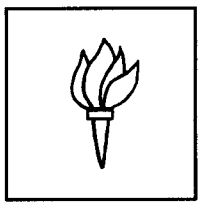

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Abstract

Financial Distress and Restructuring Models

In recent years, the literature on financial distress has been enriched by the development of formal models. This paper develops a synthesis of that formal analysis, linking it to related finance literature and corporate strategies for distressed financial restructuring. Several key assumptions generate different results which predict the effects of financial distress on investment efficiency and restructuring strategy. Central to these strategies are the recontracting arrangements proposed between owners, creditors and other relevant stakeholders. The critical factors in the alternative models are: (1) the term structure of the firm's debt, (2) the role of the seniority of debts, (3) the effects of exchange offers, (4) the effects of an automatic stay on debt payments, and (5) the role of alternative voting rules.

Financial Distress and Restructuring Models

The basic social motivation for the legal reorganization process is to preserve organization values. Reorganization and bankruptcy laws have sought to enable financially distressed firms to restructure and to return to viability. The laws seek to provide a recontracting process that will enable financially distressed firms to once again invest in growth opportunities. Many issues in this recontracting process have been identified. Can the distress be removed and sufficient going concern values manifest or will liquidation result in higher values? How can the interests of the central parties (owners, managers, creditors, consumers) be balanced? What are the effects on security prices and claims of creditors and others?[1]

In recent years, the legal rules for bankruptcy, reorganization and other recontracting processes have been reassessed. Proposals have been made to change the 1978 Bankruptcy Code (or, indeed, eliminating the Chapter 11 reorganization option entirely), which prevails in the United States, as well as to reform the bankruptcy laws of many other countries. Issues of legal reform have been analyzed by Roe [1983], Bebchuk [1988], Adler [1992] and most recently and dramatically by Bradley and Rosenzweig [1992]. Others have shown that there are major problems

[1]It should be noted that in recent years a number of heretofore illiquid claims have been "securitized" based on a new "market" for the trading of non-registered claims such as bank loans and trade credit.

with the Bradley-Rosenzweig analysis, e.g., Warren [1992], Bhandari and Weiss [1993], LoPucki [1993] and Altman [1993a].

Important ramifications of the bankruptcy process include, among others, (1) the time in bankruptcy, (2) the effects on security prices, (3) default losses, (4) application of absolute priority versus relative priority rules, (5) the managerial incentives and the effects on managerial turnover and executive compensation, (6) the role of exchange offers, and (7) the performance of the firm after emerging from bankruptcy proceedings. Our understanding of the relationships among these elements has been advanced by the development of formal models of financial distress by a number of writers, (Myers [1977], Gertner and Scharfstein [1991], Jensen and Meckling [1976], Berkovitch and Kim [1990], Diamond and Dybvig [1983], Altman [1993b], Brown, James and Mooradian [1993], Franks and Torous [1989], Bulow and Shoven [1978], Scott [1981], and Hart and Moore [1994]. Much empirical evidence has been gathered on the issues set forth.[2]

This paper seeks to provide a synthesis of the recent theoretical ideas linking them, where possible, to observed recontracting examples. We begin with relatively simple numerical models which convey the intuition and logic of the formal models and then we develop some more general relations. In evaluating alternative institutional restructuring arrangements, the test

[2]Recent empirical works on the post-reorganization performance of Chapter 11 firms consider both the average operating performance [Hotchkiss, 1994] and the restructured firms ex-post leverage [Gilson, 1994]. Both studies find that the emerged firms perform relatively poorly and imply that the process can be improved so that firms emerging from Chapter 11 will perform better.

criterion we employ is the effect on investment efficiency and, where possible, restructuring strategy, because these are central to economic performance and efficient allocation of resources.

We formulate alternative models to illustrate the impact of some of the basic forms of contractual arrangements. We define financial distress as the situation in which the current value of the firm is less than the claims of creditors. We begin with the certainty case, then consider uncertain future cash flows. Our alternative models consider (1) the term structure of the firm's debt, (2) the role of the seniority of debts, (3) the effects of exchange offers, (4) the effects of an automatic stay on debt payments, and (5) the role of alternative voting rules.

The basic assumptions of the analysis are briefly summarized.[3] All parties are risk neutral. The management of the firm maximizes the welfare of shareholders. Other things being equal, the management of a firm prefers to make investments. The debt of the firm is owned by atomistic creditors who cannot coordinate their actions. In the initial models, banks have the same point of view as the shareholders so there is no role for them to play; this assumption simplifies the calculations without altering the basic intuition of the models. Subsequently, we consider some special characteristics of financial institutions such as banks.

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[3]We will relax some of these assumptions at a later point.

I. Certainty with the Firm Value Less Than Debt Claims

Model I is from Myers [1977] in which the basic assumption is that the value of the insolvent firm, without investment projects, is lower than the face value of its debt as shown in Balance Sheet I.

XYZ Company Balance Sheet I

Liquid Assets	$70	Debt	$100
		Equity	(30)

The firm has an investment opportunity requiring an outlay of $80 with a gross present value cash flow of $90. Hence, the net present value (NPV) of the project is $10. The firm would have to raise $10 from new equity since the investment outlay required is $80 and there is only $70 of liquid assets available. Since the gross present value of cash inflows from the investment is $90, and the claim of the creditors is $100, debtholders would receive the entire $90 and the equityholders would receive nothing. Assuming no divergence of interests between equityholders, old or new, we can treat them as the same party.[4] Since the equityholders would be unwilling to make a $10 equity investment and receive no return, one form of underinvestment occurs.

The reason that underinvestment occurs is that the value of the firm (without the project) ($70) plus the net benefits of the new project ($10) is lower than the face value of its debt ($100).

[4]This assumption is not critical. An alternative assumption is that new shares are fairly priced in the market such that the expected return to new equityholders is 0. Results under these two assumptions are identical. For simplicity, throughout this paper, we assume that there is no divergence of interests between old and new equityholders.

Shareholders cannot receive returns from the project unless the NPV of the project is higher than $30. This implies that they will forego positive NPV projects whose NPV is lower than $30.

Indeed, most firms that are insolvent and restructure, do so by attempting to sell assets rather than investing in new ones. Notice that the assumptions of certainty and risk neutrality are important here since there could be cases where the NPV is negative but an outcome, no matter how unlikely, may be sufficiently high to lift the firm into a positive equity position.

Result 1: If (1) there is no uncertainty about the cash flows of the project, and (2) a firm's market value is lower than the face value of its debt, there is an underinvestment problem. As we will show, the condition that there is no uncertainty about the cash flows of the project is important. Indeed, when we relax this assumption, an overinvestment problem can occur.

