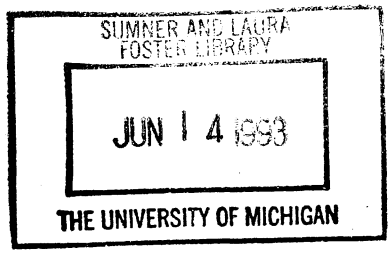
Center for Research on Economic and Social Theory
and
Department of Economics
Working Paper Series

Information, Control Right and Distressed Firms' Choices Between Workouts and Bankruptcy

David D. Li
Shan Li

October, 1992
Number 93-08



DEPARTMENT OF ECONOMICS
University of Michigan
Ann Arbor, Michigan 48109-1220

Information, Control Right and Distressed Firms' Choices Between Workouts and Bankruptcy[1]

(Comments welcome)

David D. LI
University of Michigan
Shan LI
M.I.T.

May 1992
This version: October 1992

[1]We are grateful to Oliver Hart and David Scharfstein for their invaluable help.

Abstract

We study the mechanism behind the firm's choice between workout and bankruptcy filing in financial distress. We emphasize the information and control right issues in the choice. That is, only the management knows whether the firm is economically viable but signalling out this information is impossible since some management will loose its control right. Unable to separate the good firms from the bad ones, a private workout incurs information costs. On the other hand, a role of the legal procedure of Chapter 11 is to forcefully resolve the information problem at certain cost. The firm's choice between workout and chapter 11 takes these factors into account. Our model explains a sequence of empirically verified patterns of the firm's choice. Besides, our predictions clarify certain misconceptions about the firm's rationales of the choice. For example, we show that the relative bargaining power of the management in workout and Chapter 11 is immaterial to the firm's choice.

JEL Classification Code: G33

Key Words: Financial Distress, Bankruptcy, Debt Re-negotiation, Control Right.

1. Introduction

Financial distress has become an epidemic throughout the corporate world since the late 80's. In the U.S., this is because the takeover wave in the 80's left many firms with heavy debt. The subsequent slow-down of the economy pushed many of these firms into financial distress. Of the 662 firms that issued high-yield public debt from 1977 to 1988, 106 have defaulted on their public bonds (Gertner [1992]). In 1990, almost $25 billion worth of junk bonds went into default, and 749,956 U.S. firms filed for bankruptcy (*Turnaround and Workout*, Washington D.C.). At the same time, in other parts of the world, many state-owned firms in post-socialist economies are facing bankruptcy before they can be privatized. In these countries, designing a proper bankruptcy procedure is a challenge for the government.

In this paper, we take the U.S. Bankruptcy Law as given and explore the mechanisms behind certain empirically documented phenomena of financial distress. Our conclusions have the implications for the necessity of a bankruptcy procedure like the Chapter 11 in the U.S. Bankruptcy Law. The empirical findings to be explained are the patterns of the firm's choice between private workout and filing for Chapter 11 bankruptcy protection; the announcement effect of filing for Chapter 11; the pattern of the violations of the absolute priority rule (APR) of debt payment.

Our starting point is that like many other aspects of corporate finance, in financial distress two issues stand out: control right and information. The issue of control right is due to the fact that so long as the firm is in operation, management has the control right and enjoys the benefit of control. Therefore its objectives may not be in line with those of either the equity holders or the bond holders. The information issue is that the management typically enjoys information advantage to all outsiders. In financial distress, if the firm is liquidated then the management will lose the control right and the benefit of control. Therefore, in most cases, the management of bad firms that should be liquidated would pretend that the firm is a good one.

Our central argument is that a legal bankruptcy procedure such as that of the

Chapter 11 in U.S. provides the good firms with an opportunity to credibly prove its identity. In private negotiations, it is much harder for the creditor to find the true type of the financially distressed firm. This explains the relative advantage of a Chapter 11 filing. However, the drawback of a Chapter 11 filing is its relative cost to a private workout. After the lengthy process of Chapter 11 filing, the value of the firm will decrease. This is why many times firms would choose to resolve its financial distress through private workouts.

Based on the above arguments, our model generates a sequence of predictions about the firm's choice between workout and chapter 11. It shows that the choice relies on the firm's asset structure — the more tangible asset or the less the liquidation value, the more likely that the firm will choose workout. The better the firm's reputation as a good firm, the more likely that it will choose workout. An announcement of the firm's filing for Chapter 11 will have negative effect on the value of the firm's equity. Also, the violation of absolute priority rule (APR) is more severe in a workout than in a Chapter 11 procedure. These are all empirically recognized facts about firms' resolution of financial distress. Finally, contrary to conventional wisdom, we show that relative bargaining power in workout and Chapter 11 does not have any effect on the firm's choice between workout and Chapter 11. The intuition behind the neutrality of bargaining power is valid in a very general set-up. Therefore, we hope that this neutrality result will help clarify certain mis-conceptions about the firms choice of workout and Chapter 11.

The fact that the prediction of our model matches very well with empirical findings of financial distress verifies our central argument about a role of the Chapter 11 bankruptcy procedure, i.e. it provides an effective way to find out the future profitability of the firm. Indeed, generally the court has been functioning as an establishment to overcome information asymmetry between conflicting parties before justice can be restored. Many scholars in law and economics have pointed out this role of the court.

Several authors have studied the information issue in firm's resolution of financial distress. Few of them are explicit about the issue of control right. White (1991) is the first paper emphasizing the filtering role of bankruptcy procedures in separating good firms from bad one. She focuses on the two procedures in the Bankruptcy Law: Chapter 11 and Chapter 7. Gertner (1992) argues that sometimes the firm can signal its type by offering the creditor certain equity/debt package. His analyses are pertinent to cases where the benefit of control is small compared with incentives associated with the equity value. That is, the implicit assumption is that the objective of the management is more or less in line with that of the equity holders. This is true with small and medium firms in financial distress.

In the next section, we will provide some background knowledge about the firm's resolution of financial distress. This is majorly meant for readers who are not familiar with the U.S. Bankruptcy Law. In section 3, we describe our model. Section 4 and 5 analyze in detail the bargaining between the firm and creditor in both the workout and chapter 11, respectively. Section 6 predicts the pattern of the firm's choice between workout and Chapter 11. The last section, section 7 discusses the implication of the paper and gives a brief summary.

2. Financial Distress and Its Resolutions

In a typical financial distress, the firm faces two difficulties. First, the cash flow of the firm is insufficient to cover current obligations to creditors. Thus, creditors have legal rights to demand restructuring because their contract with the firm has been breached. Second, the expected present value of the firm (based on expected profitability of the firm) is below the outstanding debt level. This means that it is impossible to issue new securities to overcome the current financial difficulty. Facing a financial distress, the management has to choose between two basic methods of reorganization: private workouts and formal bankruptcy. In both cases, new financial

claims are exchanged for the firm's outstanding debt contracts on terms that the firm finds more affordable. Under the current U.S. Bankruptcy Code, a firm can file for bankruptcy either under Chapter 7, which leads to firm liquidation, or under Chapter 11, which may lead to successful reorganization under court supervision. Since the firm's liquidation generally leads to loss of his control benefit and very little, if any, monetary payoffs to him, the management tends to shy away from Chapter 7. Therefore, we will focus on distressed firms' choice between workouts and Chapter 11 bankruptcy.[2]

There are several fundamental differences between workouts and Chapter 11. The main difference between the two approaches is that, in the latter case, reorganization rules and procedures are regulated by Chapter 11 Bankruptcy Code and the whole process is supervised by the court. This has at least three major implications. One regards the bargaining power of parties involved in re-negotiation, another is related to corporate information disclosure, and the last one concerns the cost difference between Chapter 11 and workouts.

