
10. The treatment of secured credit in bankruptcy: A unified model

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Secured credit is a loan in which the creditor has the right to claim some specific property—the collateral—if the debtor defaults on the loan. Collateral can take the form of real property, personal property, inventory, or accounts receivable. Unsecured credit, in contrast, is a loan in which the creditor has a claim to be repaid, but no right to claim any specific property. Secured loans are safer than unsecured loans for creditors, because the right to claim and sell the collateral when borrowers default assures creditors of a minimum return equal to the value of the collateral minus transactions costs. Secured loans make unsecured loans riskier because the latter are repaid only if the defaulting firm has assets remaining after secured creditors take their collateral. However, a bankruptcy filing may change secured creditors' rights. If the debtor firm liquidates in bankruptcy, secured creditors' rights are respected and they are allowed to claim their collateral. But if the firm files to reorganize in bankruptcy under Chapter 11, secured creditors lose their right to claim their collateral. This is to prevent them from shutting the firm down, allowing managers an opportunity to save the firm by reorganizing it.¹

In this chapter, I re-examine the general question of how secured credit affects economic efficiency and the specific question of how strongly secured creditors' claims should be protected in bankruptcy. The issue of whether secured credit increases efficiency has generated a substantial literature in law and economics, including several proposals for reform of bankruptcy law. But it has not generated a consensus answer. Economists agree that the rules for use of secured credit and the rules of bankruptcy priority should be constructed so as to maximize economic efficiency, which we can think of as choosing rules that maximize the size of the pie regardless of how it is divided among claimants. Thus, secured credit is economically efficient if it increases the value of firms in bankruptcy (a larger pie) and, if so, then secured creditors' high priority should be respected in bankruptcy. But if secured credit reduces the value of firms in bankruptcy (a smaller pie) while increasing secured creditors' return (a larger slice of the pie for these creditors), then it is economically inefficient. In this case, it is best to reduce the strength of secured creditors' position in bankruptcy.

An important part of the confusion concerning secured credit is that economic efficiency in the bankruptcy context has many dimensions and different authors focus on different aspects of the problem. Among the efficiency dimensions that are potentially affected by the use of secured credit are: (1) whether it reduces firms' total cost of borrowing net of transactions costs, (2) whether it affects managers' incentives to select only economically efficient investment projects, (3) whether it affects managers' incentives to shirk in managing their firms, (4) whether it affects creditors' incentive to race to the courthouse when they think the firm might default, which can lead to too many financially distressed firms shutting down, (5) whether it affects managers' incentives to reduce the external harm caused by firms' operations, (6) whether it affects managers' decisions to file for bankruptcy at the most economically efficient time, and (7) whether it affects the efficiency of bankruptcy screening, i.e., do firms that are economically inefficient liquidate in bankruptcy and firms that are economically efficient (despite their financial distress) get saved in bankruptcy?

What this essay does is to selectively survey the literature on secured credit and bankruptcy and then present a simple model that re-evaluates the various arguments in favor and against secured credit. I focus, in particular, on what I consider to be the most important economic function of bankruptcy law: saving financially distressed firms that are economically efficient and shutting down financially distressed firms that are economically inefficient. Firms are economically efficient despite their financial distress when the value of their assets is highest in its current use: these firms should continue operating either in bankruptcy reorganization or by remaining outside of bankruptcy. Firms are economically inefficient when the value of their assets is higher in some alternative use: these firms should be liquidated. Efficient screening of financially distressed firms in bankruptcy is important because when economically efficient firms shut down in bankruptcy, their going concern value is lost. And when economically inefficient firms are saved in bankruptcy, economic growth falls and new job creation slows because resources remain in outdated industries and obsolete technologies.²

My conclusions are mainly negative—no single treatment of secured creditors in bankruptcy always improves the efficiency of bankruptcy screening. Neither the existing treatment of secured creditors in bankruptcy nor the proposed reforms unambiguously improves the efficiency of bankruptcy screening. Instead, different treatments of secured credit have the effect of changing the proportions of firms that are inefficiently liquidated versus inefficiently saved.

I. SELECTIVE LITERATURE REVIEW

Consider how secured debt affects firms' total borrowing costs when they have a mixture of secured versus unsecured debt. An important paper on this topic was Schwartz (1981), who showed a neutrality result: that under certain conditions, how a firm's debt is divided between secured versus unsecured has no effect on firms' total cost of capital. Schwartz' article was written as an extension of the Modigliani-Miller (M-M) (1958) theorem, which holds that how a firm's capital is divided between debt versus equity has no effect on firms' total cost of capital. The two results mean that firms' decisions to finance themselves using debt versus equity or using secured versus unsecured debt are both independent of their operational decisions. The theorem requires a long menu of strong assumptions, including no corporate taxes, no transactions costs, no bankruptcy costs, competitive loan markets, risk-neutral lenders, and the fact that the firm raises a fixed total amount of capital from all sources. Schwartz's paper makes the same set of assumptions. Suppose that, initially, none of the firm's loans are secured. Now suppose some of the firm's loans become secured, but the total amount the firm borrows remains the same. The change makes the loans that become secured safer because secured creditors can claim their collateral if the firm defaults, but the remaining loans that are unsecured become riskier because the firm has fewer assets to repay these loans when default occurs. In response to the changes in risk, secured creditors lower their interest rate, while unsecured creditors raise their interest rate. Overall, these changes fully offset each other, since the reduction in the cost of the loans that become secured just equals the increase in the cost of the loans that remain unsecured. Thus, there is no change in the firm's total cost of capital.³

A problem with the Schwartz model is that secured debt is inefficient. This is because firms do not benefit from making some of their debt secured, because their total cost of capital remains the same. But Schwartz argued that using secured debt actually raises firms' cost of capital, since secured debt has higher transactions costs than unsecured debt due to the need to negotiate over the collateral and register (perfect) secured creditors' liens. This means that for use of secured debt to be economically efficient, it must generate some efficiency gain that offsets the increase in transactions costs. Schwartz hypothesized that use of secured credit might reduce the total cost of monitoring by creditors or increase the probability that managers choose efficient projects for their firms by reducing information asymmetries between managers and creditors. These hypotheses led other researchers to explore possible efficiency gains from use of secured credit.

Among these, Triantis (1992) presented a model in which the higher

transactions cost of secured debt generates efficiency gains by reducing the cost of asymmetric information. In his model, managers choose between efficient/safe projects versus inefficient/risky projects. Some managers choose risky projects even though they are inefficient, because these projects benefit shareholders at the expense of creditors and creditors cannot determine at the time they make their loans which firms will choose which projects. Triantis showed that using secured credit allows firms to credibly signal that they will choose safe/efficient projects, since firms that choose safe projects make higher profit and are therefore better able to bear the higher cost of secured debt. Secured debt therefore allows loan markets to function more efficiently, since creditors can identify firms that choose safe/efficient projects and they reward these firms by charging lower interest rates.

Picker (1992) presents a model in which the benefit of using secured debt is that creditors' cost of monitoring the firm is lower. In his model, managers have an incentive to choose an inefficient/risky project over an efficient/safe project, so that creditors gain from monitoring that steers managers toward safe projects. Picker assumes that monitoring is sometimes a public good with spillover benefits, in which case it is efficient for only one creditor to monitor the firm. He presents several versions of his model. In one, all creditors are unsecured and, in equilibrium, all of them choose to monitor the firm and total transactions costs are high. In a second version, all creditors are secured and each can monitor only its own collateral, so that monitoring has no spillover benefits. In equilibrium, all creditors again monitor the firm, although each creditor now monitors only the firm's use of its own collateral. Total monitoring costs are again high, although they may be lower than when all creditors are unsecured. But in a third model, monitoring by one secured creditor has spillover effects for all other creditors by preventing managers from misbehaving. In this model, it is efficient for only one secured creditor to do all the monitoring and this solution minimizes total transactions costs. However, in practice, it is not clear how frequently monitoring has spillover benefits or how often the specialized monitoring equilibrium would prevail. In addition, it is unclear why a secured creditor is the best monitor in a specialized monitoring equilibrium.⁴

Now turn to literature that examines how use of secured credit affects the screening of firms in bankruptcy. In the "creditors' bargain" model, Jackson (1982) and Baird and Jackson (1984) argue that the role of bankruptcy law is to force creditors to act collectively so as to maximize the value of the firm's assets, regardless of how the assets are divided. This means that firms in bankruptcy should reorganize if the value of their assets is higher when they continue to operate and should liquidate if the

value of their assets is higher in some alternate use. The question then is whether use of secured debt improves the efficiency of firms' bankruptcy choices. In particular, when firms file for bankruptcy, there is a conflict between high-priority creditors, who generally prefer liquidation so that they receive their repayment quickly, versus low-priority creditors, who generally prefer to save the firm since their claims will be worth little in liquidation, but may be worth more if the firm reorganizes and succeeds. How does the use of secured credit affect the outcome of this conflict?