II. Uncertainty with Respect to the Returns from the Investment Project

In Model II, the uncertainty of the future cash flows from the investment gives rise to a conflict of interest between the creditors and the equityholders that was first described in Jensen and Meckling [1976]. The assumptions of the numerical example are the same as in Model I except that the cash flow of the project is a random variable. The returns from the investment will have an 0.5 probability of a cash flow of $0 and an 0.5 probability that the cash flow will be $130. Again, the basic issue is whether the

project will be financed if the firm seeks to sell new equity to raise the necessary funds.

The NPV of the project is given by equation (1):

$$NPV = P_b X_b + P_g X_g - I \qquad (1)$$

where:

P_b = probability of the bad state

P_g = probability of the good state

X_b = cash flow in the bad state

X_g = cash flow in the good state

I = investment outlay.

Under the assumptions of the present example, we have:

$$(.5(\$0) + .5(\$130) - \$80) = -\$15.$$

We next calculate the payoff to shareholders as shown in equation (2).

$$RSH = P_b \max[(X_b-D),0] + P_g \max[(X_g-D),0] - (I-Y) \qquad (2)$$

where the new symbols are:

D = face amount of debt

I = investment outlay

Y = liquid assets of the firm.

For our example, to make the investment, \$10 has to be raised because I exceeds Y by that amount. In the bad state when the cash flow is \$0, shareholders receive nothing. If the cash flow is \$130, they receive \$130 - 100 = \$30. The expected payoff for new shareholders is:

$$.5(\$0) + .5(\$130 - \$100) - \$10 = \$5.$$

Therefore, the project will be financed by new equity and there

exists an overinvestment problem since the NPV of the project is negative.

To see why overinvestment occurs under uncertainty, it is useful to consider that equity is a call option for shareholders. In this example, by investing, shareholders receive an option to buy the firm at an exercise price of $100 (face value of the debt). Obviously, the option is only exercised when the cash flow is $130, so the value of this option is .5($130 - $100) = $15. However, shareholders obtain this option by paying only $10. The difference, $5, comes from the loss to creditors.[5] The reason overinvestment occurs is that by investing, shareholders can force creditors to sell a call option below cost. This causes an overinvestment problem. Moreover, from the properties of call options we know that shareholders will prefer more risky projects, other things being equal. Emery and Finnerty [1991] make the same point in their discussion of financial distress and observe that the shareholders' position "can be easily understood by applying the Options Principle to the characterization of stock as an option" [p. 235].

Result 2: If (1) there is uncertainty about the cash flows of the project, and (2) a firm's market value is lower than the face value of its debt, underinvestment is less likely than under certainty. A limitation of the specific numerical example is that

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[5]The expected value of the debt when the investment is made is: (.5($0) + .5($100)) = $50. Without the investment, the debtholders would receive $70. Hence the investment causes a loss of $20, reflecting the negative NPV of $15 from the investment and the $5 gain accruing to the equity investors at the expense of the creditors.

the variability in the influential variables is suppressed. For example, the second condition expresses the relationship between the amount received by creditors if the firm were liquidated (L_D=Y) versus the face value of debt (D). For the above example, the cash flow in the good state which supports efficient investment is $X_g \geq$ \$160. This is the solution to equation (1) for NPV equal to or greater than zero:

$$NPV = P_bX_b + P_gX_g - I \geq 0 \qquad \textbf{(1a)}$$

For the present example, we have:

$$.5(\$0) + .5(X_g) - \$80 = \$0$$

This solution is the horizontal line shown in Figure I at X_g = \$160.

Figure I indicates that depending upon the relationship between the value of liquid assets (L_D) and the face value of debt (D), overinvestment or underinvestment may occur.[6] The general expression for the return to shareholders' line (RSH) <u>when D may vary</u> is shown in equation (2a):

$$RSH = P_b \max[(X_b-D),0] + P_g \max[(X_g-D),0] - (I-Y) - (Y-D) \geq 0 \qquad \textbf{(2a)}$$

Therefore, equityholders will make the investment if and only if the payoff from investing (RSH) is larger than the payoff from no investment (max[(Y-D),0]).

For D = \$70, Y = \$70, and I = \$80, the solution to equation (2a) is:

$$.5(X_g-\$70) - (\$80-70) - (\$70-70) = \$0$$

$$.5X_g - \$35 - \$10 = \$0$$

$$.5X_g = \$45$$

$$X_g = \$90$$

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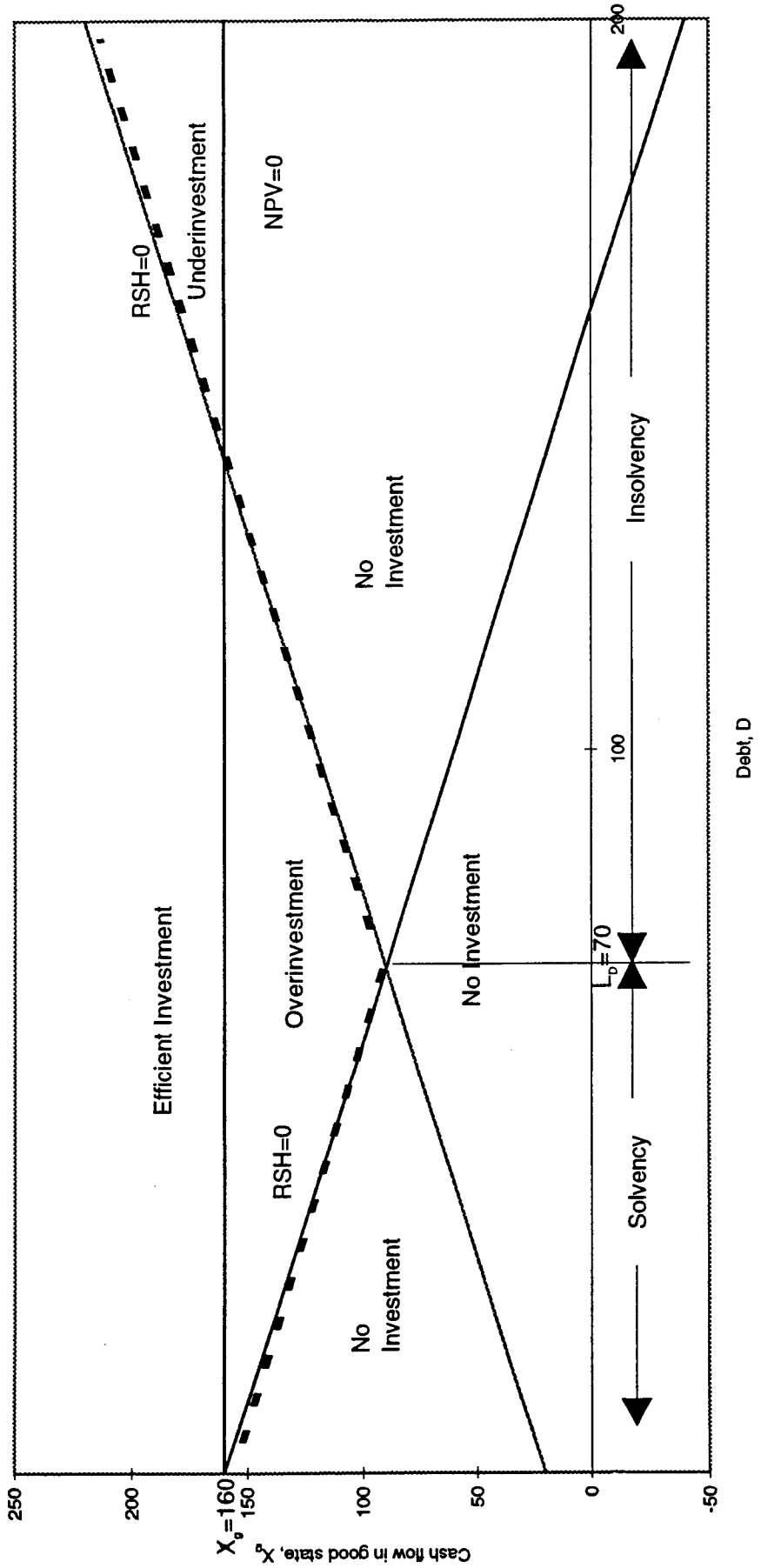
[6]Thanks to Jonathan Howe for this generalization.