First, regarding management's bargaining power, the well known hold-out problem and Trust Indenture Act of 1939 put the management in a weak bargaining position in a workout. On the other hand, there are fewer creditor hold-outs in Chapter 11 since simple majority rule now applies, and in extreme cases the court can 'cram-down' on dissident classes of creditors. Management has first mover advantage in proposing reorganization plan. The 'automatic stay' and 'debtor-in-possession-financing' provisions also work to the benefit of the incumbent management. All these factors serve

[2]In last few years, a hybrid form call pre-packaged bankruptcy has emerged. In a pre-packaged bankruptcy, the distressed firm files a plan of reorganization, which has been approved ex-ante by most of its creditors, along with its filling for Chapter 11. By doing so, the firm can emerge from Chapter 11 much faster. In essence, pre-packaged bankruptcy is an administrative extension of workouts. Therefore, for our purpose, we can treat firms' choices between pre-package bankruptcy and Chapter 11 as a special case of that between workouts and Chapter 11.

to increase management's bargaining power in Chapter 11 bankruptcy.

Second, in workouts, the firm has incentive to influence its creditors' perception of its value to gain more favorable terms in the restructuring plan (DeAngelo et al. [1990]) and full information disclosure is hard to achieve. Since the creditors are rational, the firms himself has to bear the cost of information asymmetry[3]. In Chapter 11, the management has a much smaller information advantage over the creditors since the court has the power to force mandatory information disclosure. Gilson, John and Lang (1990) write, "The firms are required to make extensive, regular disclosures of their financial and operating data to the court. Additional information is contained in the court testimony of expert witnesses and the management, and the creditors can exercise their 'right of discovery' to require additional disclosure from the debtor."

There is a consensus that deadweight cost in Chapter 11 is significantly higher than that in workouts. Here are some stylized facts: 1)Payments for legal and other professional services are likely to be higher if a firm restructures its debt in a bankruptcy court[4]; 2)Average length for Chapter 11 is longer than that for workouts [5]; 3)In Chapter 11, the bankruptcy judge may make wrong business decision and bring big inefficiency to the bankrupt firm; 4) The prolonged Chapter 11 procedure often diverts the management's attention from operating the business and this may also lead the firm to lose valuable business opportunities; 5) the distressed firm may lose valuable suppliers and customers. Notice that the latter two factors contribute to the cost of workouts as well as that of Chapter 11. Therefore the cost difference between Chapter 11 and workouts are mainly caused by the other three factors listed above, which in turn are determined by the distressed firm's asset structure. The more

[3]See Gertner (1992) for a detailed analysis.

[4]Gilson (1991) found that Professional fees incurred in exchange offer are about one-tenth of those incurred in a typical Chapter 11 case.

[5]This is partly because that in workouts firms need to deal only with creditors whose claims are in default and those covered by cross-default provisions, while Chapter 11 requires the firms to re-negotiate with all the creditors.

intangible/firm-specific assets the firm has, the longer it takes the court to verify the firm's true value and the higher the chance that the judge makes wrong business decision. In conclusion, the cost difference between Chapter 11 and workouts is determined by the firm's asset structure.

First of all, we should understand the management's objective in choosing between the two approaches.[6] In general, the management will act to maximize the total payoff to himself: his control rent and monetary payoff. We assume the latter is proportional to the firm's total share value. This assumption can be justified for the following reasons: a)many financially distressed firms have experienced leverage buy-out in the 1980s and their management has unusually high shares of stock holding in the firm; b) management's salary, bonus and other incentive scheme are generally associated with the firm's total share value.

3. The Model

We model the whole process of the resolution of the firm's financial distress. There are three time periods in our model. At date 0, the firm defaults on its current debt payment and this marks the start of the firm's financial distress. At date 1 the management of the firm has to make a choice between workout and Chapter 11 filing. After this choice is made, at date 2 the firm is either in workout or in Chapter 11 reorganization. The workout has two possible outcomes: success or failure. If it is a success, then an agreement is reached between the management and the creditor and the firm runs as a going concern until date 3. If it is a failure, then the firm files for Chapter 11 protection. The Chapter 11 reorganization can be also successful or unsuccessful. If it is successful, then a reorganization plan is reached and the firm will run for one more period. If the Chapter 11 procedure is a failure, then the firm is

[6]We use the term 'management' to represent all senior officers and directors of the firm.

liquidated in a Chapter 7 bankruptcy procedure. Figure 1 gives a chart of the timing of the model.

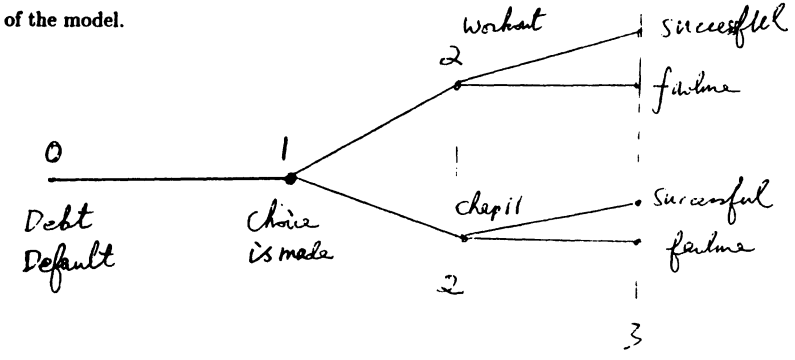


Figure 1.

There are two types of firms in financial distress: the good ones and the bad ones. The good firm is economically efficient and should survive the financial distress. The bad firm is economically inefficient and should be liquidated. Let β be the type of the firm. The good firm is represented by $\overline{\beta}$ and the bad one by $\underline{\beta}$. The difference between these two types of firms lies in the value of the firm at date 3. Let e be the value of the firm at date 3. Corresponding to the type of the firm, e can take one of the two values: $\overline{e}$ and $\underline{e}$ (which is before the incurrance of any cost in the bankruptcy procedure). By definition, $\overline{e} > \underline{e}$.

As we argued in the introduction, information asymmetry between the creditor and the management is one of the central issues of the firm's debt re-negotiation. In our model, when the firm enters financial distress at date 1, the type of the firm is private information to the management of the firm. In a private workout, the creditor cannot fully distinguish one type from the other until date 3. However, the choice of the firm at date 2 serves as an information update for the creditor.