Jackson and Baird posit a hypothetical bargaining process that all creditors participate in before making their loans to the firm, which would result in agreement on priority rules that lead to efficient liquidation versus reorganization decisions. If all creditors were unsecured, they argue that the bargain would call for a priority rule in which all creditors have equal priority and are treated equally in bankruptcy, because equal treatment both reduces total transactions costs and reduces individual creditors' incentives to race to be first to collect whenever they fear that the firm might default. But if some creditors are secured, these creditors have an incentive to quickly seize their collateral once the firm defaults, even if seizure reduces the value of the firm's assets by forcing it to shut down. Jackson argues that in this situation, creditors would adopt a priority rule that prevents secured creditors from seizing their collateral, but protects them with payments equal to their loss from depreciation of the assets and foregone interest during the delay. The payments may come from the firm's cash, from a new lender or from the old unsecured creditors, but in any case, the cost of the payments is borne by unsecured creditors. Under this priority rule, unsecured creditors, as a whole, would choose to keep their firms running when the gains from avoiding liquidation exceed the costs of compensating secured creditors and would choose liquidation otherwise. In contrast, if unsecured creditors were not required to compensate secured creditors for delay in seizing their collateral, then firms in bankruptcy would choose reorganization even when it is more efficient for them to liquidate. Thus, Baird and Jackson argue that respecting secured creditors' priority in bankruptcy improves efficiency because it results in efficient bankruptcy screening.

I analyse this argument more formally in the next section, but some weaknesses are worth noting here. One is the fact that unsecured creditors have to get together after the firm files for bankruptcy and decide whether to compensate the secured creditors and, if so, to raise the funds. They also must bargain separately with each individual secured creditor to determine an amount that each is willing to accept in return for giving up the right to seize collateral. But these negotiations are likely to fail because some unsecured creditors will act as free-riders and refuse to contribute

and some secured creditors will act as hold-outs and demand extra-high compensation. An alternative is that managers pay off secured creditors using a loan from a new lender or from cash on hand, which is likely to result in more reorganizations because it avoids the free-rider problem. But the hold-out problem is not eliminated, so that the number of firms that reorganize may still be inefficiently low. Another problem is that unsecured creditors are not in a good position to evaluate whether the firm is more valuable if it shuts down versus continues to operate, since this decision requires determining how much the firm's assets would be worth if they were sold to a different firm in possibly a different industry. But each creditor is likely to know only a small part of the firm's operations. Thus, negotiations among creditors when the firm is in bankruptcy seem unlikely to result in efficient liquidation versus reorganization decisions.

An extension of this approach concerns the issue of "involuntary" or "non-adjusting" claims against the firm, i.e., claims of creditors that never had an opportunity to negotiate their contracts with the firm. Involuntary claims include tort claims by individuals harmed by the firm, government claims for unpaid taxes and fines, and claims for environmental damage caused by the firm. Non-adjusting claims also include claims of contract creditors who have extended loans to the firm on fixed terms and small claims of all types. Non-adjusting creditors do not re-negotiate the interest rates they charge in response to changes in the firm's risk. Under an extension of the creditors' bargain approach, these claimants should be represented in the hypothetical bargaining that determines the bankruptcy payoff rule, even if, in reality, they never have an opportunity to bargain with the firm. However, in practice, bankruptcy law treats these claims as unsecured and they receive little or no compensation in bankruptcy (although claims for unpaid taxes have priority over general unsecured claims).

This causes various inefficiencies in firms' behavior. Hansmann and Kraakman (1991) point out that low payoff rates on involuntary claims in bankruptcy encourage firms to engage in projects that cause high levels of environmental and tort damage, to strip the corporation of assets that could be used to pay these claims, to buy too little liability insurance, and to avoid making investments that would mitigate the damage. Bebchuk and Fried (1996) argue non-adjusting claims give managers an incentive to make their "adjusting" creditors secured, since non-adjusting creditors cannot respond by raising the interest rates they charge. As a result, making adjusting creditors' claims secured lowers firms' total cost of capital. The existence of non-adjusting claims gives managers an incentive to choose inefficiently risky investments, since the cost of taking on extra risk is lower, capital is lower.⁵

Both sets of authors propose changes in bankruptcy law to take account of involuntary or non-adjusting claims. Hansmann and Kraakman (1991) propose that corporate shareholders have unlimited liability for external damage. Bebchuk and Fried (1996) propose that secured creditors' claims be treated as secured for only 75 percent of the liquidation value of their collateral, with the remaining 25 percent treated as unsecured.⁶ Thus, secured creditors would receive only partial rather than full priority over unsecured creditors. I discuss both of their proposals below.

There is also a more general literature in economics that deals with how debt contracts should be structured to reduce inefficient behavior by managers. The central problem here is that once firms borrow, managers have an incentive to behave inefficiently by defaulting even when their firms are doing well ("strategic default"), because creditors may agree to accept a reduced payoff rather than forcing the firm to liquidate. In one of these papers, Bester (1994) examines whether use of secured debt reduces the probability of strategic default. He argues that managers are less likely to default strategically when the firm has secured rather than unsecured debt, because secured creditors are better off when the firm liquidates and are therefore less likely to agree to a reduced payoff. Use of secured debt thus may be worthwhile despite its higher transactions costs because it reduces the probability of strategic default.⁷

II. MODEL

In this section, I develop a model that examines how secured credit affects the efficiency of firms' bankruptcy decisions and use it to evaluate the two proposals discussed above. Why is it useful to examine another model? One reason is that the model focuses on the same efficiency objective as in Baird and Jackson: that of using bankruptcy to liquidate inefficient firms while saving firms that are economically efficient despite their financial distress. But my model uses a more realistic set of assumptions in which not all creditors are equally represented in the bargaining over the treatment of different types of claims in bankruptcy. The model also allows me to evaluate whether the reform proposals discussed above result in more economically efficient bankruptcy decisions.

The model has two periods. In period 1, firms are financially distressed, but may be either economically efficient or inefficient. Managers are assumed to have three alternatives: continue operating outside of bankruptcy for another period, file for Chapter 7 bankruptcy and liquidate, or file for Chapter 11 bankruptcy and reorganize. Both continuing to operate

outside of bankruptcy and reorganizing under Chapter 11 are alternative methods of saving firms.