Figure I

Relation between Debt Levels and Efficient Investment



Thus at a cash flow in the good state (X_g) of \$90, the return to shareholders would be zero (actually, a small positive amount) so that investment would take place even though NPV would be less than zero at an X_g = \$90. This point represents the low point of the RSH equals zero curve in Figure I.

More generally, for X_b = \$0, and $P_b = P_g$ = .5, we seek a relation between X_g and D as depicted in Figure I. Equation (2a) now becomes:

$$.5(X_g-D) - (\$80-70) - (\$70-D) = \$0$$

For $D < L_D$, we have the declining left segment of the RSH = \$0 line in Figure I. It is:

$$.5X_g - .5D - \$10 - \$70 + D = \$0$$

$$.5X_g = \$80 - .5D$$

$$X_g = \$160 - D \qquad \text{for } D < L_D$$

For $D \geq L_D$, we have the rising right segment of the RSH = \$0 line in Figure I. It is:

$$RSH = P_g(X_g-D) - \max[(L_D-D),0] - \$10 = 0 \qquad \text{for } D \geq L_D$$

When $D \geq L_D$, the $\max[(L_D-D),0]$ term is always zero, so we have

$$.5(X_g-D) - \$10 = 0$$

or

$$.5X_g - .5D - \$10 = 0$$

$$X_g = \$20 + D$$

Thus as shown in Figure I, for a debt level between zero and \$140, the return to shareholders is positive but NPV = 0, so overinvestment takes place. At a debt level greater than \$140, the return to shareholders is negative but NPV is greater than zero. Hence, underinvestment occurs. But in general, when the

liquidating value of the firm (L_D) is less than the face value of its debt (D), and with uncertainty of cash flows in alternative future states, the greater is the likelihood of an overinvestment problem.

An example of overinvestment was the purchase of Eastern Airlines by Continental Airlines that occurred soon after Continental emerged from Chapter 11 in 1986. This gamble turned out to be a disaster for both the equityholders of Continental and creditors as the merged entity faltered, Eastern Airlines went bankrupt in 1989 and eventually liquidated and Continental filed for Chapter 11 once again in 1990.[7]

III. Influence of Debt Maturity

The role of debt maturity is introduced involving two periods, dates 1 and 2. The balance sheet of the firm is the same as assumed in the previous examples shown in Balance Sheet I. The firm had public debts totaling $100. Debt maturity is now introduced with the ratio of short-term debt to total debt defined as q, with $0 \leq q \leq 1$.[8] Short-term debt matures at date 1, before the investment is made; long-term debt matures at date 2, after the cash flows from the investment are realized. Again, the outcome of the investment is uncertain. The negative state of the world

[7]For a discussion of multiple Chapter 11 filings, (sometimes called Chapter 22s), see Altman [1993b].

[8]This is the symbol choice employed by GS (1991); it has no relation to Tobin's q.

occurs with a probability of 0.5 in which the cash flow is $20. With 0.5 probability, the positive state of the world occurs with cash flows of $X (of course, X > $20).[9]

With the above information, we can calculate the efficient investment criterion. The NPV of the project is:

$$NPV = .5X + .5(\$20) - \$80 = .5X - \$70.$$

If the investment decision is efficient, the investment should be made if NPV is greater than $0, or X ≥ $140. This will be our point of reference for the required level of an efficient investment.

In the following, we vary the value of q to illustrate the important role of debt maturity.

A. All Debts Are Long Term

In Model IIIA, we assume that q = 0, so all $100 debt is long term. This is equivalent to Model II. The firm can use the liquid assets ($70) to partially finance the project and needs to raise $10 additional (from the old shareholders). At date 2, the amount of public debt due is $100. If the cash flow is $20, shareholders receive nothing (and creditors receive $20). If the cash flow is $X, shareholders receive X - $100. Hence the gain to shareholders is:

$$.5(X - \$100) + .5(\$0) - \$10 = .5X - \$60.$$

Shareholders will make the investment if .5X - $60 ≥ 0, or X ≥

[9]The cash flow assumptions are slightly altered to better illustrate the principles involved.

$120. Since the required X under the efficient investment criterion is $140, the firm has an overinvestment problem.

The reason for the overinvestment is clear. As in Model II, shareholders can gamble on creditors' money. As before, if the investment is not made, creditors will receive the liquid assets. By using liquid assets to finance the project, shareholders receive an underpriced option. Therefore, the problem is an overinvestment one.

B. All Debts are Short Term

In Model IIIB, all debts are short term (q = 1), so that the entire $100 debt obligation has to be repaid before the investment is made. Therefore, to make the investment at date 1, the firm must raise: $100 + $80 - $70 = $110. For this example, we assume that the funds raised are equity so that the firm becomes an all equity firm. In the bad state, the cash flow is $20 and the shareholders receive $20. In the good state, the cash flow is $X. The expected payoff to the shareholders from making the investment is:

$$.5X + .5(\$20) - \$110 = .5X - \$100.$$

Shareholders will make the investment if $.5X - \$100 \geq 0$, or $X \geq \$200$. Compared to the efficient investment criterion of $X \geq \$140$, the firm could easily have an underinvestment problem. The required X is much higher solely because of the debt's maturity.

