See Gibbons (1992:237–39) for discussion of examples such as the Spence model of job market signaling and models of entry deterrence.

26. An assumption made in the model is that payments to creditors under the low-payment reorganization plan are made as a lump sum at the time the plan goes into effect. But payments to creditors could be made instead in the form of cash installments or equity in the reorganized firm without changing the model, as long as the payments have the same present value as P. One possibility is that *EF* firms might distinguish themselves from *IF* firms by offering payment in a different form. However, as long as both types of firms benefit from pooling rather than separating, they have an incentive always to offer the same form of payment so that creditors cannot infer the firm's type from the form of payment.

this case, the outcome is economically efficient since all *EF* firms reorganize under Chapter 11 and all *IF* firms liquidate under Chapter 7.[27]

Two key factors that affect whether a filtering failure or a perfect filtering equilibrium occurs in bankruptcy are L_e and L_i—the values of *EF* and *IF* firms when sold as going concerns in Chapter 11. As either L_e or L_i rises, it becomes more likely that a separating equilibrium will occur, because creditors' expected return if they reject low-payment reorganization plans rises. Thus one way to reduce the probability of filtering failure in bankruptcy would be to sell many failing firms as going concerns in Chapter 11. This would encourage the market for bankrupt firms to become more active, which would cause values to rise. Ironically, another way to increase the probability of perfect filtering occurring is to raise C_R—the transactions costs of reorganization. Higher levels of C_R reduce the attractiveness of reorganization to *IF* firm managers and make them less likely to file under Chapter 11. Thus, in this case, higher transactions costs may increase rather than decrease efficiency.[28]

4. Filtering in Out-of-Court Debt Restructurings

An alternative to bankruptcy that has received quite a bit of attention is out-of-court debt restructuring. In a restructuring, managers and creditors of a firm in financial distress negotiate outside of bankruptcy over changes in the firm's capital structure and a reduction or delay in debt payments. If the negotiations succeed, then the firm in effect reorganizes without filing under Chapter 11. Restructurings have advantages over Chapter 11 proceedings in that they involve lower transactions costs and less disruption to the firm's operations, so resources are saved. However, restructurings have disadvantages from managers' standpoint, since the various provisions in Chapter 11 that increase managers' bargaining power vis-à-vis creditors do not apply.[29] Nonetheless, empirical evidence suggests that many managers of failing firms try the out-of-bankruptcy debt restructuring route.[30]

---

27. In a article written after this one, Gertner and Picker (1992) discuss a similar model of bankruptcy and argue that a separating equilibrium will occur in which good firms file under Chapter 11 and bad firms file under Chapter 7. However in their model, like the one here, both pooling and separating equilibria are possible. A similar issue arises in Schwartz's (1993) article on bankruptcy workouts (restructurings), in which he asks why workout negotiations often fail and argues that they fail because it is in managers' interest to make "greedy" offers that give themselves a larger share than they would be entitled to in bankruptcy. Schwartz assumes that managers know the firm's value and creditors do not, but he argues that in bargaining over a workout, managers will not underrepresent the firm's value to creditors. Thus in his model information asymmetry does not contribute to the failure of workout negotiations. However, in similar models it can be shown that information asymmetry can also cause workout negotiations to fail.

28. See White (1994b) for a simulation of the model.

29. There is no automatic stay on creditors' legal actions against the firm during restructurings, the firm remains obligated to pay interest, and there is no exclusivity period for managers. There is also no mechanism to compel a dissenting minority of creditors to agree to a proposed plan. However creditors know that managers will file under Chapter 11 if negotiations fail.

30. See Gilson (1990, 1993); Gilson, John, and Lang (1990); and Franks and Torous (1991)

The existence of debt restructuring as an alternative to Chapter 11 suggests the question of how restructurings affect the filtering properties of bankruptcy. Consider the model of the restructuring process shown in Figure 5. Here the lower portion of the game is the same as the bankruptcy game in Figure 3, but a preliminary restructuring stage has been added. Again a move of nature (N) determines whether failing firms are *EF* or *IF,* and the probability of failing firms being *EF* is .4. Initially, all managers of failing firms are assumed to propose restructurings. As in Chapter 11, creditors must vote on the restructuring proposal without knowing the firm's type. If the proposal is accepted, then it goes into effect and the game ends. In this case if the firm is *EF,* then I assume that it is saved and continues to operate indefinitely. If the firm is *IF,* then I assume that it continues to operate until time t_4 in Figure 1 and then liquidates—the same outcome as when creditors accept a reorganization plan under Chapter 11. Now suppose the managers' restructuring proposal is rejected. Since there is no bankruptcy judge to force a sale of the firm, I assume that creditors do not learn the firm's type. Therefore, managers face the same bankruptcy choices as in the model in Figure 3.