Small versus large firms in financial distress are likely to face different choices among these alternatives. Managers of small firms usually choose between continuing to operate outside of bankruptcy versus liquidating in Chapter 7 bankruptcy, because they cannot afford the high transactions costs of reorganization. But managers of large firms typically choose between filing to liquidate versus reorganize in bankruptcy. This is because larger firms are more closely monitored by creditors, so that they make their bankruptcy decisions when their firms are in better financial condition and can afford the transactions costs of reorganizing.⁸

Prior to the start of the model, firms borrow from at least two creditors. By period 1, some of these firms are in financial distress and managers must make bankruptcy decisions. If firms liquidate in bankruptcy in period 1, the liquidation value of their assets is assumed to be V_1 . If firms continue to operate in period 1, either outside of bankruptcy or in Chapter 11, then in period 2 the value of their assets is assumed to be V_2 . V_2 is assumed to be known with certainty, but may take a range of (positive) values from low to high. The model ends in period 2 with liquidation of firms' assets. Both V_1 and V_2 represent the market value of all of the firm's assets in their best alternative use, sold either piecemeal or as going concerns to buyers in the same or other industries. Because we wish to consider the possibility that firms cause environmental and/or accidental damage when they operate, firms that continue to operate from period 1 to period 2 are assumed to cause external harm of X_2 . X_2 includes all types of external harm, regardless of whether victims receive compensation.⁹

It's unusual in discussing firms' bankruptcy decisions to assume that future earnings are certain rather than uncertain. I make this assumption partly for convenience, since it simplifies the notation and makes the model simpler. However, the main reason for this assumption is to show that managers make inefficient bankruptcy decisions regardless of whether their firms' future earnings are certain or uncertain; in other words, uncertainty is not necessary for managers to make inefficient bankruptcy decisions. If earnings were assumed to be uncertain rather than certain, then it is straightforward to show that more firms would choose continuation or reorganization even when the best outcome is liquidation. Thus, inefficient continuations or inefficient reorganizations would occur more often.¹⁰

The economically efficient treatment of firms in bankruptcy is straightforward: firms should continue operating if the increase in the value of their assets between periods 1 and 2 exceeds their external harm, or if $V_2 - V_1 > X_2$, and they should liquidate in period 1 otherwise.¹¹ Thus,

saving the firm is more likely to be efficient if the increase in the firm's value $V_2 - V_1$ is high and/or if external harm X_2 is small. Only future external harm affects whether it is efficient for the firm to continue operating versus liquidate; past external harm is a sunk cost. Making the economically efficient choice between saving versus liquidating the firm is equivalent to choosing the alternative that maximizes the size of the pie, regardless of how it is divided.

The firm is assumed to have no cash on hand as of period 1. As a result, in order for it to continue operating or reorganize in period 1, it must receive a new loan that allows it to pay all of its debt obligations that are due in period 1.

Now turn to the question of how firms make their bankruptcy decisions. Unlike Baird and Jackson, I do not assume that a grand "creditors' bargain" made in advance determines the decision. Instead, I assume that the decision is made in period 1 by a sub-group of parties: managers—who represent themselves and equity—and a single creditor called the bank that may or may not be willing to make a new loan to the firm. These parties collectively are referred to as the coalition. The coalition excludes creditors who are not willing to make new loans to the firm when it is in financial distress, because these creditors are assumed to have no bargaining power at the time of the bankruptcy decision. Non-coalition creditors include holders of damage claims, government and trade creditors, and adjusting or non-adjusting creditors of the firm that are unwilling to extend new credit. As discussed below, the bank's new loan can be either secured or unsecured.¹²

In period 1, the coalition chooses between continuing to operate outside of bankruptcy versus liquidating in Chapter 7 (below, I consider the coalition's choice between reorganizing in Chapter 11 versus liquidating in Chapter 7). Because the model has only two periods, the choice of continuation delays liquidation of the firm from period 1 until period 2. Since I assume that equity would be wiped out if liquidation occurred in period 1, shareholders are assumed to be willing to give up part or all of their equity in order to induce the bank to make the new loan. The coalition makes the bankruptcy decision by picking the alternative that maximizes the size of its pie slice. This decision may be inefficient because the choice that maximizes the size of the coalition's pie slice may not be the choice that maximizes the size of the pie.

The firm is assumed to have three groups of existing creditors: secured creditors who are owed S_1 in period 1 and S_2 in period 2, unsecured creditors who are owed U_1 in period 1 and U_2 in period 2, and creditors with damage claims who are owed T_1 in period 1 and T_2 in period 2.¹³ Because the firm is in financial distress, the total value of claims is assumed to

exceed the liquidation value of the firm's assets in period 1, V_1 . Thus, $S_1 + S_2 + U_1 + U_2 + T_1 + T_2 > V_1$.

If the firm liquidates in Chapter 7 bankruptcy in period 1, the value of its assets V_1 will be used to pay creditors' claims according to the absolute priority rule. I assume that secured creditors' claims are backed by collateral that is equal in value to the amount of their claims and, in liquidation, they take their collateral and are therefore paid first. The remaining assets of the firm are liquidated and used to pay unsecured and damage claims. All of these are assumed to have equal priority and thus are paid the same proportion of their face value. The fractional payment rate to unsecured and damage claims is $(V_1 - S_1 - S_2)/(U_1 + U_2 + T_1 + T_2)$. Shareholders receive nothing.

In contrast, if the firm continues to operate outside of bankruptcy, it must repay all claims due in period 1, $S_1 + U_1 + T_1$, in full. The firm is assumed to have no cash on hand in period 1, so that all of the funds for repayment of these claims must come from a new loan from the bank. The interest rate on the new loan is assumed to be r . The amount that the firm must repay in period 2 if it avoids bankruptcy and continues operating in period 1—referred to as the continuation loan—is therefore $B_2^C = (S_1 + U_1 + T_1)(1 + r)$. Here, the superscript C refers to continuation and the subscript 2 refers to period 2 when the loan must be repaid.

How much does the coalition receive under continuation? In period 2, the total amount available to be distributed is V_2 , which may be high or low. Secured creditors claim their collateral, so that the first S_2 dollars go to them. If $V_2 > S_2$, then the next payment goes to the bank to repay the continuation loan, since the continuation loan is assumed to take priority over unsecured and damage creditors' claims.¹⁴ Thus, increases in V_2 up to $S_2 + B_2^C$ go to the coalition. If $V_2 > S_2 + B_2^C$, then the next payment goes to unsecured and damage creditors and, finally, if $V_2 > S_2 + B_2^C + U_2 + T_2$, anything else goes to the coalition. The coalition's return under continuation is therefore $\max[V_2 - S_2, 0]$ if $V_2 \leq S_2 + B_2^C + U_2 + T_2$ plus $V_2 - (B_2^C + S_2 + U_2 + T_2)$ if $V_2 > S_2 + B_2^C + U_2 + T_2$. Since shareholders' return if liquidation is chosen in period 1 is zero, shareholders therefore prefer continuation over liquidation in period 1 whenever the firm's future value is large enough to repay the continuation loan in full, or if $V_2 \geq S_2 + B_2^C$. The condition for the coalition to form is the same, since the bank is willing to provide the continuation loan as long as it will be repaid, or if $V_2 \geq S_2 + B_2^C$.

Figure 10.1 shows the coalition's return on the vertical axis and the range of values of V_2 on the horizontal axis. The coalition receives nothing unless V_2 exceeds S_2 , then it receives all of the increase in V_2 up to $S_2 + B_2^C$, at which point the continuation loan has been repaid in full. Past this point,

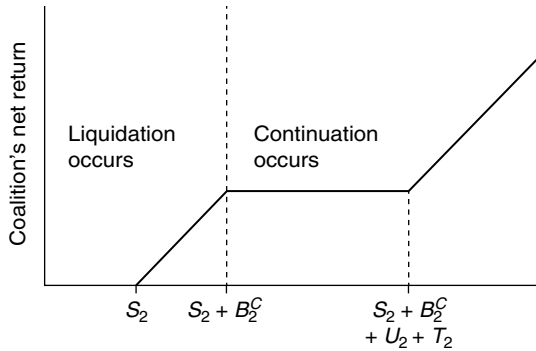


Figure 10.1 *The coalition's choice between continuation and liquidation*

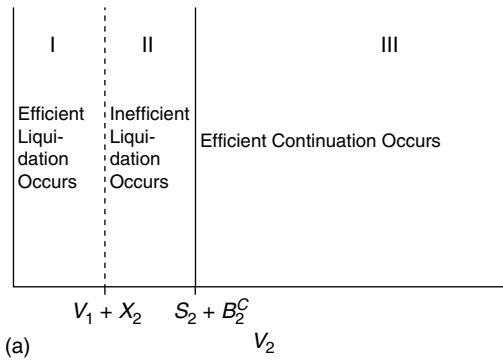


Figure 10.2A *Conditions for inefficient liquidation to occur*

the coalition receives nothing more until unsecured creditors and damage claimants have been paid in full, and finally, it receives all of the firm's value above $S_2 + B_2^C + U_2 + T_2$. The vertical line at $S_2 + B_2^C$ is the boundary between the regions where the coalition does not form and liquidation occurs and where the coalition forms and chooses continuation. To the left of the vertical line, the coalition does not form and liquidation occurs because V_2 is not high enough to repay the continuation loan in full, so the bank would lose money if it made the loan. To the right of the vertical line, the coalition forms and continuation occurs because V_2 is high enough to repay the continuation loan in full and possibly more.