As in Model I, the source of the problem here is that the value of the firm ($70) is lower than the face value of its debt

($100). Since all debts are short term, the firm has to pay the difference, $30, to creditors before it makes the investment. Since the good state occurs with a probability of 0.5, the additional amount of X required is therefore $60. Therefore, the XYZ Co. has an underinvestment problem. When the firm has to pay off a preexisting debt before it can invest, this is like a "tax" which causes an underinvestment problem. Alternatively, when the owners can exercise their option to buy out the creditors at a cost below the value of the option, this is a subsidy which results in overinvestment.

Result 3: The maturity structure of debt influences investment efficiency. The shorter the maturity structure of debt the more likely the firm will have an underinvestment problem. The longer the maturity structure of the debt, the more likely that the firm will have an overinvestment problem.

Restructuring the Debt Maturity. The above example of a debt maturity situation leading to underinvestment can be mitigated or even eliminated by strategies for altering the liability term structure, known as distressed extensions or exchanges. Extension results in a lengthening of the maturity of all or a portion of the debt to enhance the probability of repayment and keep the firm from the higher cost alternative -- Chapter 11 bankruptcy-reorganization.[10] In our case, the investment is reduced by the

[10]A number of studies have compared the out-of-court restructuring arrangement with the more legalistic Chapter 11 procedure. Although all studies, e.g., Franks & Torous [1989], Gilson, John & Lang [1990], and Helwege [1994], conclude that out-of-court arrangements, usually exchanges, are less costly when they are successful, too often the arrangement is not successful and Chapter 11

amount of the debt payment that is deferred.[11] Exchanges result in substituting equity for debt.

Distressed exchanges have become quite popular in the last ten to fifteen years as firms which issued high yield "junk" bonds tried to work out what was felt to be short-term problems due to the overleveraging of a basically sound operating company. Exchanges usually involve either a total exchange of preferred and/or common equity for debt or a combination of a partial equity exchange and a partial new, but extended, debt.

The classic distressed exchange involves a firm whose operating and financial condition has deteriorated due to both chronic and cyclical economics and attempts to restructure both its asset and liability structures. For example, the large International Harvester Corporation farm equipment, truck and bus manufacturer was on the verge of total collapse in 1980-1982. The firm first exchanged its interest payments due to banks for preferred stock and extended both its interest payments to creditors and payables to suppliers. Next, it converted its short-term bank debt (1-3 years) to longer term "junk" bonds (10-12 years) and finally exchanged its common equity in its newly named entity, Navistar International, for the "old" junk bonds. These distressed restructuring strategies resulted in the firm's very survival and the short- and long-term creditors were paid out in

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is merely postponed.

[11]If the short-term debt can be "rolled-over," this is effectively an extension of the debt maturity. Healthy firms do this routinely but it is much less common in distressed and insolvent entities.

full.[12]

C. Debt Maturity for Efficient Investment

In the two previous examples, we illustrated the extreme cases of q = 0 and q = 1. Model IIIC calculates a value of q that eliminates both the overinvestment and underinvestment problem, further illustrating the role of debt maturity. For example, if q = .2, the amount of short-term public debt is $20 and the amount of long-term public debt is $80.

To make the investment, the XYZ Co. uses liquid assets plus $10 of new equity to finance the project and has to raise $20 of additional equity to pay off the short-term debt. Since the $30 new financing is equity, at date 2 the amount of debt due is $80. If the cash flow is $20, the shareholders receive nothing and the public debtholders receive $20. If the cash flow is $X, shareholders receive $X - $80. The shareholders' profit from investing is:

$$.5(\$0) + .5(X - \$80) - \$30 = .5X - \$70.$$

Shareholders will invest if $.5X - \$70 \geq \$0$, or $X \geq \$140$. The investment decision in this case is efficient. There is neither an over or underinvestment problem.

Result 4: Our demonstration that it is possible to choose a q (a maturity structure of the debt) that will enable the firm to

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[12]In addition, and perhaps most important, International Harvester sold its farm equipment division and, combined with the cash flow savings on debt, was able to invest in plant modernization and new models of its truck and bus production.

make an efficient investment decision suggests another relationship. Recall the underlying assumption that the cash or liquid assets of the firm (Y) are less than the face value of total debt. If $X (cash flows from the investment) is subject to higher uncertainty (overinvestment problem), q can be higher (more short-term debt) creating an offsetting underinvestment tendency that results in efficient investment. If $X is subject to less uncertainty (underinvestment problem) q can be lower (more long-term debt) creating an offsetting overinvestment tendency that results in efficient investment.

D. Toward Generalizations

We can generalize the Model III relationships. Equation (1), which is the NPV equation, remains unchanged. However, equation (2), the return to shareholders becomes equation (2b) in which the debt maturity relation (q) between short-term and long-term debt is recognized:

$$RSH = P_b \max[X_b-(1-q)D,0] + P_g \max[X_g-(1-q)D,0] - I + Y - qD \geq 0 \quad \textbf{(2b)}$$

Also, we make explicit a third condition that the market value of the debt claims must not fall below the original liquidating value

of the firm (L_D) which the creditors could have realized.[13] This is shown as equation (3):

$$V_D = qD + P_b \min[X_b,(1-q)D] + P_g \min[X_g,(1-q)D] \geq L_D \qquad \textbf{(3)}$$

We provide numerical examples of the two sets of equations in Table 1. We hold L_D fixed at \$70 and the face value of debt at \$100; X_b = \$40 and X_g \$120 with equal probabilities and the required investment is \$80. We illustrate solutions for NPV and RSH = \$0 and for $V_D = L_D$.