Because restructuring is assumed to save resources compared to reorganiza-

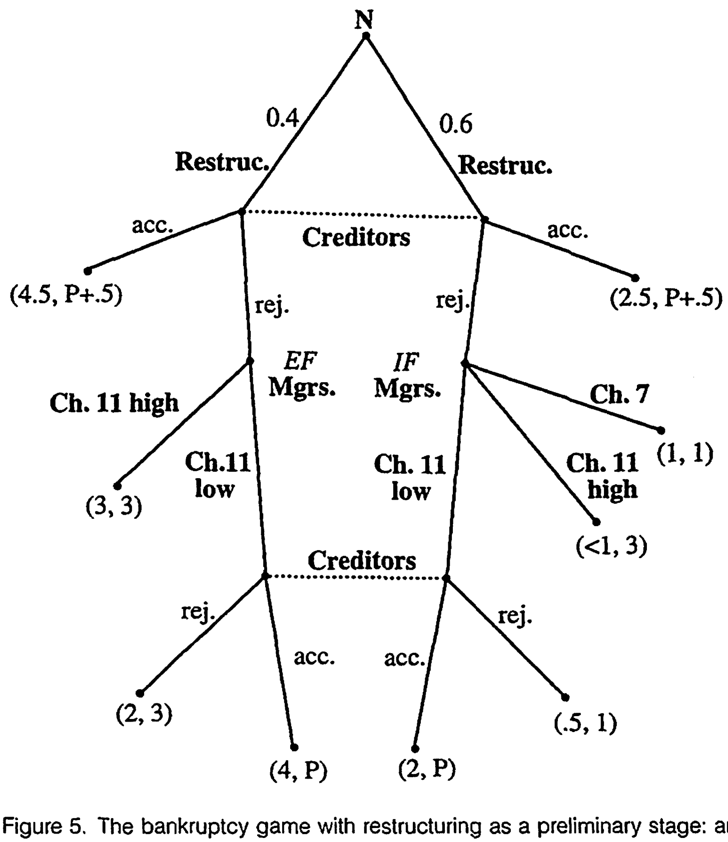

Figure 5. The bankruptcy game with restructuring as a preliminary stage: an example.

tion, I assume that the payoffs to both managers and creditors are higher if a restructuring plan is accepted than if a Chapter 11 low-payment plan is accepted. Thus in Figure 5, managers of *EF* and *IF* firms receive 4.5 and 2.5, respectively, when a restructuring plan is accepted, compared to only 4 and 2 when a low-payment reorganization plan is accepted. Similarly, creditors of *IF* and *EF* firms each receive $P + .5$ when a restructuring proposal is accepted; while they receive P when a low-payment reorganization plan is accepted.

How introducing the restructuring procedure affects the filtering properties of bankruptcy depends on the type of equilibrium that would otherwise have prevailed. Suppose $P = 1.9$,[31] so that in the absence of restructuring, there would be a pure pooling equilibrium—that is, managers always propose low-payment reorganization plans and creditors always accept. Now suppose restructuring is introduced as an option. Managers' restructuring proposals offer creditors a payoff of $1.9 + .5 = 2.4$. Creditors now accept all restructuring proposals, since their payoff in a restructuring exceeds their payoff under a low-payment reorganization plan. Thus the addition of restructuring as an alternative to bankruptcy causes the pure pooling equilibrium in which all firms reorganize under Chapter 11 to be replaced by a pure pooling equilibrium in which all firms restructure outside of bankruptcy. The addition of restructuring as an alternative to Chapter 11 merely transfers the filtering problem to an earlier stage, since all *IF* firms are still able to delay shutting down. The model also suggests that some firms that restructure successfully are *IF* firms that should shut down.