The model highlights the differences between private workouts and Chapter 11 reorganizations by making the following assumptions. First, in the model, we assume

that the firm's genuine type (good or bad) is fully disclosed in the process of the Chapter 11 bankruptcy debt reorganization, while in the private workout, there is no credible information disclosure. This is because in reality information asymmetry in the Chapter 11 bankruptcy court is much less severe than that in the private workout. Second, we assume that the Chapter 11 process is costly while the private workout is costless, since indeed the Chapter 11 procedure is much more costly than a private workout.

Let D be the face value of total outstanding debt of the firm at date 1. L is the firm's liquidation value in a Chapter 7 procedure. Let μ_0 be the creditor's prior knowledge at date 1 about the probability that the firm is a good one, $\overline{\beta}$. In other words, at date 1 the creditor expects the firm to be worth $E(e) = \mu_0\overline{e} + (1-\mu_0)\underline{e}$.

We are interested in the situation where asset sale is not a viable way to pay off short term debt, i.e., the firm has to restructure all of its outstanding liabilities. We assume that both the incumbent management and the asset in place are necessary to realize the value e. All parties are risk neutral and have 0 discount rate. We also assume that:

A1. $L < E(e) < D$.

This implies that liquidation without negotiation is a bad strategy on the creditor's part. It also says that the strategy of continuation without debt re-negotiation can only yield less payoff than D for the creditor.

Let $\tilde{e}$ be the value of the good firm after incurring the cost of the Chapter 11 procedure. As was argued, the relative cost of the Chapter 11 procedure is dependent on the asset structure of the firm. To catch this idea, let γ represent the ratio of firm's intangible asset to tangible asset. In other words, we assume:

A2. $\tilde{e}(\gamma)' < 0$.

Next, we assume that

A3. $\underline{e} < L < \tilde{e}(\gamma) < D < \overline{e}$.

A3 says that from the social efficiency point of view, the bad firm should be

liquidated immediately and the good firm should be allowed to run as a going concern even after incurring the cost of Chapter 11. The last part of A3 $\tilde{e}(\gamma) < D < \overline{e}$ assumes that after the Chapter 11 procedure, the value of the good firm is reduced to a level which is below the face value of the debt. This implies that the creditor has to reduce the debt obligation even for the good firm.

The debt restructuring negotiated between the creditor and the firm can be regarded as an exchange of the firm's outstanding security. Replacing the old debt, the firm offer to the creditor Q_W shares of the reorganized firm and D_W new debt.

To model the incentive of the management of the firm, we use $\overline{B}$ to represent the private control benefit of the good firm's management when the firm runs as a going concern. Let $\underline{B}^W, \underline{B}^{11}, \underline{B}^7$ be the control benefits of the bad firm's management in workout, Chapter 11 and Chapter 7, respectively. The control benefit in the Chapter 7 liquidation process is the worst, since the firm stops running rather immediately. In other words, we have

A4. $\underline{B}^7 = 0$.

In addition to these private benefits of control, the management obtains monetary benefits from its share holding in the firm. We assume that the management has δ_0 proportion of shares.

Later we will use α^{11} and α^W to denote the relative bargaining power of the firm in Chapter 11 and workouts, respectively.

4. Bargaining in the Chapter 11 Re-organization

In the Chapter 11 reorganization, the management of both the good and the bad firms are obliged by the law to adequately disclose relevant information regarding the future profitability of the firm. In our model, we assume that there is no information asymmetry between the management and the firm. Given that the creditor knows beyond any doubt the true type of the firm, all bad firms will be forced into Chapter

7 liquidation, while good firms will survive. In other words, only good firms can successfully reorganize their debts.

We model the debt reorganization under Chapter 11 as a bargaining process between the management and the creditor under symmetric information. *Ex post,* the outcome of such a bargaining game is efficient. For simplicity, we adopt the generalized Nash bargaining solution to predict the outcome of the Chapter 11 procedure. This solution concept should be general enough, since most extensive form bargaining would generate similar equilibria(see Binmore, Rubinstein and Wolinsky [1986]).

The default option of the Chapter 11 bargaining outcome is Chapter 7 liquidation. For the management, the alternative to accepting a Chapter 11 debt reorganization plan is to file for Chapter 7 liquidation. For the creditor, the same option is also available. In a Chapter 7 liquidation, the share value of the firm is 0, since the liquidation value L is less than D. The payoff to the management is 0, because the management loses both his monetary and control benefit($B^7 = 0$). On the other hand, after the liquidation, the creditor can obtain a value L.

To specify the outcome of the bargaining, suppose that the bargaining power of the management is $0 < \alpha^{11} < 1$ and the bargaining power of the creditor is $1 - \alpha^{11}$. The manager of the good firm expects to survive, therefore his payoff is

$$\overline{V}_M^{11} = \delta_0 V_E^{11} + \overline{B} \tag{3.1}$$

Where δ_0 is the percentage of the existing shares held by the management. Thus, the good management will act in the best interest of the shareholder, i.e. his objective in the bargaining is to maximize V_E^{11}. According to the Nash bargaining solution, the payoff to the shareholder V_E^{11} should be the solution to the following problem

$$\max_{V_E^{11}} \quad (V_E^{11} - 0)^{\alpha^{11}} \left[(\tilde{e}(\gamma) - V_E^{11}) - L \right]^{1-\alpha^{11}} \tag{3.2}$$

which implies that the shareholders of the good firm will get:

$$\overline{V}_E^{11} = \alpha^{11}(\tilde{e}(\gamma) - L) \tag{3.3}$$

and that the the payoff to the creditor of the good firm is:

$$\overline{V}_C^{11} = (1-\alpha^{11})(\tilde{e}(\gamma) - L) + L \tag{3.4}$$

Consequently, the payoff to the management of the good firm is

$$\overline{V}_M^{11} = \delta_0 \overline{V}_E^{11} + \overline{B} \tag{3.5}$$

The bad firm will be liquidated in the Chapter 11 procedure. The liquidation value of the firm is L which is less than the debt value. Therefore, the share value is 0 and the creditor gets L. As a result the monetary payoff to the management is 0 and its payoff is:

$$\underline{V}_M^{11} = \delta_0 \underline{V}_E^{11} + \underline{B}^{11} = \underline{B}^{11} \tag{3.6}$$

Finally, we can calculate creditor's anticipated payoff when the firm just enters the Chapter 11 procedure. Suppose that at this time, the creditor believes that μ is the proportion of good firms (μ is different from μ_0 since there is information disclosure after the choice is made), then the expected payoff to the creditor is

$$E(V_C^{11}) = \mu[\ (1-\alpha^{11})(\tilde{e} - L) + L\ ] \ + \ (1-\mu)L$$

$$= \mu(1-\alpha^{11}(\tilde{e} - L) + L \tag{3.7}$$

This expected payoff will serve as a reference point in the bargaining in the workout.

5. The Bargaining in the Private Workout

Unlike the Chapter 11 procedure, in the private workout the creditor cannot fully distinguish the type the firm. The creditor and the firm would have to bargain under asymmetry of information. The generalized Nash bargaining solution is no longer appropriate, since the type of the firm is private information.