Table 1

Illustrative Solutions for NPV and RSH = \$0 and $V_D = L_D$

Model II $q = \$0$, $X_b = \$40$, $X_g = \$120$

$NPV = .5(\$40) + .5(\$120) - \$80 = \$0$ **(1)**

$RSH = .5(\$0) + .5(\$120-100) - \$80 + \$70 = \$0$ **(2b)**

$V_D = .5(\$40) + .5(\$100) = \$70 = L_D$ **(3)**

Model III $q = .2$, $X_b = \$40$, $X^g = \$140$

$NPV = .5(\$20) + .5(\$140) - 80 = 0$ **(1)**

$RSH = .5(\$0) + .5(\$140-80) - \$80 + \$70 - \$20 = \$0$ **(2b)**

$V_D = .2(\$100) + .5(\$20) + .5(\$80) = \$70 = L_D$ **(3)**

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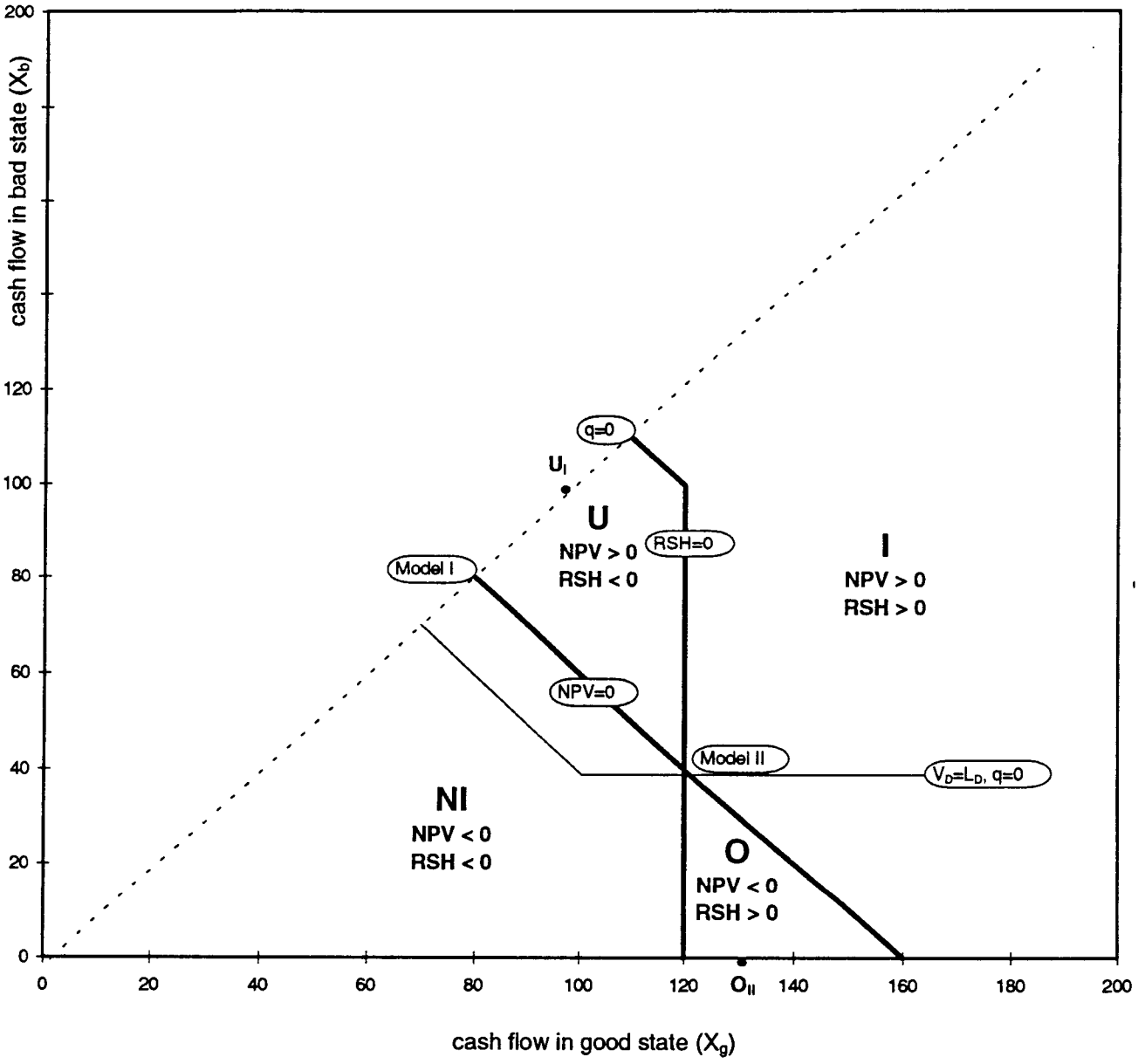
[13]This relationship conforms with the concept of "adequate protection"--a clause in the Bankruptcy Code (___) which "guarantees" certain secured creditors a return at least as much as the value of the collateral at the time of the claim confirmation--usually shortly after the bankruptcy petition is filed. If the reorganization is not successful and the liquidation value falls below the amount of adequate protection, then indeed these creditors would have been better off with liquidation at an earlier date. This conforms to the overinvestment sector O in Figure 11. Therefore, the V_D=L_D line in Figure 11 illustrates whether equityholders can take advantage of debtholders. In most cases, adequate protection results in attractive returns to the debtholder, eg., the creditors who owned Youngstown Sheet & Tube secured bonds in the parent company's (LTV Corp.) bankruptcy. Unlike the Eastern Airlines case, the extended Chapter 11 proceeding of LTV did not negatively impact those creditors who were adequately protected.

The results in Table 1 are illustrated in Figure II. The results of Model I and Model II are depicted for q = 0. The isolines for equations NPV = 0 and RSH = 0 are labeled. The requirement of $V_D = L_D$ is shown. The special case of Model I is where $X_b = X_g = \$80$. Model II is shown as the point 0_{II} at an $X_b = 0$ and $X_g = \$130$, where NPV is negative but RSH is positive, indicating overinvestment.

Four areas are designated in Figure II. These sections are labeled by the following abbreviations representing four different types of investment actions:

Figure II

Models I to III



NI = no investment (NPV<0, RSH<0)

U = underinvestment (NPV>0, RSH<0)

O = overinvestment (NPV<0, RSH>0)

I = efficient investment (NPV>0, RSH>0)