Now turn to question of whether the coalition's bankruptcy decision is economically efficient. Figure 10.2A again shows values of V_2 along the horizontal axis. The solid vertical line delineates the regions on either side of $S_2 + B_2^C$ where the coalition chooses liquidation versus continuation.

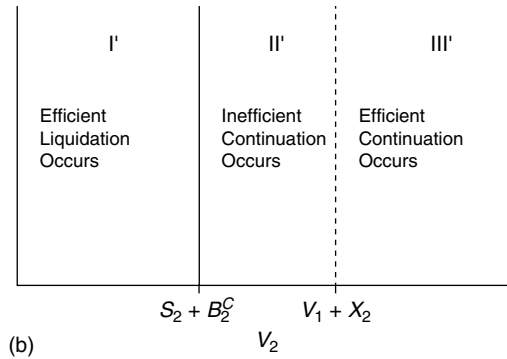


Figure 10.2B Conditions for inefficient continuation to occur

But now there is also a dotted vertical line at $V_1 + X_2$. This line separates the region where $V_2 < V_1 + X_2$ and liquidation is economically efficient (to the left of the dotted line) from the region where $V_2 > V_1 + X_2$ and continuation is economically efficient (to the right of the dotted line). The two vertical lines together delineate three regions, labelled regions I, II and III. In region I, the coalition chooses liquidation because $V_2 < S_2 + B_2^C$ and liquidation is also economically efficient because $V_2 < V_1 + X_2$. Thus, liquidation occurs and is the efficient choice. In region III, the coalition chooses continuation outside of bankruptcy because $V_2 > S_2 + B_2^C$ and this choice is also economically efficient because $V_2 > V_1 + X_2$. Thus, continuation occurs and is the efficient choice. However, in region II, the coalition chooses liquidation because $V_2 < S_2 + B_2^C$, but continuation is economically efficient because $V_2 > V_1 + X_2$. Thus liquidation occurs but continuation is economically efficient. The coalition makes economically inefficient decisions in region II because, while the firm is worth more if it continues to operate, the coalition prefers liquidation since creditors' claims in period 1 are too large for the bank to make the continuation loan. Although the pie would be bigger if the firm continued to operate in region II, the coalition makes the wrong choice because its pie slice in liquidation is larger.¹⁵

In Figure 10.2B, the situation is reversed because $S_2 + B_2^C$ is assumed to be smaller than $V_1 + X_2$, rather than larger. This means that the dotted vertical line is to the right of the solid vertical line, rather than the reverse. The resulting three regions are now labelled I', II', and III'. In regions I' and III', liquidation or continuation is economically efficient and the coalition again makes the economically efficient choice. But now in the middle region, region II', liquidation is economically efficient because $V_2 < V_1 + X_2$, but the coalition chooses continuation because

$V_2 > S_2 + B_2^C$. Thus, continuation occurs in this region even though liquidation is economically efficient. The difference between the two figures is that either creditors' claims $S_2 + B_2^C$ are smaller, which increases the coalition's return from continuation, and/or the economic costs of continuing the firm's operations, $V_1 + X_2$, are higher. Thus, rather than too much liquidation occurring, instead, too much continuation may occur.¹⁶

Overall, the model shows that the coalition of shareholders and the bank does not generally make economically efficient bankruptcy decisions and that, depending on individual firms' characteristics, either too much continuation or too much liquidation may occur. The only situation in which the coalition always makes economically efficient bankruptcy decisions is the special case when $V_1 + X_2 = S_2 + B_2^C$. In this case, the inefficient regions II in Figure 10.2A and II' in Figure 10.2B both disappear. But this special case is unlikely to occur in practice.

Now consider whether treating secured creditors less favorably in bankruptcy improves the efficiency of the coalition's bankruptcy decisions. In particular, suppose now that if continuation is chosen in period 1, secured creditors' claims become unsecured.

Because the coalition, rather than secured creditors, now receives the first S_2 dollars of the firm's period 2 value, the coalition now chooses continuation whenever $V_2 \geq B_2^C$, rather than when $V_2 \geq S_2 + B_2^C$. Because the former inequality is more likely to hold than the latter, the coalition chooses continuation more often. In Figure 10.1, the curve showing the coalition's net return shifts to the left, so that the coalition's return begins to rise starting at zero rather than starting from S_2 . Also, the line between the regions where liquidation versus continuation is chosen shifts leftward from $S_2 + B_2^C$ to B_2^C , making the coalition choose continuation more often and liquidation less often.

In Figure 10.2A, the solid vertical line shifts to the left by the same amount, but the dotted vertical line remains in the same position, because changing the treatment of secured creditors has no effect on economic efficiency. The leftward shift of the solid vertical line makes region II in Figure 10.2A smaller and region III in Figure 10.2A larger. As a result, inefficient liquidation is less likely to occur. However, in Figure 10.2B, the same leftward shift of the solid vertical line occurs and this causes region II' to increase in size and region I' to become smaller, making inefficient continuation more likely to occur. Thus, treating secured creditors less favorably causes the coalition to choose continuation more often, reducing the probability of inefficient liquidation but increasing the probability of inefficient continuation. This is because the coalition is more likely to choose continuation, but the efficiency of continuation remains unaffected. Treating secured creditors more favorably has the opposite effect. In

general, no treatment of secured creditors in bankruptcy always results in the coalition making economically efficient bankruptcy decisions.

Now assume that coalition's choice in period 1 is between liquidation under Chapter 7 versus reorganization under Chapter 11, rather than between liquidation versus continuation outside of bankruptcy—the typical bankruptcy choice for large corporations. If the firm reorganizes under Chapter 11, assume that it must pay transactions costs of C in period 1, which include lawyers' fees, professional fees and court costs. Also, managers must make an agreement with creditors on the terms of a reorganization plan that will go into effect in period 2. Suppose the reorganization plan that satisfies the requirements for approval by creditors has the following characteristics. It pays all unsecured creditors and damage claimants a fraction u of the face value of their claims in period 2, while the remaining fraction $(1-u)$ of these claims is discharged. Also, secured creditors are not allowed to foreclose on their collateral in period 1, but they may receive interest on their loans and/or compensation for loss of the value of their collateral during the reorganization procedure. This payment is assumed to equal a fraction s of the face value of their claims, while the remaining fraction $(1-s)$ of their claims is discharged. Secured creditors are assumed to receive this payment in period 1, regardless of whether their claims are due in period 1 or period 2. Note that the coalition benefits from choosing reorganization in period 1 both because reorganizing delays the firm's obligation to repay unsecured claims that are due in period 1 and because it partially discharges both unsecured and secured claims. These features of reorganization provide both temporary and permanent financial relief to financially distressed firms.¹⁷

The amount of the bank loan needed to finance reorganization in period 1 is denoted B_2^R , where the R superscript denotes reorganization and the 2 subscript again denotes the amount to be repaid in period 2. The reorganization loan equals the transactions costs of reorganizing plus the cost of payments to secured creditors in period 1.¹⁸ The interest rate on the loan is again assumed to be r , so that $B_2^R = (C + s(S_1 + S_2))(1 + r)$. Assume that the reorganization loan takes highest priority as an "administrative expense" of Chapter 11 bankruptcy and is repaid in period 2 before all other creditors' claims.