Without getting into the details of modeling the rules of the bargaining under information asymmetry, we adopt a general approach to the bargaining. We will first work with two extreme cases: 1) the creditor has all the bargaining power; 2) the management of the good firm has all the bargaining power. Under our assumption, the bad firm will always imitate the action taken by the good firm, the bad firm is powerless in our model. Then we use a convex combination of the two extreme cases to characterize the equilibrium of the bargaining game. The weight in the convex combination is the two parties' relative bargaining power. Each elaborate extensive form bargaining solution with asymmetry of information corresponds to an outcome here with a particular bargaining power. Actually, we will show that the relative bargaining power, which seems to be arbitrary, does not change the choice of the firm between workouts and Chapter 11 reorganization.

5.1 Case 1: The Creditor Has All the Bargaining Power

When the creditor has all the bargaining power, he will propose a take-it-or-leave-it offer to the management. In doing so the creditor is able to reduce the payoff to the management to the lowest possible level. As was discussed before, we assume that the debt reorganization take the form of an exchange offer. The creditor proposes to exchange the original D debt of the old firm for Q_W shares and D_W debt of the new firm.

In proposing the exchange offer, the creditor has to make sure that the management is willing to accept the offer and that the good management has no incentive to act as a bad management and vise versa. These considerations correspond to the individual rationality constraint and the incentive compatibility constraint, respectively. There are two possible offers that the creditor may consider. One kind is that $D_w \geq \underline{e}$. In this case, the value of the new debt is so high that the equity of the bad firm is worthless. The second case is the opposite, i.e. $D_w < \underline{e}$. In this offer, the equity value of the bad firm will be positive. In order to leave the bad firm with 0

payoff, the creditor needs to claim 100% of the equity.

i) Reorganization Plan with $D_w \geq \underline{e}$.

Now the bad firm will receive nothing, its individual rationality (IR) constraint will be irrelevant. As for the management of the good firm, filing for Chapter 11 protection is an alternative to the workout and thus its payoff from the organization pl an must be at least as high as that from the Chapter 11 procedure. To summarize, the creditor maximizes his expected payoff, subject to the good management's individual rationality constraint, i.e., he has the following problem to solve:

$$V_c^W = \max_{Q_W, D_W} \quad \mu Q_W(\overline{e} - D_W) + \mu D_W + (1-\mu)\underline{e} \tag{4.1}$$

$$S.T. \quad (1-Q_W)(\overline{e} - D_W) \geq \overline{V}_E^{11} \tag{4.1.1}$$

Notice that we assume that the management always has the option to file for Chapter 11 protection, the good firm's outside option is $V_E^{11}(\overline{\beta})$ instead of 0.

There are multiple solutions to this problem. It is easy to see the intuition, since all parties care only about the expected payoff and the exact combination of debt and equity is not important at all. This argument is like that behind the traditional MM proposition. For examples, we give two extreme solutions.

Solution 1: The firm assumes the lowest amount of new debt, that is $D_{W1}^* = \underline{e}$. Solving the problem, we have

$$Q_{W1}^* = 1 - \frac{\overline{V}_E^{11}}{\overline{e} - \underline{e}}$$

Solution 2: The firm assumes the highest amount of new debt, i.e. $Q_{W2}^* = 0$. From the good firm's individual rationality constraint, we have

$$D_{W2}^* = \overline{e} - \overline{V}_E^{11}$$

Therefore, the general solution (Q_W, D_W) satisfies:

$$Q_{W1}^* \geq Q_W \geq 0, \quad D_{W2}^* \geq D_W \geq \underline{e}$$

The payoffs to management of the good firm and the bad firm are:

$$\overline{V}_m^W = \delta_0 \overline{V}_E^{11} + \overline{B}$$

and

$$\underline{V}_m^W = \underline{B}^W$$

respectively.

ii) Reorganization Plan with $D_w \leq \underline{e}$.

In such kind of re-organization plan, the bad firm may get positive payoff when the creditor does not get 100% of the new equity. As for the good firm, like in the previous case, its expected payoff should be at least as large as that in a Chapter 11 procedure. Thus, the creditor's problem is

$$V_c^W = \max_{Q_W, D_W} \quad \mu Q_W(\overline{e} - D_W) + \mu D_W + (1-\mu)[Q_W(\underline{e} - D_W) + D_W] \tag{4.2}$$

$$S.T. \quad (1-Q_W)(\overline{e} - D_W) \geq \overline{V}_E^{11} \tag{4.2.1}$$

$$(1-Q_W)(\underline{e} - D_W) \geq 0 \tag{4.2.2}$$

In the Appendix, we show that V_c^W is increasing in D_W. Therefore, the solution is to offer the maximum amount of $D_W^* = \underline{e}$ and the equity is

$$Q_W^* = Q_{W1}^* = 1 - \frac{\overline{V}_E^{11}}{\overline{e} - \underline{e}}$$

Notice that in all solutions, the creditor does not leave any positive value to the bad firm. The payoff to the management of the good firm is:

$$\overline{V}_m^W = \delta_0 \overline{V}_E^{11} + \overline{B}$$

and the payoff to the management of the bad firm is:

$$\underline{V}_m^W = \underline{B}^W$$

5.2 Case 2: The Management Has All the Bargaining Power

Now that the management of the good firm is able to propose a take-it-or-leave-it offer $\{Q_W, D_W\}$ to the creditor. In doing so, the management has to see that the creditor's payoff is at least as high as a minimum level. This minimum level of payoff is equal to the expected payoff to the creditor if the creditor refuses to accept the proposed deal. Should the creditor refuses to accept the proposal, the management is forced to file Chapter 11 protection. As we have shown in the analysis of the Chapter 11 bargaining, the creditor can expect to get

$$E(V_C^{11}) = \mu(1-\alpha^{11})(\bar{e}-L)+L \qquad 3.4$$

As in the case of $\alpha^W = 0$, the bargaining solution is not unique in terms of $\{Q_W, D_W\}$. In order to characterize the solution, we will discuss two possibilities:

i) $D_w \geq \underline{e}$

In this case, the bad firm gets 0 payoff, its individual rationality condition is satisfied. The offer has to leave the creditor with a payoff as large as that he expects to get in a Chapter 11 procedure. The management of the good firm solves the following problem.

$$V_E^W(\bar{\beta}) = \max_{Q_W, D_W} (1-Q_W)(\bar{e}-D_W) \qquad (4.3)$$

$$s.t. \qquad \mu Q_W(\bar{e}-D_W)+\mu D_W+(1-\mu)\underline{e} \geq E(V_C^{11}) \qquad (4.3.1)$$

Although there are many possible solutions, one of them is when the firm assumes the lowest amount of new debt.