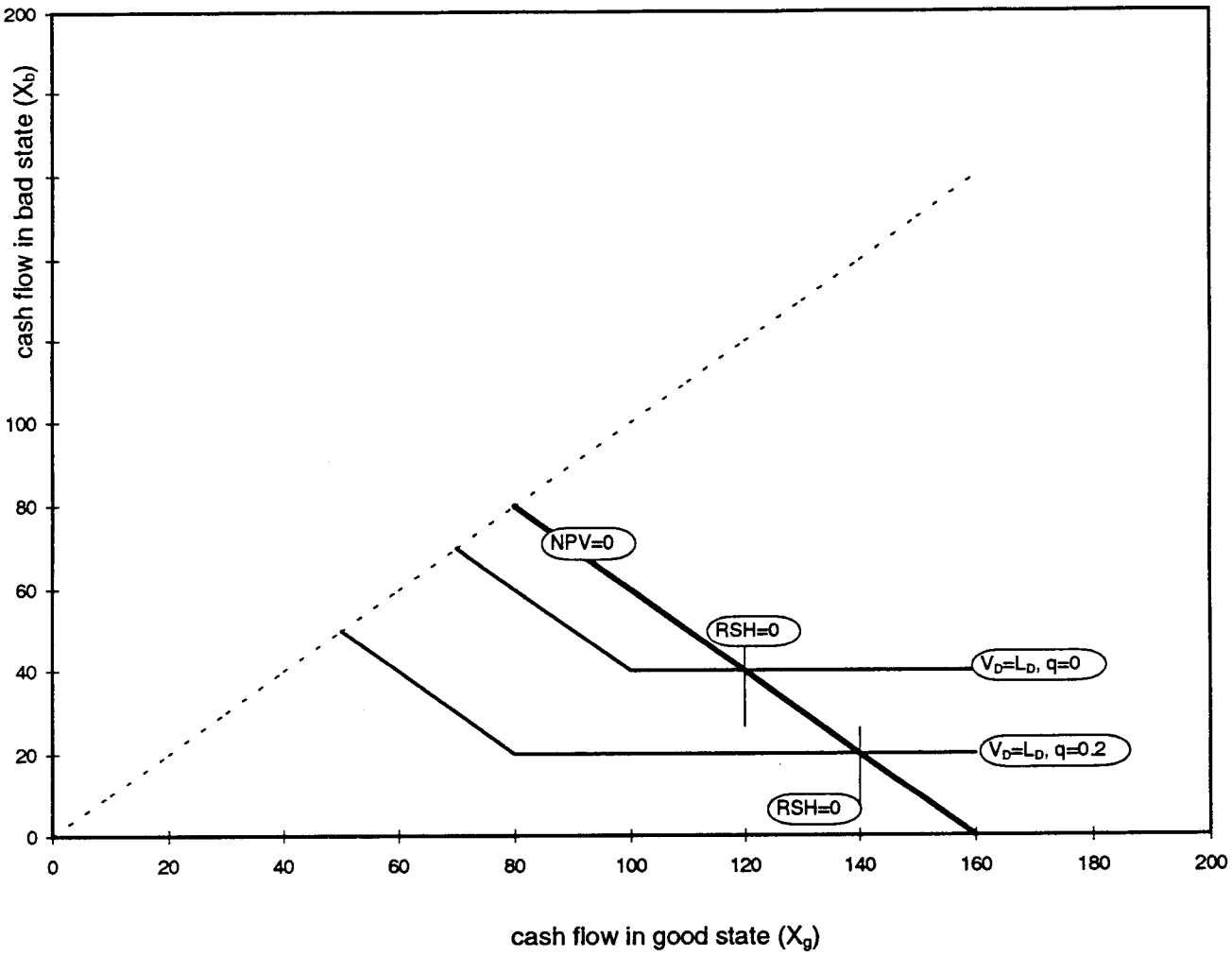
Efficient investment takes place only in the area where NPV and RSH are both positive and the market value of debt claims does not fall below their original liquidation values.

In Figure III, both the V_D line and the RSH line are shown to shift with different values of q. When q is raised from 0 to .2, meaning that short-term debt goes from 0 to 20% of total debt, the intersection of the three decision lines is shifted. The $V_D = L_D$ line shifts downward with the increased q. This is because the debtholders receive more up front in the form of the short-term debt that has to be repaid before the investment is made. Hence they can accept a lower cash flow in the bad state and provide more for the shareholders in the good state. The RSH = $0 line shifts to the right with rising q. This is for reasons symmetrical to those for the downward shifting of the V_D line. Shareholders must now receive a higher return in the good state to offset the tax that must be paid to retire the short-term debt as a condition for making the investment.

In Tables 2 and 3, disequilibrium conditions are illustrated for Models II and IIIC for cash flows in each state and given values of q. For Model II, the NPV is negative but the RSH is positive so the investment is made, illustrating the overinvestment problem. The V_D value drops to 65 because the shareholders receive

Figure III

RSH and V_D Under Varying q



an option worth $15 by paying $10. The difference is at the expense of the debtholders.

Table 2

Illustrative Disequilibrium Relations for Model II

Model II

X_b = $0

X_g = $130

q = $0

NPV = .5($0) + .5($130) - $80 = -15

RSH = .5($0) + .5($130-$100) - 10 = $5

V_D = .5($0) + .5($130) = $65 vs L_D = $70

Value of option = .5($130-100) = $15 vs $10

Overinvestment Problem--Undervalued Option.

Table 3

Illustrative Disequilibrium Relations for Model IIIC

Model IIIC

X_b = $20

X_g = $150

q = .9

NPV = .5($20) + .5($150 - $80) = $5

RSH = .5($20-$10) + .5($150-$10) - $80 + $70 - $90 = -$25

V_D = $90 + .5($10) + .5($10) = $100 ($30 from SH)

Underinvestment Problem--A Tax Up Front.

For Model IIIC in Table 3, a high value of q is illustrated (our earlier example in Section C has a lower q assumption =.2).

This means that most of the debt is short term resulting in a large tax up front. The NPV is positive but the RSH becomes negative. The market value of the debt rises from $70 to $100. The increase in V_D by $30 represents what is taken from the shareholders.

IV. Shifted Priority Positions

In the previous model, it was assumed that the firm raises the required funds by issuing equity (to old shareholders). An implication of this assumption is that existing publicly-held debt has a higher seniority than the new (equity) security issued.

In Model IV, the firm issues new debt for the funds required. The further assumption is made that existing debt carries no covenants to protect its priority position so that the firm is able to establish a senior priority position to the new debt. When the firm can change the seniority of the new debt, it is more likely that it will make the investment.

To illustrate the influence of assigning senior priority to the new debt, Model IV continues with the assumption of an efficient debt maturity structure under which q is equal to .2. As before, the firm has liquid assets of $70 and the required investment outlay is $80. To make the investment, the firm needs an additional $10 plus $20 to pay the maturing short-term debt. Therefore, at date 2, the firm has $30 new debt and $80 existing long-term debt. If the cash flow from the project is $X, all debts are paid in full so that the old shareholders receive $X - $80 (the old shareholders hold the $30 new debt). Since the new debt is

senior, if the cash flow is $20, the shareholders receive $20 rather than nothing because the debt they hold is senior to the old public debt. The return to shareholders from investing is:

$$.5(\$20) + [.5(X - \$80) - \$30] = .5X - \$60.$$

Shareholders will invest if $.5X - \$60 \geq 0$, or $X \geq \$120$. Now XYZ Co. has an overinvestment problem. By manipulating the seniority of the debts (more long term relative to short term), shareholders can take advantage of public debtholders and get more from the investment. Therefore, they have more incentive to invest.[14]

The creation of new debt with a seniority or super-priority status vis-a-vis old debt is the prime factor that has stimulated the growth and importance of debtor-in-possession (DIP) financing. DIP financing, supplied primarily by banks and finance companies, is used to provide needed investment and working capital funds to firms which have just filed for Chapter 11 protection and has been a critical element to the success of many formal in-court restructurings.[15] The super-priority status of the new debt need only be sanctioned by the Bankruptcy Judge, obviating the need for prior-creditor approval. An out-of-court restructuring whereby new debt is given priority over old debt, on the other hand, requires virtually 100% creditor approval and is very difficult to obtain.

Result 5: The larger the firm's power in manipulating the position of claimholders the more the firm can take advantage of

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[14]If $q = .4$, the overinvestment bias will be avoided.