Now consider the coalition's choice between liquidation versus reorganization in period 1. If the coalition chooses liquidation, it receives nothing. If it chooses reorganization in period 1, again I assume that the firm's assets will be sold for the amount V_2 in period 2. (This means that the value of the firm continuing to operate between periods 1 and 2 is assumed to be the same regardless of whether it remains outside of bankruptcy or reorganizes in Chapter 11.) In period 2, the first B_2^R dollars of V_2 go to

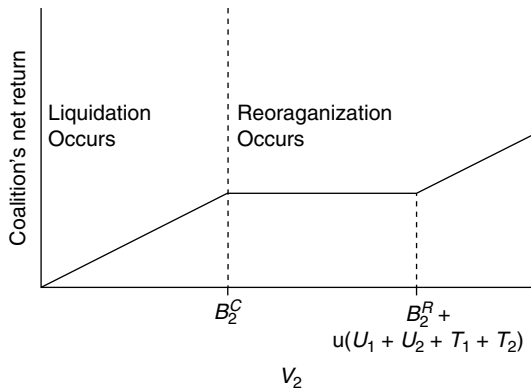


Figure 10.3 *The coalition's choice between reorganization and liquidation*

the coalition to repay the reorganization loan. Then the coalition receives nothing more until all payments to unsecured and damage claimants owned under the reorganization plan are made, and finally it receives all of the firm's additional value beyond $B_2^R + u(U_1 + U_2 + T_1 + T_2)$, if any. As shown in Figure 10.3, the coalition chooses reorganization over liquidation whenever $V_2 \geq B_2^R$ and it chooses liquidation whenever this condition is reversed. This inequality is also the condition for the bank to be willing to make the reorganization loan. Figure 10.3 shows the regions where the coalition chooses liquidation versus reorganization.

An interesting implication of the model is that the size of the payments promised to unsecured and damage creditors under the reorganization plan has no effect on the coalition's choice between reorganization versus liquidation. This is because all payments promised to these creditors under the plan take lower priority in period 2 than the bank's loan to finance reorganization and therefore the coalition ignores them in making its bankruptcy decision. Only the payments promised to secured creditors affect the coalition's choice.

If we compare Figure 10.3 to Figure 10.1, the coalition is more likely to choose reorganization over liquidation than it is to choose continuation over liquidation as long as $B_2^R < S_2 + B_2^C$. Ignoring interest payments, this condition is satisfied whenever $C < (1 - s)(S_1 + S_2) + U_1 + T_1$, or when the transactions costs of reorganizing are less than the value of claims that the coalition avoids repaying in period 1 when it chooses reorganization. This condition is likely to hold for many large firms.

Now turn to the efficiency effects of the reorganization choice, shown in Figures 10.4A and 10.4B. The solid vertical lines in both figures indicate the boundary between the regions where the coalition chooses

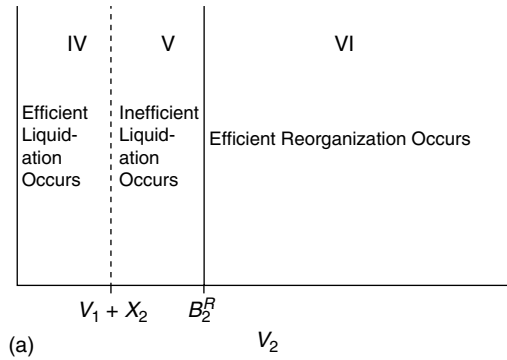


Figure 10.4A Conditions for inefficient liquidation to occur

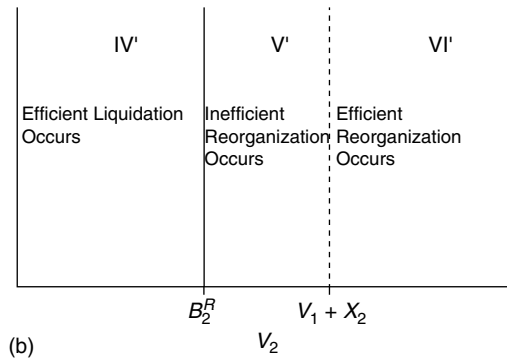


Figure 10.4B Conditions for inefficient reorganization to occur

liquidation versus reorganization, while the dotted vertical lines in both figures indicate the boundary between the regions where liquidation versus reorganization is economically efficient. (As in Figures 10.2A and 10.2B, liquidation is economically efficient when $V_2 < V_1 + X_2$ and reorganization is economically efficient otherwise.) In each figure, the two vertical lines delineate three regions, labelled IV, V, and VI in Figure 10.4A and IV', V', and VI' in Figure 10.4B. In regions IV and IV', liquidation is economically efficient and is chosen by the coalition and in regions VI and VI', reorganization is economically efficient and is chosen by the coalition. However, in region V of Figure 10.4A, the coalition chooses liquidation even though reorganization is economically efficient. Thus, liquidation occurs too often and some firms liquidate that should reorganize. Similarly in region V' in Figure 10.4B, the coalition chooses reorganization even

though liquidation is more efficient. Thus reorganization occurs too often and some firms reorganize that should liquidate. In general, inefficient reorganization is more likely to occur when the economic cost of the firm operating until period 2, $V_1 + X_2$, is high and/or when the cost of the bank loan B_2^R required to finance reorganization is low. Inefficient liquidation is more likely in the opposite situations.

Now consider how changing the treatment of secured creditors in reorganization affects the efficiency of the coalition's reorganization versus liquidation choice. In particular, suppose secured creditors are treated worse in reorganization because the partial payment of their claims is deferred until the reorganization plan is adopted in period 2, rather than being paid when the firm files to reorganize in period 1. This change means that the bank loan required to finance reorganization falls by the amount $s(S_1 + S_2)(1+r)$ and the condition for the coalition to choose reorganization becomes $V_2 > C(1+r)$, rather than $V_2 > (C + s(S_1 + S_2))(1+r)$. In Figure 10.3, the reduction in the size of B_2^R causes the region where the coalition chooses reorganization to increase in size. In Figure 10.4A, the solid vertical line shifts to the left, while the dotted vertical line remains unchanged. This makes region V smaller, so that inefficient liquidation is less likely to occur. However, in Figure 10.4B, the same leftward shift of the solid vertical line makes region V' larger and means that inefficient reorganization is more likely to occur. These changes result from the fact that reducing the priority of secured creditors' claims makes reorganization more attractive to the coalition by increasing the size of its pie slice, but does not affect the efficiency of reorganization so that the size of the pie remains the same. Reducing the favorable treatment of secured creditors in reorganization thus has ambiguous effects on the economic efficiency of reorganization versus liquidation decisions: while fewer inefficient liquidations occur, there are more inefficient reorganizations.

Finally, it is useful to consider the economic efficiency implications of the bankruptcy choice if the coalition were choosing between continuation outside of bankruptcy versus reorganization under Chapter 11. In our model, reorganization has efficiency costs because it generates extra transactions costs of C , while its benefit to the coalition consists entirely of redistribution from non-coalition creditors to the coalition. Reorganization is therefore inefficient relative to continuation outside of bankruptcy unless it generates some efficiency improvement that is outside of the model.

A. Hansmann and Kraakman's Proposal for Unlimited Liability for Damage Claims

Now turn to Hansmann and Kraakman's (H-K) proposal for unlimited liability by shareholders for claims of damage by tort victims. One important consideration is that the priority rule in bankruptcy affects whether shareholders actually bear the cost of paying damage claims or whether they are able to transfer this cost to creditors. If damage claims take high priority in bankruptcy, then at least part of the cost of repayment may be shifted to creditors rather than borne by shareholders; while if these claims take low priority, then most or all of the cost of repayment falls on shareholders, but the claims are less likely to be paid. Another important consideration is that it may be difficult to enforce unlimited liability (or any liability) by shareholders, since enforcement may require that the bankruptcy trustee sue individual shareholders and these suits are time-consuming and uncertain. Because bankruptcy trustees are likely to sue the deepest-pocketed shareholders, unlimited liability may also discourage rich shareholders from investing in corporations that create tort damages and therefore reduce the benefits of diversification. In addition, individual shareholders' liability is limited by personal bankruptcy law, where shareholders may benefit from high exemptions levels.¹⁹

Assume that if the firm liquidates in period 1, secured creditors claim their collateral and are repaid in full. Also suppose that unsecured creditors have higher priority than damage creditors in bankruptcy. They therefore are repaid next, but I assume that they receive less than the full value of their claims, so that $V_1 - S_1 - S_2 < U_1 + U_2$.²⁰ As a result, if the firm liquidates in period 1, damage creditors receive nothing from the liquidation process and so the entire cost of repaying their claims falls on shareholders. Shareholders' return if the firm liquidates in period 1 is therefore $-(T_1 + T_2)$, rather than zero as in the previous discussion.