Now suppose that $\gamma = .6$, so that in the absence of restructuring, there would be a separating equilibrium in which managers of *IF* firms file under Chapter 7 and managers of *EF* firms offer high-payment plans under Chapter 11. As discussed above, there is no value of P consistent with a pooling equilibrium in bankruptcy, since creditors reject low-payment reorganization plans unless $P > 2.2$, but P cannot take values this high. Now suppose restructuring is introduced as a bankruptcy alternative and suppose managers' restructuring proposals offer creditors a payoff greater than 2.2. Then creditors accept restructuring proposals even though they would reject low-payment plans under Chapter 11. Thus introducing restructuring causes the separating equilibrium in bankruptcy to be replaced by a pure pooling equilibrium in which all firms restructure outside of bankruptcy. Filtering failure therefore replaces perfect filtering. This result occurs because the resource savings in restructuring compared to reorganization make restructuring attractive to all parties even when reorganization is not. Note, however, that the inefficiency is hidden in the restructuring equilibrium, since neither type of firm files under Chapter 11.

---

for empirical studies of firms that have attempted debt restructurings and comparisons of restructurings with Chapter 11 reorganizations. See Gertner and Scharfstein (1991); Asquith, Gertner, and Scharfstein (1991); and Schwartz (1993) for models of the restructuring process.

31. From the previous discussion of the example, P must be between 1.8 and 2.

The previous case demonstrates that the introduction of restructuring can cause a perfect filtering equilibrium in bankruptcy to be replaced by a filtering failure equilibrium at the restructuring stage. However, the opposite cannot occur: if there is filtering failure at the bankruptcy stage, it cannot be replaced by perfect filtering at the restructuring stage. For a pure pooling equilibrium to occur in Chapter 11, creditors must accept all Chapter 11 low-payment plans, which requires that $P > 3\gamma + (1 - \gamma)$. But in this case, creditors would also accept all restructuring proposals, since $P + .5 > 3\gamma + (1 - \gamma)$. Therefore the introduction of restructuring cannot cause an inefficient bankruptcy equilibrium to be replaced by an efficient restructuring equilibrium, at least in the context of Figure 5.

Neither of these outcomes can be viewed as realistic—in reality, all failing firms do not restructure outside of bankruptcy just as all failing firms do not reorganize under Chapter 11. Nonetheless the model points out aspects of the restructuring process that may be realistic, such as the fact that some firms may restructure successfully despite the fact that they are inefficient. In this case we would predict that at least some restructured firms would continue to experience financial difficulties following their restructurings. In fact, a recent empirical study of firms that restructured outside of bankruptcy (Gilson, John, and Lang, 1990) found that about half of them continued to have financial difficulties and ended up in Chapter 11.[32]

A more realistic bankruptcy equilibrium would be one in which all three procedures—restructuring, Chapter 11, and Chapter 7—are used. As an example of such an equilibrium, suppose in Figure 5 that $\gamma = .6$ and $P = 1.7$. In this case, creditors always reject low-payment reorganization plans because $1.7 < .6(3) + .4(1) = 2.2$. But at the restructuring stage, managers offer creditors a payoff of $P + .5 = 2.2$, so that creditors play mixed strategies and accept some but not all restructuring proposals. In this equilibrium, some firms of both types restructure successfully. Of those firms whose restructuring proposals are rejected, *IF* firms liquidate under Chapter 7; *EF* firms file under Chapter 11 and offer high payment plans which creditors accept. Thus all three procedures are used. Perfect filtering appears to occur, since the only firms observed in Chapter 11 are *EF* firms and the only firms observed in Chapter 7 are *IF* firms. But in reality there is still filtering failure, because some *IF* firms delay shutting down by successfully restructuring outside of bankruptcy.

Another, more realistic, possibility is that not all managers of failing firms are playing the same bankruptcy game. For example, Gilson, John, and Lang (1990) suggest that small firms and firms with complex capital structures are unlikely to restructure successfully. Therefore managers of firms with these characteristics may not have restructuring as an option, since they know in advance that creditors will not accept their restructuring proposals. An alternative model would therefore assume that some managers of failing firms play the game shown in Figure 5, which includes restructuring, while the rest play

32. The figure of one-half includes firms whose attempts to restructure were unsuccessful.

the game shown in Figure 3, which does not. Both creditors and managers know which individual firms are in which game, even though creditors do not know whether individual firms are *IF* or *EF*. In this case the game in Figure 5 might have a pooling equilibrium in which all firms restructure, while the game in Figure 3 might have a pooling equilibrium in which all firms adopt low-payment reorganization plans under Chapter 11. Here some *IF* firms delay shutting down by reorganizing and others delay shutting down by restructuring. All three bankruptcy procedures are used, since all *IF* firms that restructure or reorganize successfully later liquidate in Chapter 7. The introduction of restructuring has the effect of shifting some filtering failure from Chapter 11 to the earlier restructuring stage.