$$D_{W1}^* = \underline{e}$$

$$Q_{W1}^* = \frac{E(V_C^{11})-\underline{e}}{\mu(\bar{e}-\underline{e})}$$

Another solution is the one when the firm assumes the highest amount of new debt:

$$D_{W2}^* = \frac{E(V_C^{11})-(1-\mu)\underline{e}}{\mu}$$

$$Q_{W2}^* = 0$$

Therefore, the general solution (Q_W, D_W) satisfies:

$$Q_{W1}^* \geq Q_W \geq 0, \quad D_{W2}^* \geq D_W \geq \underline{e}$$

From the the solution, we get the payoff to the management of the good firm:

$$\overline{V}_m^W = \delta_0 \frac{E(e)-E(V_C^{11})}{\mu} + \overline{B}$$

and the payoff to the management of the bad firm:

$$\underline{V}_m^W = \underline{B}^W$$

The payoff to the creditor is

$$V_C^W = E(V_C^{11})$$

ii) $D_w \leq \underline{e}$

Now that the debt level is lower than the lowest possible value of the firm, the bad firm may expect to get a positive payoff. The problem of the good firm can be written as:

$$V_E^W(\bar{\beta}) = \max_{Q_W, D_W} (1-Q_W)(\bar{e}-D_W) \qquad (4.4)$$

$$S.T. \qquad \mu Q_W(\bar{e}-D_W)+\mu D_W+(1-\mu)[Q_W(\underline{e}-D_W)+D_W] \geq E(V_C^W) \qquad (4.4.1)$$

Again, like in the previous case, we can show that $V_E^W(\bar{\beta})$ is increasing in D_W. Therefore, the only solution in this case is $D_W^* = \underline{e}$, $Q_W^* = Q_{W1}^*$. Notice that in this case the bad firm actually gets 0 payoff. This implies that the good firm has offered

a reorganization plan that leaves 0 slice of the pie for the bad firm. One can easily check that in both i) and ii), the payoffs to each parties are the same.

5.3 The Outcome of the Workout in the General Case

This is an intermediate case in between the extreme ones. The solution in this case is modeled as a convex combination of the extreme cases and the weight of the convex combination is the relative bargaining power. It will be shown later that the relative bargaining power is immaterial to the equilibrium choice of the firm between workouts and Chapter 11 procedures.

The general solution of bargaining in workout is:

$$\overline{V}_M^W = \delta_0 \alpha^w \frac{E(e) - E(V_C^{11})}{\mu} + \delta_0(1-\alpha^w)\overline{V}_E^{11} + \overline{B}$$

$$\underline{V}_M^W = \underline{B}^W$$

This expression is very general, since when the relative bargaining power α^w goes to extremes, this expression becomes the ones in the corresponding cases discussed in sections 5.1 and 5.2. In the next section, we will use these payoff functions to construct equilibrium.

6. The Firm's Choice Between the Workout and the Chapter 11 Procedure

The firm's choice between the private workout and the chapter 11 procedure is a sequential equilibrium of the whole game. Like any game with signals, there are many possible equilibria. However, many of these equilibria are not "reasonable", since they are supported by irrational believes of the creditors. Here, we will focus only on stable equilibria. The concept of stable equilibria was introduced by Kolhnberg and Merten (1988). As a matter of fact, in the current situation, many other kinds of

sensible approaches to equilibrium refinement, e.g., the perfect Bayesian equilibrium of Grossman and Perry (1986), will give us the same solution.

It is easy to understand that there is no separating equilibria. The reason is that in any separating equilibria the creditor can fully distinguish the good firms from the bad one. The bad firm would be immediately liquidated. On the other hand, if the bad firm plays the same strategy as the good firm, then it could survive.

Let $\overline{q}$ be the probability that a $\overline{\beta}$-type firm chooses to go to workout and $\underline{q}$ the same probability for the other type of firm. There are three possible kinds of equilibria. That is $(\underline{q}, \overline{q}) = (1,1)$, $(\underline{q}, \overline{q}) = (0,0)$ and that $0 < \underline{q} < 1$, $0 < \overline{q} < 1$. We can show that the last kind of equilibria can be ruled out, i.e. there are no mixed strategy equilibria.

Proposition 1 *If* $\frac{E(e)-E(V_C^{11})}{\mu_0} > \overline{V}_E^{11}$, *then* $(\underline{q}, \overline{q}) = (1,1)$, *i.e. that both kinds of firms choose workouts, is the strategy of a unique Perfect Sequential Equilibrium. If* $\frac{E(e)-E(V_C^{11})}{\mu_0} < \overline{V}_E^{11}$, *then* $(\underline{q}, \overline{q}) = (0,0)$ *is a unique Perfect Sequential Equilibrium strategy, i.e. in this case, all firms choose to file for Chapter 11 bankruptcy immediately. In any case, there is no mixed strategy Perfect Sequential Equilibria.*

Proof: (See the Appendix)

There is a clear intuition behind this proposition. In making its decision the firm recognizes that the Chapter 11 procedure is the default option to the private workout. Therefore, in the workout, even if the firm's relative bargaining power is 0, it should get an expected value as high as that in a Chapter 11 procedure. This value is $\overline{V}_E^{11}$. On the other hand, when the good firm has 100% of bargaining power in the workout, it can make a take-it-or-leave-it offer to the creditor. Such an offer should leave the creditor with the value that the creditor can get in a Chapter 11 procedure. Thus, in this case, the good firm can get an expected value of $\frac{E(e)-E(V_C^{11})}{\mu_0}$. In general the good firm can expect to get a payoff in between these two values. Therefore, in order for the firm to be better off with a private workout, it must be that the second payoff is

larger than the first one.

In the following, we will study various factors that may have affect the the firm's choice between workout and Chapter 11 procedures. We will compare the prediction of the model with documented empirical findings. These factors are the assest structure of the firm, the liquidation value of the firm, the creditor's *ex ante* belief about the firm's type, and the relative bargaining powers of the management in both workout and Chapter 11 procedure.

6.1 The Neutrality of Bargaining Powers to the Firm's Choice

The model predicts that the relative bargaining powers are immaterial to the firm's choice between workouts and Chapter 11 procedure. This is true for both the bargains powers in workout α^W and the bargaining power in the Chapter 11 filing α^{11}.

Proposition 2 *(*The Neutrality of Bargaining Powers *)* *Ceteris Paribus,* the firm's choice between workout and Chapter 11 is independent of both the firm's bargaining power in workout α^W and the firm's bargaining power in Chapter 11 α^{11}.

Proof: Define

$$\Delta V = \frac{E(e) - V_C^{11}}{\mu_0}$$

From proposition 1, we can see that if $\Delta V \leq 0$ then the firm will choose workout, otherwise it will choose Chapter 11. Since in the criteria function ΔV, neither α^W nor α^{11} appear, the conclusion is obvious.

This neutrality result is very surprising, since the conventional wisdom is that other things being equal, the firm should favor the option in which it has relatively more bargaining power. However surprising, it is easy to explain the intuition of this result. When the firm's bargaining power in Chapter 11 increases, the shareholder can expect to get better payoff in the Chapter 11 procedure. Also, this means that

Q.E

the creditor will get less in Chapter 11. Consequently, in the workout bargaining the creditor is more willing to accept a less favorable deal, since Chapter 11 is the alternative to workout. In balance, there is no net effect of an increase in the bargaining of the shareholder in Chapter 11. The same is true for bargaining power change in workouts.