Now, suppose the firm instead continues to operate outside of bankruptcy in period 1. The amount of the continuation loan, $B_2^C = (S_1 + U_1 + T_1)(1 + r)$, remains the same as in the previous discussion and covers full repayment of all debts due in period 1. In period 2, the firm liquidates and its value is again assumed to be V_2 . Suppose that in period 2, secured creditors are repaid first because they claim their collateral assets, the continuation loan is paid next, unsecured claims are paid next, and damage claims take lowest priority. However, unlike the discussion above, shareholders must now bear the remaining amount of damage claims that are not repaid in the liquidation process.

This means that secured creditors receive the first S_2 dollars of the firm's period 2 value, the bank receives the next B_2^C dollars, unsecured creditors

receive the next U_2 dollars, and damage claimants receive the next T_2 dollars, until the value of the firm's assets V_2 is exhausted. Damage claimants therefore receive nothing unless the firm's value exceeds $S_2 + B_2^C + U_2$, they receive all of the firm's additional value from $V_2 = B_2^C + S_2 + U_2$ to $V_2 = B_2^C + S_2 + U_2 + T_2$, and they receive no additional payment if V_2 exceeds the latter amount. Thus, if V_2 is between $B_2^C + S_2 + U_2$ and $B_2^C + S_2 + U_2 + T_2$, damage claimants receive partial payment from the liquidation process. Call this amount P_2 (for partial payment of period 2 damage claims). Shareholders owe damage claimants the remaining amount $T_2 - P_2$, if this amount is positive. Shareholders' return if continuation is chosen in period 1 is therefore $-T_2$ if $P_2 = 0$, $-(T_2 - P_2)$ if $0 < P_2 < T_2$ and 0 if $P_2 = T_2$. Because this return is higher than shareholders' return of $-(T_1 + T_2)$ if the firm liquidates in period 1, they prefer that the firm continue to operate outside of bankruptcy. Intuitively, choosing continuation allows shareholders to escape liability for current damage claims T_1 and to partially or fully avoid liability for future damage claims T_2 as well. Although imposing unlimited liability for damage claims makes shareholders worse off under both liquidation and continuation, they are better off if the firm continues to operate in period 1.²¹ Thus inefficient continuation decisions still would be expected to occur.

Turning to efficiency considerations, the change in shareholders' liability for damage claims has no effect on the efficiency of the bankruptcy decision, since the change is just a transfer from shareholders and/or debtholders to damage claimants. As in the discussion in the previous section, the increase in the probability that continuation is chosen by the coalition in period 1 causes the solid vertical line in Figure 10.2A to shift to the left. But because the efficiency of liquidation versus continuation is unaffected, the dotted vertical line in Figure 10.2A remains the same. As a result, region II becomes smaller and inefficient liquidation is less likely to occur. However, the change also causes the solid vertical line in Figure 10.2B to shift to the left, while the dotted vertical line remains the same. This means that region II' in Figure 10.2B becomes larger, so that inefficient continuation is more likely to occur. Thus, making shareholders liable for damage claims causes firms to continue operating more often, lowering the probability of inefficient liquidation, but raising the probability of inefficient continuation. Again, the efficiency effects of the change to unlimited liability are ambiguous.

Now turn to the effect of unlimited shareholder liability for damages on the efficiency of firms' decisions to reorganize in Chapter 11. H-K do not discuss whether their proposal would also apply unlimited liability for damage claims to shareholders of corporations that reorganize in Chapter 11. An issue with unlimited liability for damage claims is that it conflicts

with the goal of Chapter 11 that all creditors take a “haircut” and receive partial payment of their claims in order to facilitate the failing firm’s survival.

Suppose the coalition now chooses between liquidating versus reorganizing in period 1. Shareholders’ return in liquidation remains the same as before, $-(T_1 + T_2)$. Assume that if reorganization is chosen instead, damage claims receive the same treatment as in the discussion of reorganization in the previous section. Thus, damage claimants, like unsecured claimants, are assumed to receive u percent of their claims, with the payment being made in period 2. Choosing reorganization rather than liquidation in period 1 thus allows the coalition to defer paying all damage claims and to reduce the amount they pay damage claimants by $(1-u)$ percent. Because liquidation is now much less favorable to the coalition while reorganization remains equally favorable as before, the coalition has a stronger incentive to choose reorganization when liability for damage claims is unlimited in liquidation. But because the efficiency of the liquidation-reorganization choice is unaffected by the change to unlimited shareholder liability for damage claims, the result is that more inefficient reorganizations and fewer inefficient liquidations would occur.

These results suggest that if shareholders had unlimited liability for damage claims, they would choose to continue failing firms’ operations—either outside of bankruptcy or in Chapter 11 reorganization—more often and would choose liquidation less often. Thus, fewer failing firms would liquidate in bankruptcy. But the efficiency effects of the change in liability are ambiguous, since some of the additional continuations and reorganizations would be economically inefficient.

B. Bebchuk and Fried’s proposal for 75 percent priority for secured claims

The Bebchuk and Fried (B-F) proposal is that secured claims take priority for only 75 percent of the face value of their claims in bankruptcy, with the remaining 25 percent of their claims treated as unsecured. How would this proposal affect bankruptcy decisions and the efficiency of bankruptcy choices?

Consider first how the change in the treatment of secured claims affects the efficiency of the coalition’s choice between liquidation versus continuation outside of bankruptcy. The change does not affect the analysis of when it is economically efficient for the firm to liquidate, but it does affect the coalition’s bankruptcy decision. Suppose T_1 and T_2 are now redefined to represent non-adjusting claims due in periods 1 and 2, while U_1 and U_2 are redefined to represent unsecured, but adjusting (negotiated) claims due in the two periods. The total amount of the firm’s debt,

$S_1 + S_2 + U_1 + U_2 + T_1 + T_2$, remains the same and is again assumed to be greater than the period 1 value of the firm's assets, V_1 .

If the firm chooses to liquidate in bankruptcy in period 1, shareholders' return is zero regardless of whether secured creditors have priority for 75 percent or 100 percent of their claims. This is because all creditors' claims must be repaid in full before equity receives anything.²² Now consider the coalition's return if it chooses continuation outside of bankruptcy in period 1. Secured creditors are again assumed to take highest priority when the firm liquidates in period 2, but now their priority is only for 75 percent of their period 2 claims. The size of the new loan from the bank needed to finance continuation in period 1 remains the same as above, $B_2^C = (S_1 + U_1 + T_1)(1 + r)$. But the coalition's return under continuation rises as a result of the change, because secured creditors now take priority in period 2 only for 75 percent of their claims, with the remaining 25 percent becoming unsecured. This means that the first $.75S_2$ dollars of the firm's period 2 value goes to secured creditors, the next $B_2^C(1 + r)$ dollars go to the coalition, the next $.25S_2 + U_2 + T_2$ dollars go to creditors, and anything that remains goes to equity, until the firm's period 2 value V_2 is exhausted. The condition for the coalition to choose continuation over liquidation in period 1 therefore becomes $V_2 > .75S_2 + B_2^C$, rather than the previous condition of $V_2 > S_2 + B_2^C$ when secured creditors' claims took full priority in period 2. The coalition therefore chooses continuation more often.

In Figure 10.1, the change in secured creditors' priority causes the vertical line between the liquidation versus continuation regions to shift to the left, so that the coalition is more likely to choose continuation. Examining how this change affects efficiency, in Figure 10.2A the solid vertical line moves to the left, but the dotted vertical line remains in the same place. As a result, region II becomes smaller and inefficient liquidation is less likely to occur. But in Figure 10.2B, the solid vertical line also moves to the left, making region II' larger and inefficient continuation more likely to occur. Thus, reducing secured creditors' priority from 100 percent to 75 percent of their claims makes the coalition more likely to choose continuation outside of bankruptcy over liquidation in period 1, but does not make this choice more economically efficient. As a result, fewer inefficient liquidations occur under the reform, but there are more inefficient continuations. The change has ambiguous effects on the efficiency of firms' bankruptcy decisions.