These models illustrate the fact that the introduction of restructuring as a bankruptcy alternative may not improve efficiency even though it saves resources. In particular, introducing restructuring may cause a perfect filtering equilibrium in bankruptcy to be replaced by filtering failure, with the filtering failure being disguised because it occurs at the restructuring stage rather than in Chapter 11. The model also suggests an explanation for why many restructured firms ultimately fail: because many of them are economically inefficient and should shut down.

5. Public Policy Issues in Bankruptcy

This article presents a game theoretic model that explores how well U.S. bankruptcy procedures filter failing firms. Under the ideal bankruptcy system, all economically inefficient failing firms (*IF* firms) would liquidate under Chapter 7 and all economically efficient but failing firms (*EF* firms) would reorganize under Chapter 11 or restructure outside of bankruptcy. However, the model shows that the bankruptcy system may not achieve this outcome. Because creditors are assumed to be unable to distinguish between *IF* versus *EF* firms, some or all *IF* firms may reorganize under Chapter 11 along with the *EF* firms that the reorganization procedure was designed to save—that is, filtering failure may occur. Filtering failure occurs because managers of both types of firm benefit from pooling with each other: managers of *EF* firms benefit from pooling with *IF* firms because creditors accept lower compensation than they would if they knew the firm was *EF*, while managers of *IF* firms benefit from pooling with *EF* firms because pooling enables them to obtain the gains from reorganizing. Adding debt restructuring as an alternative to Chapter 11 may reduce economic efficiency even more, since the transactions cost savings in restructuring compared to reorganization may cause a perfect filtering equilibrium in bankruptcy to be replaced by a filtering failure equilibrium in restructuring. Alternatively, if filtering failure would otherwise occur in bankruptcy, then restructuring may disguise the filtering failure problem by shifting it to an earlier stage.

Turn now to the issue of Type I error in bankruptcy and the resulting deadweight costs under various bankruptcy regimes. Consider first a regime in which the only bankruptcy procedure is liquidation under Chapter 7. In this case no Type I error occurs, since all *IF* firms liquidate. However substantial

Type II error occurs, since all *EF* firms liquidate rather than reorganize. Table 2 shows that total deadweight costs of bankruptcy are $N_i(D_{abc} + C_L) + N_e(D_{fghi} + C_L)$, where N_i and N_e are the total numbers of *IF* and *EF* firms, respectively. Thus a regime in which the only bankruptcy procedure is liquidation generates high deadweight costs, both because all *EF* firms liquidate and because *IF* firms delay shutting down too long. Although no Type I bankruptcy error occurs, *IF* firms nonetheless cause deadweight costs because they continue operating too long.

Now suppose Chapter 11 reorganization is introduced as an additional bankruptcy procedure. If perfect filtering occurs, then there is no error in bankruptcy, because all *IF* firms liquidate under Chapter 7 and all *EF* firms reorganize under Chapter 11. The only deadweight costs associated with bankruptcy are transactions costs plus the costs of delay in shutting down *IF* firms, or $N_i(D_{abc} + C_L) + N_eC_R$. These costs are lower than under the liquidation-only option as long as $C_R < D_{fghi} + C_L$. However, the model discussed above suggests that Chapter 11 may cause filtering failure in bankruptcy. Compared to liquidation-only, the introduction of Chapter 11 causes Type II error to decrease, but at the cost of increasing Type I error, because *IF* firms as well as *EF* firms may reorganize. Table 2 shows that the deadweight costs of bankruptcy under a pure pooling equilibrium are $N_i(D_{ade} + C_L + C_R) + N_e(C_R)$. Thus when policymakers adopt a policy such as Chapter 11, the

Table 2. Deadweight Costs and Costs of Bankruptcy Error

	Deadweight Cost per Firm		Cost of Error	
Type of Firm	Liquidate	Reorganize	Type I	Type II
IF	$D_{abc} + C_L$	$D_{ade} + C_L + C_R$	$D_{bced} + C_R$	—
EF	$D_{fghi} + C_L$	C_R	—	$D_{fghi} + C_L - C_R$

Bankruptcy Regime	Amount of Type I Error	Amount of Type II Error	Total Deadweight Cost
Ch. 7 only	0	N_e	$N_i(D_{abc} + C_L) + N_e(D_{fghi} + C_L)$
Ch. 7/Ch. 11 (perfect filtering)	0	0	$N_i(D_{abc} + C_L) + N_e(C_R)$
Ch. 7/Ch. 11 (filtering failure)	N_i	0	$N_i(D_{ade} + C_L + C_R) + N_e(C_R)$
Restructuring (filtering failure)	N_i	0	$N_i(D_{ade} + C_L + C_W) + N_e(C_W)$

result is that efficient failing firms are saved, but at the cost of wasting resources on saving inefficient failing firms.