[15]See Altman [1993b], Chapter 4 for an in-depth discussion of DIP financing. These loans, in addition to their super-priority status, are usually also secured.

debtholders whose priority position is unprotected. This highlights the importance of bond covenants. Furthermore, when the firm has the power to manipulate seniority, the overinvestment problem is likely to be more severe.[16]

V. Analysis of Exchange Offers

Thus far, we have analyzed situations in which we have varied debt structure and claim priority. In the remainder of the paper, we consider exchange offers and the role of specialized financial institutions. Our exchange offer example relates to the work of Gertner and Scharfstein (GS) [1991]. Since the firm's assets are less than its liabilities, an out-of-court exchange offer is considered a "distressed" restructuring.[17]

In Model V, used to analyze exchange offers, we will keep all of the previous assumptions except to assume that the firm has sufficient liquid assets ($80) to cover the cost of the investment project so that one less complicating element of cash flows is removed to simplify the analysis. To analyze the payoffs to a creditor to whom an exchange offer is made, we assume an 0.5 probability of a cash flow of $50 and 0.5 probability of a cash

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[16]Although the guiding principle of distressed restructuring is the so-called absolute priority doctrine, it has been estimated by many researchers that as much as 75% of reorganizations result in violations of absolute priority. Still, these violations are not material and seniority really does provide significant investor protection. See Altman and Eberhart [1994].

[17]Indeed, the public debt that is "distressed" typically sells in the 60-80% of par value range and the exchange is treated as a variety of a default by market practitioners and other analysts (e.g., see Merrill Lynch [1994] for default statistics on high-yield debt where defaults include these distressed restructurings).

flow of $130. The firm makes an unconditional exchange offer to the public creditors. Initially, we assume no short-term debt and all debt matures in period 2.

The face value of the debt is $100, held equally by 10 creditors and these creditors cannot coordinate their actions. All debts are long term; they mature after the cash flow from the investment is realized. The firm makes an unconditional exchange offer to the public debtholders to exchange $8 new debt for every $10 old debt. The new debt is more senior than any remaining, nonexchanged old debt and is now pari-passu with all the other debt (a very critical assumption). Two issues are posed. If each creditor believes that all others will tender, will the exchange offer be successful?[18] After the exchange offer, are creditors better off or not?

The payoff table for an individual debtholder under the above assumptions is shown in Table 4. We first consider the position of a creditor who decides to holdout. For the nine others who tender, the face value of the new debt is $72. If the cash flow is $130, $58 is available to pay off the hold-out creditor in full, $10. If the unfavorable state occurs, the $50 is not sufficient to cover the senior claims of the nine creditors who tendered and the payoff to the hold-out, now junior creditor, would be nothing.

We next consider the tender alternative for an individual

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[18]Bernardo [1994] presents a generalized treatment of exchange offers analyzed in terms of symmetric Nash equilibria. He specifies the conditions that support a symmetric tendering equilibrium as well as the conditions that support a symmetric holdout equilibrium.

creditor. The face value of the new debt would become $80. Under the favorable state, when the cash flow is $130, all creditors are paid in full and each receives $8. If the cash flow is $50, each creditor receives $5. As shown in Table 1, the expected payoff for tendering is larger. Hence, all creditors tender and the offer succeeds.

Table 4
Payoff to a Creditor

		Cash Flow (probability)		Expected Payoff
		$130 (.5)	$50 (.5)	
Action of the Creditor	Tender	$8	$5	.5(8)+.5(5)=$6.5
	Hold Out	$10	$0	.5(10)+.5(0)=$5.0

The creditors become worse off because of the exchange offer. Without the exchange offer, the expected payoff for a creditor is .5($10) + .5($5) = $7.5. On average, therefore, each creditor loses $1 because of the offer.[19] If creditors can work as a group, they will reject the offer. However, under the assumption that creditors cannot coordinate and they think that all others will tender, tendering dominates holding out. This phenomenon is called a 'hold-in' problem by GS.

Mooradian [1994] extends this analysis. He observes that with a single creditor there is no coordination problem of the type discussed above. He also analyzes the role of asymmetric

[19]See our discussion in the next section on the increasingly common development of organized creditor committees represented by sophisticated distressed restructuring specialists.

information in a model of public debt restructurings. In the absence of Chapter 11, an inefficient firm always mimics an efficient firm. As a consequence, either inefficient firms overinvest or efficient firms underinvest. But Mooradian observes that Chapter 11 provides an incentive for an economically inefficient firm to reveal its condition because management bargains on behalf of equityholders to preserve a valuable claim on the firm for them.

VI. Extensions with Financial Intermediaries

For the first set of models, it is assumed that no "banks" are formally involved. Banks and other financial institutions have several characteristics that distinguish them from atomistic creditors: (1) they are better informed about the debtor, (2) they write debt contracts of relatively short maturity to facilitate monitoring and recontracting, (3) they are smaller in number, facilitating communication and negotiation, and (4) in practice, they generally seek a priority position.[20]

If the firm can negotiate costlessly with "bank-type" lenders, there is no bargaining problem. The parties will function according to a Coase Theorem [1937] which holds that they will work as one party seeking to maximize investment returns in their joint interest.

In GS, unlike public debtholders, the bank can negotiate with

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[20]The rationale for this is set forth persuasively in Welch [1994].

old shareholders costlessly and maximizes the joint payoff to itself and the shareholders. Moreover, bank debt is always short term (matures at date 1). Unless the bank agrees to make concessions, the bank debt needs to be repaid before the investment is made.[21]

In a bank debt restructuring, the bank extends the maturity of the old debt to date 2, and provides the firm with the cash necessary for making the investment and paying off short-term public debt. The face value of the new bank debt will be equal to the face value of the old bank debt plus the new loan. Interest on new bank debt is allowed. If the bank refuses to refinance the firm, the firm may try to get financing from other sources.[22] If no other source is available to finance the project, the firm will be liquidated at date 1.

The basic assumptions of the previous models with only public debtholders are maintained. Balance Sheet I applies with liquid assets of $70 and total debt claims of $100. The new project requires an investment of $80. The cash flow in the bad state, is $20 and in the good state, is $X.

The assumptions about the debt structure, however, are altered. (1) The firm has two types of debts, bank debt and public

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[21]A recent working paper by James [1994] argues that bank debt forgiveness can mitigate holdout and information problems and increase the chance of success of exchange offers. The bank, however, must be willing to go along with the restructuring plan.

[22]As noted above, new debt financing after the Chapter 11 filing is usually given a super-priority status over the old debt. The lender can be either the old bank or an entirely new financial institution. If the latter is the case, the interest rate on the new debt is usually higher than if the original bank was the lender.

debt. The sum of the bank debt and the public debt is $100 (face value). (2) All debts (old and new, bank and public) have the same priority. There is no interest payable on old debt. The interest on (the new) debt is junior to the principal. (3) There are still long-term and short-term public debts. The variable q continues to be defined as the ratio of the short-term public debt to total public debt.