Finally, examine the effect of B-F's proposed reform on the efficiency of firms' decisions to liquidate under Chapter 7 versus reorganize under Chapter 11. To do so, we return to the model of reorganization discussed above in which secured creditors are entitled to be paid s percent of

their claims in period 1 when the firm reorganizes. Under the B-F proposal, suppose secured creditors are now entitled to be paid the fraction $.75s$ of their claims in period 1 and an additional fraction $.25s$ of their claims in period 2. (This assumes that the overall payoff rates to secured and unsecured creditors under the reorganization plan, s and u , remain the same as before.)²³ Under these assumptions if the coalition chooses reorganization, the reorganization loan from the bank becomes $(C + .75s(S_1 + S_2))(1 + r)$ and this loan is repaid first in period 2. Thus, the first $(C + .75s(S_1 + S_2))(1 + r)$ dollars of the firm's period 2 value go to the coalition to repay the reorganization loan, the next $u(U_1 + U_2 + T_1 + T_2 + .25s(S_1 + S_2))$ dollars go to creditors as payments promised under the reorganization plan, and, if anything is left, it goes to equity. The condition for the coalition to choose reorganization over liquidation in period 1 therefore becomes $V_2 \geq (C + .75s(S_1 + S_2))(1 + r)$. This condition is more likely to be satisfied than the previous condition, which was $V_2 \geq (C + s(S_1 + S_2))(1 + r)$.

These changes mean that under the B-F proposal, the vertical line forming the boundary between the regions of liquidation versus reorganization in Figure 10.3 shifts to the left, making the coalition choose reorganization more often. However, the efficiency of liquidation versus reorganization remains unchanged, because the reform only redistributes returns among creditor groups. Thus, in Figure 10.4A, the solid vertical line moves to the left while the dotted vertical line remains in the same position. This means that inefficient liquidation is less likely to occur. In Figure 10.4B, the solid vertical line also moves to the left while the dotted vertical line again remains in the same position. This means that inefficient reorganization is more likely to occur. Overall, adopting B-F's proposed reform means that more reorganization would occur, but some of the additional reorganizations would be of firms that should liquidate.

B-F's proposal to downgrade 25 percent of secured creditors' claims to unsecured status thus lowers the cost to the coalition of continuing to operate the firm, either by remaining outside of bankruptcy or filing to reorganize under Chapter 11. But the coalition's return when it chooses liquidation remains unchanged. The result is that continuation outside of bankruptcy and reorganization would occur more often under the proposal, while liquidation in Chapter 7 would occur less often. But because the proposal has no effect on the efficient outcome, the efficiency implications are ambiguous: while fewer economically efficient firms would liquidate, more economically inefficient firms would be saved.

III. CONCLUSION

This chapter re-examines an old controversy in the law and economics literature: whether use of secured credit is economically efficient and what treatment of secured credit in bankruptcy leads to economically efficient outcomes. The literature has not generated a consensus answer and several authors have proposed changes in the treatment of secured claims in bankruptcy that they argue would improve efficiency. But a problem with the literature is that bankruptcy law affects economic efficiency in many ways and different authors focus on particular economic efficiency goals in arguing for their proposed treatments of secured creditors in bankruptcy. In this chapter, I focus on the central economic function of bankruptcy law—that of screening of failing firms in bankruptcy so that economically inefficient firms liquidate and economically efficient (although financially distressed) firms are saved. I analyse various priority rules for secured credit in bankruptcy and two proposals for reform of the treatment of secured credit in bankruptcy, all using efficient screening in bankruptcy as the criterion for economic efficiency.

The overall result is that none of the actual or proposed rules for treatment of secured credit in bankruptcy always improve efficiency. All of the proposed changes increase the number of firms that are saved by reorganizing in Chapter 11 bankruptcy or by continuing to operate outside of bankruptcy. But while some of the additional firms saved should be saved, others that are saved should shut down. There appears to be no general rule for treatment of secured claims in bankruptcy that always results in economically inefficient firms shutting down in bankruptcy and economically efficient firms being saved.

NOTES

1. Secured creditors have the right to be compensated for the loss of value of their collateral during the reorganization process if the value of their collateral exceeds the face value of their claims. Another way that collateral protects secured creditors is that, in bankruptcy, unsecured creditors' claims receive payment only after the transactions costs of bankruptcy are paid and therefore may receive only partial or no payment. But secured creditors are paid in full as long as the value of their collateral equals the value of their claims. See Adler (1998) for general discussion of secured credit.
2. An important problem with efficient bankruptcy screening is that neither managers nor creditors of bankrupt firms are likely to know whether their firms are economically efficient or inefficient, since the answer depends on the value of firms' assets in alternative uses. See White (1989) and (2016) for discussion of bankruptcy screening and the multiple efficiency objectives of bankruptcy.
3. An earlier model of the effect of secured debt on the total cost of capital is Scott (1977). Unlike Schwartz (1981), Scott argues that use of secured credit reduces firms'

- total cost of capital rather than leaving it unaffected. The difference between the two models is that Scott assumes that some of the unsecured creditors are tort claimants and government creditors that do not raise the interest rates they charge when firms issue secured debt, even though their claims become riskier. Scott's model thus anticipated the research both on the effect of secured debt on the total cost of capital and the effect of secured debt on unsecured claims that cannot adjust their loan terms when the firm becomes riskier (discussed below).
4. See Jackson and Kronman (1979), Levmore (1982) and Adler (1993) for additional discussion of whether/when using secured credit reduces the cost of monitoring. To the author's knowledge, there have been no empirical studies of monitoring costs and monitoring equilibria.
 5. Bebchuk and Fried (1996) also discuss the fact that, when firms have more non-adjusting creditors, secured creditors have a reduced incentive to bargain with managers to adopt and enforce restrictive covenants that would improve the efficiency of the firm's behavior. This is because part of the cost of not adopting or enforcing covenants is borne by non-adjusting creditors. The more non-adjusting creditors the firm has, the more inefficient are managers' incentives.
 6. This is Bebchuk and Fried's "fixed-fraction priority rule." They also discuss an "adjustable-priority rule" that would deny secured creditors priority over non-adjusting creditors, but allow them priority over other adjusting creditors. They show that, relative to full priority for secured creditors, both rules reduce the firm's incentive to invest in inefficiently risky projects and to create external harm, at the cost of raising the firm's total cost of capital and possibly preventing the firm from investing in economically efficient projects. But they do not address the effect of their priority rules on the efficiency of bankruptcy screening. Other proposals for super-priority of tort claims are discussed by Adler (1993) and LoPucki (1994).
 7. Other papers in this literature show that strategic default by managers is reduced when firms borrow from multiple creditors rather than a single creditor (Bolton and Scharfstein, 1996) and when creditors hold a mixture of long-term and short-term debt rather than only short-term debt (Berglof and von Thadden, 1994). Berkovitch, Israel and Zender (1998), and Povel (1999) examine how features of bankruptcy law affect managers' level of effort in managing their firms.
 8. For discussion of small firms' bankruptcy choices, see LoPucki (1983); for discussion of large firms' bankruptcy choices, see LoPucki and Whitford (1990), and Weiss (1990).
 9. If a party sustains damage but has a contractual relationship with the firm, then the harm is not part of X_2 because the contract presumably includes compensation.
 10. In particular, as uncertainty in future earnings increases, more firms choose to continue to operate outside of bankruptcy or reorganize even when liquidation is more efficient, because shareholders benefit disproportionately when firms' future earnings turn out to be high. See Stiglitz (1972) and White (1989) for discussion.
 11. For simplicity, the discount rate is assumed to be zero.
 12. Bebchuk and Fried (1996) use a similar model to analyse the effects of their proposed priority rules. Papers that discuss actual firms' bankruptcy decisions, such as LoPucki (1983), and LoPucki and Whitford (1990), also emphasize that these decisions are typically made by managers and a narrow group of creditors. Other coalition models of the bankruptcy decision include Bulow and Shoven (1978), White (1980 and 1989), and Ang and Chua (1980). Coalition creditors are assumed here not to have previously loaned money to the firm, but see Bizer and DeMarzo (1992) for a model in which creditors make sequential loans to a firm.
 13. Damage claims may still be in litigation, so that their value could be uncertain. However, in the model, I assume here that they have fixed values.
 14. The bank's new loan may take priority over unsecured claims and damage claims in period 2 for a variety of reasons, including that the continuation loan is secured or that the firm has an account at the bank and the bank can claim the funds in the account when default occurs. Other priority rules are discussed below. See Schwartz (1989) and