6.2 Asset Structure and the Firm Choice to Workout

The model predicts that the higher the proportion of intangible assets of the firm, the more likely the firm may choose to resolve its financial distress through private workout. This pattern of the firm's choice between workout and Chapter 11 is revealed in Gilson, John and Liang (1990). The intuition for this result is straightforward. When the firm has more intangible assets, it is more costly for the firm to go through the Chapter 11 process. Other things being equal, it is more likely to see the outcome that the firm chooses to go through workout.

Proposition 3 *(Asset Structure and the Choice to Workout) Given μ_0, L, there exists γ^*, such that if $\gamma > \gamma^*$, then the firm will choose workout; otherwise it will choose Chapter 11. Where γ^* is defined as*

$$\gamma^* = \frac{E(e) - (1-\mu_0)L}{\mu_0}$$

This is to say that Ceteris Paribus, firms with more intangible assets will be more likely to choose workout.

Proof: From equations (??) and (??), we can have

$$\Delta V = \alpha^{11}(\bar{e} - L) - \frac{\mu_0 \bar{e} + (1-\mu_0)\underline{e} - \mu_0(1-\alpha^{11})(\bar{e} - L) - L}{\mu_0}$$

$$= \frac{\mu(\bar{e} - \bar{e}) - (1-\mu_0)(\underline{e} - L)}{\mu_0}$$

Since $\tilde{(e)}'(\gamma) < 0$, we have

$$\frac{\partial \Delta \mu_0}{\partial \gamma} = \tilde{e}'(\gamma) < 0$$

which implies the conclusion. As for γ^*, it corresponds to the value found by setting ΔV equal to 0. Q.E.D.

6.3 Liquidation Value of the Firm and the Firm's Choice

According to Gilson, Johns and Liang (1990), the firm's liquidation value is positively correlated with the firm's choice to file for Chapter 11 bankruptcy. Our model makes the same prediction.

Proposition 4 *(Liquidation Value and the Firm's Choice) Given μ_0, γ, there exists L^*, such that if $L < L^*$, then the firm will choose workout; otherwise it will choose Chapter 11. Where*

$$L^* = \frac{E(e) - \mu_0 \tilde{e}}{1 - \mu_0}$$

This implies that firms with higher liquidation value will more likely choose Chapter 11.

Proof: (It is similar to the prove of proposition 2 and hence omitted.)

The reason for this prediction is rather simple. In a successful workout the bad firm will survive along with the good one. The opportunity cost of having the bad firm survive is the liquidation value. This cost is partially shared by the good firm. Therefore, an increase in the liquidation value will make workout less attractive.

6.4 The Reputation Effect on the Firm's Choice

Proposition 5 *(The Reputation Effect) Given L, γ, $\exists \mu^*$, such that if $\mu_0 > \mu^*$, then the $\overline{\beta}$-type firm will choose workout; otherwise it will choose Chapter 11. This implies*

that firms will more likely choose workout if they owe more of their debt to banks, and/or owe fewer lenders. Where

$$\mu^* = \frac{L - \underline{e}}{L - \underline{e} + \overline{e} - \tilde{e}}$$

Proof: See the proof on proposition 2.

The explanation of this reputation effect is straightforward. If the creditor believes that the firm is likely to be a good one, then the creditor can *expect* to get more from the workout since the contract in the workout is designed so that the shareholder of the bad firm always gets 0 payoff. Therefore, for a *given* workout package the creditor is more willing to accept. This implies that the manager of the good firm is more willing to go to workout and we know that the manager of the bad firm will definitely follow.

6.5 The Announcement Effect in Financial Distress

Our model is able to predict an announcement effect in the firm's resolution of financial distress. In reality, relative to the creditors who are negotiating with the firm, small equity investors trading in the stock market have much less accurate information about the true type of the firm. In particular, we assume that the investors expect μ to follow a distribution $F_\mu(.)$, which has an expectation μ_0. Let μ^* be defined as in the last proposition.

Before the firm announces its choice between workout and Chapter 11, but after the announcement that the firm is in financial distress, the investors know that if $\mu < \mu^*$ then the firm will go to Chapter 11, otherwise, the firm will choose workout. μ^* is given in proposition 5. Therefore, the investors' expected share value of the firm is

$$V_b = E(V_E^W \mid \mu > \mu^*) + E(V_E^{11} \mid \mu < \mu^*)$$

After an announcement that the firm will choose to workout, the expectation of

the investors becomes

$$V_a(W) = E(V_E^W \mid \mu > \mu^*)$$

After an announcement that the firm will choose to file chapter 11, the expectation becomes,

$$V_a(11) = E(V_E^{11} \mid \mu < \mu^*)$$

Apparently, we have

$$V_a(11) \leq V_b \leq V_a(W)$$

More generally, the following proposition is true.

Proposition 6 *If $F_\mu(\mu^*) < 1$, then an announcement of Chapter 11 filing will have a negative effect on the stock price of the firm in financial distress. If $F_\mu(\mu^*) > 0$, then then the firm's announcement of choosing workout will have a positive effect on the stock price of the firm in financial distress.*

Proof: (Obvious and omitted)

The intuition is very simple. If the market does not expect the firm to choose Chapter 11 with 100% confidence, then the announcement of Chapter 11 filing is bad news and comes as a surprise. Therefore the stock price will go down. The opposite case can be similarly explained.

6.6 Comparison of the Violations of Absolute Priority Rule in Chapter 11 and Workouts

Our model based on the bargaining between the firm and the creditor can also explain a puzzling empirical finding of the firms' resolution of financial distress, that is, the pattern of the violation of absolute priority rule.

Violations of the absolute priority rule (APR) are very common in the firms resolution of financial distress. The absolute priority rule of payment to the security holders is well defined when the firm issues the securities. The normal priority rule is

that debtholders should be paid before the equity holders get any payment. Among different classes of debt holders, there are also well set payment order. For example, short term debt should be paid off before long term debt can be paid. In reality, APR is hardly followed in either Chapter 11 or workouts and there are clear patterns of the violation. According to Franks and Torus (1990), in workouts, the violation of APR is more severe than that in Chapter 11 procedures.

The violation of the APR is commonly measured as the difference between what a security holder expects to get according to the APR and what was actually obtained. Let VL^{11} be the index of violation in Chapter 11 and VL^W be the index of violation in workout. In our model, the violation of the APR in Chapter 11 is only due to the bargaining power of the firm, since asymmetry of information is out of the issue. On the other hand, the violation in the workout is partly contributed by the information rent enjoyed by the management as well as its bargaining power.