In Model VI, we begin our analysis of the implications of the use of bank debt by considering the extreme case in which there is no public debt and the debt of $100 is all bank debt. Model VI differs from Model IIIB where q was equal to one in that the bank can defer payment on its claims due at date 1, while in Model IIIB all of the short-term debt has to be repaid before the investment can be made. The same continuing question is raised: What is the lowest $X such that the bank will agree to restructure the bank debt and finance the new investment project? The further question investigated is whether the investment is efficient or whether under or overinvestment occurs.

If the bank does not refinance the firm and liquidation occurs, the bank receives $70, the value of the liquid assets. On the other hand, if the bank lends the firm the additional $10 and defers the maturity of the old bank debt to date 2, the amount of the bank debt (principal) due at date 2 will be $110. (The bank was already owed $100 and loaned $10 more). Since the bank debt is the only debt and the bank maximizes the joint welfare of itself and shareholders, we can treat the firm as an all-equity firm.

Therefore, the bank's expected payoff from bank debt restructuring is:

$$.5(\$20) + .5X_g - \$10 \geq \$70$$

If $X_g \geq \$140$, the project will be financed.

If, however, there was $20 of public debt due in period 1 and it could not be deferred to period 2 without considerable costs, then the project will be financed only if $X_g \geq \$180$.

The investment decision is efficient in this case. Since the bank is the only source of debt financing, it seeks to maximize the joint welfare of itself and the shareholders. In order to meet maturing obligations and finance the new investment, the bank does not face an extra "tax", which leads to underinvestment, or does not receive a free option on the firm which leads to overinvestment.

Result 6: When the principal amounts of all forms of debt have the same seniority (and interest is junior to principal), the higher the ratio of bank debt to total debt, the more efficient is the investment decision. At one end-case, when all debt is bank debt, the investment decision is efficient. The logic of these results follows from the previous analysis. Compared to most public debt, the bank debt is shorter term so the overinvestment problem is reduced since the underpriced option is not offered to the source of the new financing. On the other hand, compared to short-term public debt, with the bank as the source of new financing, the firm does not face the inflexible requirement of paying off the short-term public debt (it avoids that tax), thereby

mitigating the underinvestment problem.

VII. Some Implications for Bankruptcy Rules

From the above models, predictions can be made about the consequences of some legal rules. We begin with the automatic stay provision of Chapter 11 of the U.S. Bankruptcy Code. An automatic stay permits the firm to stop all principal and interest payments and prevents secured creditors from taking possession of their collateral. These creditors must be compensated, however, with "adequate protection", which stipulates that, at the very least, they should receive the value of the collateral in any subsequent reorganization. This is equivalent to converting all debt to a longer-term maturity. Other things being equal, when a firm is in financial distress (liquid assets are less than debt claims) the automatic stay will increase the firm's incentive to invest. In this sense, if the firm faces an underinvestment situation, the automatic stay may help overcome the problem.

GS also observe that the 1978 Bankruptcy Code provided voting rules. In many cases, no individual creditor could become pivotal, unless they owned at least one third in value or 1/2 in number of the outstanding debt in one of the creditor classes. Chapter 11 specifies majority (in number) requirements for approval of the plan, and provides that dissenters must accept the same terms as

approved by the majority.[23] In this sense, each class of creditors behaves as one party in which minority creditors cannot holdout. The new voting rules facilitate renegotiation of the debts so that the potential for investment efficiency is improved by reducing bargaining costs. This result is further clarified by introducing banks into the analysis. The models generally assume that one of the advantages of large individual debtholders, such as banks, is that negotiations are facilitated.

Two relatively recent phenomena call into question any assumption about the impotence of individual creditors. The first is the aggressive strategies of powerful, active investors who purchase controlling interest in a key class of claims in order to block unpopular plans or to propose a plan which results either in dramatically better terms for the creditor or even control of the company when it emerges from Chapter 11. A well-known example of the latter is the role of Japonica Partners, creditors in the Allegheny International Corporation case, and the resulting ownership of the entity that was formed after Chapter 11 -- Sunbeam Oster. An example of the former, is the successful negotiation strategy of M.J. Whitman & Company, significant holders of the

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[23]If the reorganization is proposed in an out-of-court distressed restructuring, i.e., not under Chapter 11, then a virtual unanimous acceptance by those creditors who are impaired must be received. This explains the relatively recent phenomena known as a "pre-packaged Chapter 11", whereby the required (but not necessarily unanimous) proportion of accepting creditor votes are assembled for a plan **prior to** the filing of Chapter 11. In most cases, the formal Chapter 11 reorganization which follows is a relatively simple procedure and the actual time, and money, spent in the bankruptcy procedure has been as little as one month and averages only a few months. See McConnell & Servantes [1991], Salerno & Hansen [1991] and Altman [1993b] for discussions of prepackaged plans and their recent experience.

third mortgage debt, in the reorganization of the Public Service of New Hampshire.

The second phenomena is not really new but involves the more organized and aggressive posture of well-informed and well-financed representatives of a group of creditors in the Chapter 11 or pre-Chapter 11 negotiations. Skillful investment bankers, with sufficient voting power, or even "nuisance-power", can and have gained far better terms in reorganization than the atomistic creditor approach can achieve. These costly representative cases do not, however, always result in better deals for the creditors, who might have instead represented themselves.

VIII. Summary

In this paper we have presented a synthesis of the literature on financial distress. The theoretical models are explained by the use of numerical examples and more general equation relationships. Our simplified examples of alternative models are used to illustrate the more general principles of rational behavior under alternative patterns of: (1) who holds the debt, (2) the debt maturity structure, (3) priorities and the ability to change priorities, (4) sources of new financing, and (5) form of the new financing. The power and applicability of the general principles are further illuminated by showing their applications.

The formal models predict the effects of key elements in bankruptcy law: (1) the role of the automatic stay, which has the effect of extending debt maturity and increasing the riskiness of

debt; (2) voting rules which affect procedures for resolving conflicts of interest; (3) the special role of banks is suggested in that negotiations are facilitated; (4) debtor-in-possession (DIP) financing facilitates new investments, but changes the seniority of claims; and (5) the influence of priority rules and the seniority of claims predicts that modest departures from the absolute priority "rule" are justified to achieve agreement on recontracting (reorganization) arrangements. In general, there is a tradeoff between flexibility that gets a plan adopted and modifications of the size and priority of debt claims which can influence their riskiness.

This paper reflects the topics covered in the formal models of the bankruptcy process. Particularly important is the need for progress in modeling the conditions under which financial distress will be removed and new investment opportunities generated. While strategies for reorganizing a financially distressed firm are many, with sometimes positive and other times extremely negative results, our paper analyzes these strategies from the standpoint of efficient allocation of resources. The empirical studies of firms emerging from Chapter 11 proceedings suggest that models and guidelines for efficient investment could improve their economic performance.

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