- Bebchuk and Fried (1996) for discussion of the relationship between loan priority, whether loans are secured, and rules that give priority to earlier-in-time lenders.
15. Note that inefficient liquidation occurs here even though there is no race among creditors to be first to collect. In most models, when firms in financial distress liquidate too often, it is because of the race to be first. For an example, see Webb (1991).
 16. If the firm's future earnings were uncertain rather than certain, then the coalition would be more likely to choose continuation. This means that region II' would become larger and region II would become smaller.
 17. Secured creditors receive interest during the Chapter 11 procedure only if the liquidation value of their collateral exceeds the face value of their claims. Thus, the payment rate of s may represent a mixture of higher payments to some secured creditors and lower payments to others.
 18. Liquidation clearly has transactions costs as well, but these are implicitly assumed to be smaller and are ignored here. The transactions costs of liquidation are limited by the fact that firms filing to liquidate often have very few assets not subject to secured creditors' liens and trustees' fees are a percentage of the value of assets they liquidate. It would be straightforward to add these costs to the model. See LoPucki (1983), White (1983), Weiss (1990), and Bris et al. (2006) for estimates of the transactions costs of reorganization versus liquidation for small and large corporations.
 19. H-K also discuss whether individual shareholders should share liability for tort damages proportionate to the number of shares they own or whether liability should be joint and several. In this discussion, I ignore distributional issues and assume that all shareholders share equally in the cost paying damage claims, or that all shares are owned by a single owner. For discussion of real world problems concerning unlimited liability, see Hansmann and Kraakman (1991), and LoPucki (1994).
 20. Damage claims often rank below other unsecured claims in bankruptcy, because they are involuntary claims that have not been negotiated with the firm. Unsecured creditors, in contrast, sometimes negotiate contractual provisions with the firm that give them higher priority in bankruptcy liquidation.
 21. The bank is willing to provide the loan as long as $V_2 \geq S_2 + B_2^c$. However, if this inequality is not satisfied, then shareholders are willing to bribe the bank up to $T_1 + T_2$ to make the continuation loan, since they must pay this amount to damage claimants if the firm liquidates in period 1. Consequently, the bank is willing to make the continuation loan when the firm's period 2 value is as low as $S_2 + B_2^c - (T_1 + T_2)$.
 22. Bebchuk and Fried (1996) assume that the 75 percent treatment of secured creditors' claims would not apply in bankruptcy liquidation, since secured creditors generally seize their collateral prior to the firm's Chapter 7 filing. They also argue that secured creditors in practice get only partial priority in Chapter 11 reorganizations, because they do not receive interest during the reorganization proceeding if their claims are undersecured and because their compensation under the reorganization plan may be in the form of a risky note rather than cash.
 23. Changes in the bargaining power of creditors' groups might cause these payoff rates to change.

REFERENCES

- Adler, B.E. (1993), "An Equity-Agency Solution to the Bankruptcy-Priority Puzzle," *J. of Legal Studies* 22:1, 73-98.
- Adler, B.E. (1998), "Secured Credit Contracts," in *The New Palgrave Dictionary of Economics and The Law*, edited by Peter Newman, vol. 3, p. 405-10. London: Macmillan Reference Limited.
- Ang, J.S. and J.H. Chua (1980), "Coalitions, the Me-First Rule, and the Liquidation Decision," *Bell Journal of Economics* 11:1, 355-9.

- Baird, D. and T.H. Jackson (1984), "Treatment of Diverse Ownership Interests: A Comment on Adequate Protection of Secured Creditors in Bankruptcy," *Univ. of Chic. Law Review* 51, 9.
- Bebchuk, L. and J. Fried (1996), "The Uneasy Case for the Priority of Secured Claims in Bankruptcy," *Yale Law Journal* 105, 857.
- Berglof, E. and E.L. von Thadden (1994), "Short-term Versus Long-term Interests: Capital Structure with Multiple Investors," *Quarterly J. of Econ.* 109, 1055–84.
- Berkovitch, E., R. Israel and J.F. Zender (1997), "Optimal Bankruptcy Law and Firm-specific Investments," *European Econ. Rev.* 41, 487–97.
- Bester, H. (1994), "The Role of Collateral in a Model of Debt Renegotiation," *J. of Money, Credit, and Banking* 26, 72–85.
- Bizer, D.S. and P.M. DeMarzo (1992), "Sequential Banking," *J. of Political Economy* 100:1, 41–61.
- Bolton, P. and D. Scharfstein (1996), "Optimal Debt Structure and the Number of Creditors," *J. of Political Economy* 104, 1–25.
- Bris, A., I. Welch and N. Zhu (2006), "The Costs of Bankruptcy: Chapter 7 Liquidation versus Chapter 11 Reorganization," *J. of Finance* 61:3, 1253–303.
- Bulow, J. and J. Shoven, (1978), "The Bankruptcy Decision," *Bell J. of Econ.* 9, 437–56.
- Hansmann, H. and R. Kraakmann (1991), "Toward Unlimited Shareholder Liability for Corporate Torts," *Yale Law Journal* 100, 1879.
- Jackson, T.H. (1982), "Bankruptcy, Non-Bankruptcy Entitlements, and the Creditors' Bargain," *Yale Law J.* 91, 857.
- Jackson, T.H. and A. Kronman (1979), "Secured Financing and Priorities Among Creditors," *Yale Law J.* 88, 1143.
- Levmore, S. (1982), "Monitors and Freeriders in Commercial and Corporate Settings," *Yale Law J.* 92, 49.
- LoPucki, L.M. (1983), "The Debtor in Full Control: Systems Failure Under Chapter 11 of the Bankruptcy Code?" *American Bankruptcy Law J.* 57, 247–73.
- LoPucki, L.M. (1994), "The Unsecured Creditors Bargain," *Virginia Law Rev.* 80, 1887.
- LoPucki, L.M. and W. Whitford (1990), "Bargaining over Equity's Share in the Bankruptcy Reorganization of Large, Publicly-held Companies," *Univ. of Penn. Law Rev.* 139, 125–96.
- Modigliani, F. and M.H. Miller, "The Cost of Capital, Corporation Finance and the Theory of Investment," *American Ec. Rev.* 48:3, 261–97 (1958).
- Picker, R.C. (1992), "Security Interests, Misbehavior, and Common Pools," *U. Chic. L. Rev.* 59, 649–50.
- Povel, P. (1999), "Optimal 'Soft' or 'Tough' Bankruptcy Procedures," *J. of Law, Econ. and Org.* 15, 659–84.
- Schwartz, A. (1981), "Security Interests and Bankruptcy Priorities: A Review of Current Theories," *J. of Legal Studies* 10:1, 1–37.
- Schwartz, A. (1989), "A Theory of Loan Priorities," *J. of Legal Studies* 18:2, 209–61.
- Scott, J.H. (1977), "Bankruptcy, Secured Debt and Optimal Capital Structure," *J. of Finance* 32, 1–19.
- Stiglitz, J.E. (1972), "Some Aspects of the Pure Theory of Corporate Finance: Bankruptcies and Take-overs," *Bell Journal of Economics* 3, 458–82.
- Triantis, G. (1992), "Secured Debt under Conditions of Imperfect Information," *J. of Legal Studies* 21:1, 225–58.
- Webb, D.C. (1991), "An Economic Evaluation of Insolvency Procedures in the United Kingdom: Does the 1986 Insolvency Act Satisfy the Creditors' Bargain?" *Oxford Econ. Papers* 43, 139–57.
- Weiss, L.A. (1990), "Bankruptcy Resolution: Direct Costs and Violation of Priority of Claims," *J. of Financial Econ.* 27, 285–314.
- White, Michelle J. (1980), "Public Policy Toward Bankruptcy: Me-First and Other Priority Rules," *Bell J. of Economics* 11:2, 550–64.
- White, Michelle J. (1983), "Bankruptcy Costs and the New Bankruptcy Code," *J. of Finance* 38, 477–88.

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White, Michelle J. (1989), "The Corporate Bankruptcy Decision," *J. of Economic Perspectives* 3, 129–52.

White, Michelle J. (2016), "Economics of Corporate and Personal Bankruptcy Law," in *Oxford Handbook of Law and Economics*, Francesco Parisi, (ed.). Oxford, UK: Oxford University Press.