In the Chapter 11 procedure, the bad firm is singled out and liquidated immediately. The creditor gets L and the equity holder gets nothing. The APR is strictly followed in this case. As for the good firm, the creditor should get $\tilde{e}(\gamma)$ (which is smaller than D) and the equity holder gets nothing according the the APR. However, the bargaining outcome entitles the firm to a payoff of $\alpha^{11}(\tilde{e}(\gamma) - L)$ and leaves the creditor only with $(1 - \alpha^{11})(\tilde{e}(\gamma) - L) + L$. Therefore, the violation of the APR in the Chapter 11 procedure is

$$VL^{11} = \tilde{e} - (1 - \alpha^{11})(\tilde{e} - L) - L$$

In the private workout, both kind of firms survive. The creditor expects to get the payment of $E(e) = \mu_0 \overline{e} + (1 - \mu_0)\underline{e}$ (which is smaller than D by the definition of financial distress.). However, the creditor has to leave the good firm with some payoff, which is $V_E^W = \alpha^w \frac{E(e) - E(V_C^{11})}{\mu} + (1 - \alpha^w)\overline{V}_E^{11}$. Therefore, the violation of the APR in the private workout is

$$VL^W = E(e) - V_C^W = E(e) - (E(e) - V_E^W) = V_E^W$$

The following proposition shows that the violation in Chapter 11 is smaller than that in the private workout.

Proposition 7 *(Comparisons of the Violation of Absolute Priority Rule) Given that a firm is in financial distress, the violation of absolute priority rule in a successful private workout is bigger than that in a successful chapter 11 procedure.*

Proof: The violation in workout is

$$VL^W = E(e) - V_C^W = E(e) - (E(e) - V_E^W) = V_E^W$$

$$= \alpha^W \frac{\mu\bar{e} + (1-\mu)\underline{e} - \mu(1-\alpha^{11})(\tilde{e}-L) - L}{\mu} + (1-\alpha^W)\alpha^{11}(\tilde{e}-L)$$

The violation in Chapter 11 is

$$VL^{11} = \tilde{e} - (1-\alpha^{11})(\tilde{e}-L) - L$$

Notice that when $\alpha^{11} = 1$ and $\alpha^W = 0$, these two violations must be equal:

$$VL^W = \tilde{e} - L = VL^{11}$$

However, both VL^W and VL^{11} are increasing in α^{11} and α^w, since

$$\frac{\partial VL^W}{\partial \alpha^{11}} = \frac{E(e)-L}{\mu} + (\tilde{e}-L)$$

$$= \frac{1}{\mu}[E(e) - L - \mu(\tilde{e}-L)] > 0$$

(This is because workout is the outcome);

$$\frac{\partial VL^W}{\partial \alpha^{11}} = \alpha^W(\tilde{e}-L) + (1-\alpha^W)(\tilde{e}-L) = (\tilde{e}-L) > 0$$

and

$$\frac{\partial VL^{11}}{\partial \alpha^{11}} = \tilde{e} - L > 0$$

Therefore, in general when $0 \leq \alpha^{11} \leq 1$ and $0 \leq \alpha^W \leq 1$, it is true that

$$VL^W \geq VL^{11}$$

Q.E.D.

This proposition offers an interpretation of the violation of APR. The fact that the violation of the APR in workout is bigger than that in the Chapter 11 procedure is often explained by the conjecture that the presence of a bankruptcy judge helps preserve the APR (see Franks and Torous [1990]). It is not clear whether this conjecture is indeed true, since the motive and behavior of the judge is very hard to characterize in general. Here, our explanation of the relative severity of the violation relies on a simple fact that the firm chooses to go to workout with Chapter 11 being taken as an outside option. Given this, the firm that indeed chooses workout should get higher payoff than that in a Chapter 11 procedure. This implies that the creditor will lose more in a workout than in a chapter 11 procedure. Therefore, the violation in private workout than in a Chapter 11 procedure. We believed that our argument is much more general than those detailed in the proof of the proposition. The conclusion should hold under much more general conditions.

7. Conclusion

The starting point of this paper is that information asymmetry between the creditor and the management of the firm is a central issue in the firm's resolution of financial distress. Coupled with this information problem is the issue of corporate control. That is, the management of the bad firm always wants to stay in control by pretending that the firm has a good profit prospect. Our simple model catches both aspects of financial distress.

We emphasize the difference between a private workout and a Chapter 11 procedure. We argue that in the Chapter 11 procedure, more private information of the firm can be credibly and forcefully disclosed than that in a private workout. On the other hand, a Chapter 11 procedure is more costly than private workout.

A simple model based on the above considerations predicts a sequence of empirically consistent results. For example, financially distressed firms with high ratio of

tangible assets or high liquidation value tend to choose private workout. The success of workout depends positively on the creditor's belief about the future profitability of the firm. Moreover, the announcement of the workout will have a positive effect on the stock of the firm while the announcement of the Chapter 11 filing will have negative effect on the stock price. Also, the violation of the absolute priority rule is more severe in workouts than in Chapter 11 procedures. All these prediction are consistent with major stylized facts about distressed firms' choices between workouts and Chapter 11 filings.

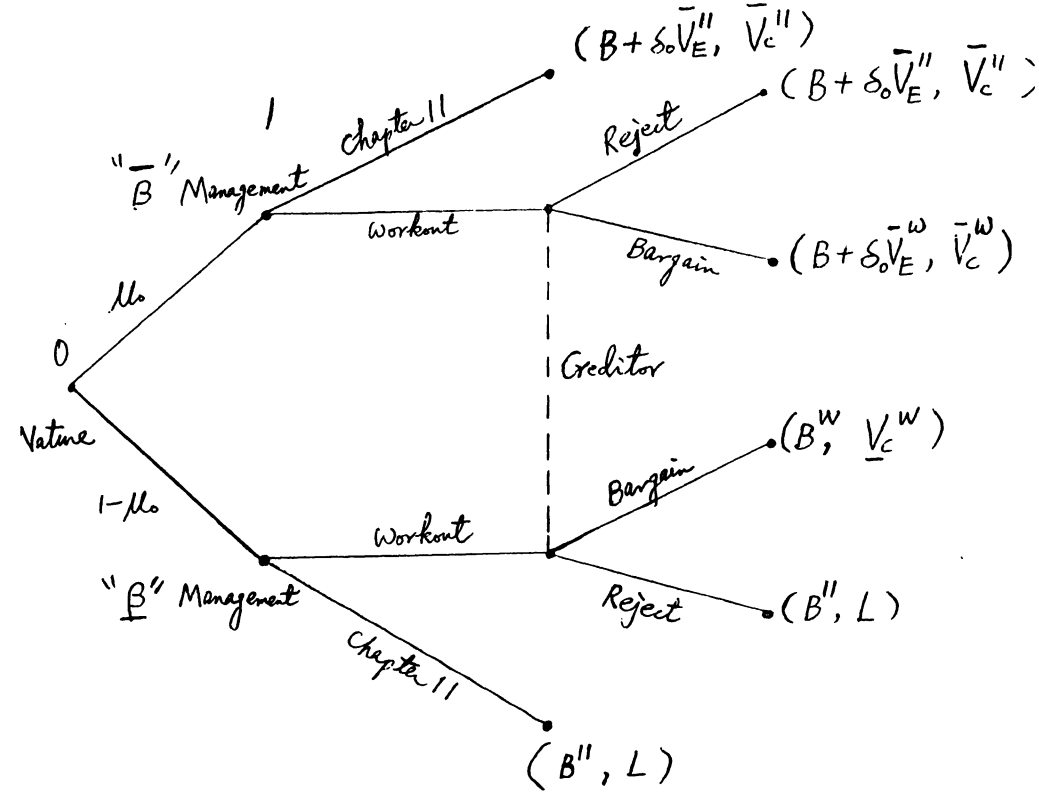
Finally, analyses based on the simple model establish a surprising result which is against received wisdom of financial distress. That is the firm's bargaining power in the workout and the Chapter 11 procedure is neutral to the firm's choice between the workout and the Chapter 11 filing. An examination of the intuition reveals that this conclusion is rather general and robust to our assumptions. The simple reason is that the Chapter 11 filing is an outside option to the private workout. Therefore, we hope that the paper may contribute to clarify issues in this regard.