Finally, suppose out-of-court debt restructurings are considered as a bankruptcy alternative. The transactions costs of restructuring, denoted C_W, are assumed to be lower than the transactions cost of reorganizing, C_R. The deadweight costs of bankruptcy if all failing firms successfully restructure are $N_i(D_{ade} + C_L + C_W) + N_eC_W$, which is lower than the deadweight costs of bankruptcy if all failing firms reorganize. However, introducing restructuring may cause a filtering failure equilibrium to replace a perfect filtering equilibrium. In this case introducing restructuring increases deadweight costs because it causes *IF* firms to restructure when they would otherwise liquidate. In general whether introducing restructuring raises or lowers deadweight costs depends on the trade-off between the benefit of reduced transactions costs for all failing firms that restructure rather than reorganize versus the cost of increased Type I error because some *IF* firms that restructure would otherwise have liquidated under Chapter 7.

To summarize, U.S. bankruptcy policy trades off additional Type I error for reduced Type II error by allowing firms to reorganize under Chapter 11. The practice of restructuring outside of bankruptcy—which occurs in the shadow of Chapter 11—has the same effect. Such a policy has obvious attractions to policymakers because the costs of Type II error, job loss when firms shut down, are immediate and obvious. In contrast, the costs of Type I error, economic stagnation, are long-term and hidden. U.S. bankruptcy policy would be optimal if either the costs of Type I error were zero or if all failing firms were *EF* firms and therefore worth saving. But since neither of these assumptions holds, the policy seems seriously deficient. A number of writers have advocated abolishing or drastically changing Chapter 11, and the results of this analysis provide a new justification for doing so.[33] However, the analysis does not provide support for shifting to a liquidation-only bankruptcy policy, since the deadweight costs of bankruptcy under a policy of liquidation-only could be higher than the costs of bankruptcy under the combined Chapter 7/Chapter 11 policy, even when filtering failure is taken into account. Thus although the combined U.S. bankruptcy policy of Chapter 7/Chapter 11 has its problems, no simple alternative appears to dominate it.

The model suggests that a way to improve Chapter 11 without abolishing it would be to sell all firms as going concerns in Chapter 11 if a reorganization plan proposed by managers has not been adopted by the end of the initial exclusivity period, which is 180 days if managers propose a plan or 120 days if they do not. Increasing the number of bankrupt firms sold on the open market would improve the functioning of the market for failing firms by

---

33. See Roe (1983), Baird (1986), Jackson (1986), Bebchuk (1988), Bradley and Rosenzweig (1992), Rasmussen (1992), Aghion, Hart, and Moore (1992), and Adler (1993). See White (1994a) for a comparison of Chapter 11 with bankruptcy policies in Britain, France, and Germany.

encouraging more potential buyers to enter, which would raise sale values.[34] As the model shows, the advantage of these changes is that increases in the value of *EF* or *IF* firms when sold on the open market as going concerns reduces the probability of filtering failure in bankruptcy.

References

Adler, B. E. 1993. "Financial and Political Theories of American Corporate Bankruptcy," 45 *Stanford Law Review* 311–46.

Administrative Office of the U.S. Courts. 1981. *Federal Judicial Workload Statistics*. Washington, D.C.: U.S. Government Printing Office.

Aghion, P., O. Hart, and J. Moore. 1992. "The Economics of Bankruptcy Reform," 8 *Journal of Law, Economics, & Organization* 523–46.

Asquith, P., R. Gertner, and D. Scharfstein. 1991. "Anatomy of Financial Distress: An Examination of Junk Bond Issues," National Bureau of Economic Research working paper no. 3942.

Baird, D. 1986. "The Uneasy Case for Corporate Reorganizations," 15 *Journal of Legal Studies* 127–47.

———, and R. Picker. 1991. "A Simple Noncooperative Bargaining Model of Corporate Reorganization," 20 *Journal of Legal Studies* 311–50.

Bebchuk, L. 1988. "A New Method for Corporate Reorganization," 101 *Harvard Law Review* 775–804.

———. 1991. "The Effects of Chapter 11 and Debt Renegotiation on Ex Ante Corporate Decisions," Harvard Law School working paper.

———, and H. Chang. 1992. "Bargaining and the Division of Value in Corporate Reorganization," 8 *Journal of Law, Economics, & Organization* 253–79.

Bradley, M., and M. Rosenzweig. 1992. "The Untenable Case for Chapter 11," 101 *Yale Law Journal* 1043–95.

Brown, D. 1989. "Claimholder Incentive Conflicts in Reorganization: The Role of Bankruptcy Law," 2 *Review of Financial Studies* 109–23.

Flynn, E. 1989. "Statistical Analysis of Chapter 11," unpublished study, Administrative Office of the U.S. Courts.

Franks, J., and W. Torous. 1994. "A Comparison of Financial Recontracting in Distressed Exchanges and Chapter 11 Reorganizations," 35 *Journal of Financial Economics* 349–70.

Gertner, R., and R. C. Picker. 1992. "Bankruptcy and the Allocation of Control," University of Chicago working paper.

———, and D. Scharfstein. 1991. "A Theory of Workouts and the Effects of Reorganization Law," 46 *Journal of Finance* 1189–1222.

Giammarino, R. 1989. "The Resolution of Financial Distress," 2 *Review of Financial Studies* 25–47.

Gibbons, R. 1992. *Game Theory for Applied Economists*. Princeton, N.J.: Princeton University Press.

Gilson, S. C. 1990. "Bankruptcy, Boards, Banks and Blockholders," 27 *Journal of Financial Economics* 355–87.

———. 1993. "Debt Reduction, Optimal Capital Structure, and Renegotiation of Claims During Financial Distress," working paper, Harvard Business School.

———, K. John, and L. H. P. Lang. 1990. "Troubled Debt Restructurings: An Empirical Study of Private Reorganization of Firms in Default," 27 *Journal of Financial Economics* 315–55.

34. Currently, potential buyers of a bankrupt firm must purchase claims and participate in the bargaining over the reorganization plan, since firms in Chapter 11 are rarely offered for sale. This delays and complicates the process of adopting a Chapter 11 plan, often without increasing the amount that creditors receive. A recent example is the role of Federated Department Stores in the R. H. Macy and Company bankruptcy (see Strom, 1994).

Jackson, T. H. 1986. *The Logic and Limits of Bankruptcy Law.* Cambridge, Mass.: Harvard University Press.

Jensen, M. 1986. "Agency Costs of Free Cash Flow, Corporate Finance, and Takeovers," 76 *American Economic Review* 323–29.

Jensen-Conklin, S. 1992. "Do Confirmed Chapter 11 Plans Consummate? The Results of a Study and Analysis of the Law," 97 *Commercial Law Journal* 297–331.

Myers, S. C., and N. Majluf. 1984. "Corporate Financing and Investment Decisions when Firms Have Information that Investors Do Not Have," 13 *Journal of Financial Economics* 187–221.

Rasmussen, R. K. 1992. "Debtor's Choice: A Menu Approach to Corporate Bankruptcy," 71 *Texas Law Review* 51–121.

Roe, M. 1983. "Bankruptcy and Debt: A New Model for Corporate Reorganization," 83 *Columbia Law Review* 527–602.

Schwartz, A. 1981. "Security Interests and Bankruptcy Priorities: A Review of Current Theories," 10 *Journal of Legal Studies* 1–38.

———. 1993. "Bankruptcy Workouts and Debt Contracts," 36 *Journal of Law & Economics* 595–632.

Scott, R. E. 1986. "A Relational Theory of Secured Financing," 86 *Columbia Law Review* 901–77.

Strom, S. 1994. "Macy Bondholders Insist on a $4 Billion Valuation." *New York Times,* April 26, C4.

Weiss, L. 1992. "Restructuring Complications in Bankruptcy: The Eastern Airlines Bankruptcy Case." Working paper, A. B. Freeman School of Business, Tulane University.

White, M. J. 1989. "The Corporate Bankruptcy Decision," 3 *Journal of Economic Perspectives* 129–51.

———. 1994a. "The Costs of Corporate Bankruptcy: A U.S.-European Comparison," in J. Bhandari, ed., *Bankruptcy: Economic and Legal Perspectives.* New York: Cambridge University Press.

———. 1994b. "Does Chapter 11 Save Economically Inefficient Firms?" forthcoming in *Washington University Law Quarterly.*

Williamson, O. 1975. *Markets and Hierarchies: A Study in the Economics of Internal Organization.* New York: Free Press.