The implication of the paper is that a bankruptcy procedure under court supervision is necessary, because such a legal procedure can provide a relatively efficient way to separate good firms from bad ones. Therefore, we find another reason for the necessity of bankruptcy laws, in addition to the hold-up problem which was eloquently argued by Gertner and Scharfstein (1991).

Appendix: The Proof of Proposition I

1.

First of all, we prove that in any equilibrium the $\overline{\beta}$ management and the $\underline{\beta}$ either both adopt mixed strategies or the same pure strategy. In other words, it is impossible for one management to choose workout for sure and the other management choose



$$\bar{V}_E'' = \alpha''(\tilde{e} - L), \quad \bar{V}_c'' = (1-\alpha'')(\tilde{e} - \ell) + L$$

$$\bar{V}_E^w = \alpha^w \frac{E(e) - E(V_c'')}{\mu} + (1-\alpha^w)\bar{V}_E''$$

$$\bar{V}_c^w = \alpha^w \frac{E(V_c'') - (1-\mu)\underline{e}}{\mu} + (1-\alpha^w)(\bar{e} - \bar{V}_E'')$$

$$\underline{V}_c^w = \underline{e}$$

Figure 2: Game Tree Confined to Cases of Non-separating Strategies

Chapter 11 for sure. The reason is very simple, since in this case the creditor will immediately recognize the bad firm and push it into Chapter 7 liquidation. In this case, the payoff to the bad firm's management is $\underline{B}^7$, which is smaller than $\underline{B}^{11}$ and $\underline{B}^W$. Therefore, the $\underline{\beta}$ management would have done better to switch to the strategy of the $\overline{\beta}$ management.

Confining to the case where the $\underline{\beta}$ management cannot be identified immediately, the game can be expressed in the following extensive form game tree (Figure-2). At time 0, the nature makes the move to decide the type of the firm. Then, the management, which can be of either type, makes the choice between workout and Chapter 11. In Chapter 11, the payoffs to the management and the creditor are determined by a generalized Nash bargaining game. The payoffs are denoted in the corresponding nodes. After the management chooses workout, the creditor has to make a decision between rejecting workout and bargaining. If the creditor rejects, the firm goes to Chapter 11. If the creditor bargains, the payoffs are given in the bargaining game discussed before.

2.

In proving the equilibrium, we use two principles that the concept of stable equilibrium entails: Iterated Dominance (ID) and Admissibility (A) (see Fundenberg and Tirole (1991)). (ID) requires that all strictly dominated strategies should be deleted and (A) requires that "no mixed strategies in a strategically stable set can assign positive probability to any pure strategy that is weekly dominated." (Fundenberg and Tirole).

Let's prove that there cannot be mixed strategy stable equilibrium in our model. Suppose the opposite is true, i.e. at least one of $\underline{q}$ and $\overline{q}$ is in $(0,1)$.

Compare the payoffs to $\underline{\beta}$ when it chooses workout and Chapter 11. No matter what strategies the creditor plays, the outcome of workout is no worse than Chapter 11 for $\underline{\beta}$. That is, Chapter 11 is weakly dominated by workout for $\underline{\beta}$. Therefore, according to principle (A), in a mixed strategy equilibrium, $\underline{q} = 1$. Thus, we can

concentrate on mixed strategy equilibria where $\underline{q} = 1$.

Next, compare the payoffs to $\overline{\beta}$. In the pure strategy of choosing workout for sure, it will get either $\overline{V}_E^{11}$ or $\overline{V}_E^W$, depending on whether the creditor rejects or bargains. In playing the pure strategy of choosing Chapter 11, $\overline{\beta}$ will get $\overline{V}_E^{11}$ for sure. For any value of μ_0, either $\overline{V}_E^{11}(\mu_0) \geq \underline{V}_E^W(\mu_0)$ or $\overline{V}_E^{11}(\mu_0) < \underline{V}_E^W(\mu_0)$. Therefore, for any given value of μ_0 and regardless the strategy of the creditor, either the pure strategy of going to workout is weakly dominated by the pure strategy of choosing Chapter 11 or the opposite is true. Thus, according to (A), it is impossible for $\overline{\beta}$ to play mixed strategies in any stable equilibria.

3.

Finally, we prove that if $\frac{E(e)-E(V_C^{11})}{\mu_0} \geq \overline{V}_E^{11}$, then the only stable equilibrium is for both type of management to choose workout. Similarly, the other case can be proved.

Now we are left only with two candidates for equilibria: $\overline{q} = \underline{q} = 1$ and $\overline{q} = \underline{q} = 0$. We show that the second case is impossible. In the second case, $\overline{\beta}$ will deviate to the $\overline{q} = 1$. If he does so, the belief of the creditor upon observing workout is $\mu = 1 > \mu_0$. Thus, it is true that

$$\frac{E(e) - E(V_C^{11})}{\mu} \geq \overline{V}_E^{11}$$

since the left-hand side is increasing in μ. Therefore the payoff to $\overline{\beta}$ after the switch is larger. Thus we proved that the only possible equilibrium is for both types of management to choose workout.

We have to check that $\overline{q} = \underline{q} = 1$ is indeed an equilibrium. For $\overline{\beta}$, deviating to choosing Chapter 11 is clearly sub-optimal, since the payoff in Chapter 11 is smaller than workout for $\overline{\beta}$. For $\underline{\beta}$, deviating from $\underline{q} = 1$ to $\underline{q} < 1$ is also unwise, since $\underline{B}^{11} < \underline{B}^W$.

Q.E.D.

References

Asquith, P., R. Gertner, and D. Scharfstein: *Anatomy of Financial Distress: Evidence from Junk-Bond Issuers.* working paper, Sloan School, MIT. 1991.

Berry, C. and E. Bailey: *Bankruptcy: Law and Practice.* London, Butterworths, 1987.

Baird, D. and T. Jackson: *Cases, Problems and Materials on Bankruptcy.* Boston and Toronto, Little, Brown and Company, 1985.

Brown, D.: *Claimholder Incentive Conflicts in Reorganization: The Role of Bankruptcy Law. The Review of Financial Studies.* vol. 2, 1989, 109-123.

Bulow, J. and J. Shoven: *The Bankruptcy Decision. Bell Journal of Economics.* vol. 9, 1978, 437-456.

DeAngelo, H., L. DeAngelo, and D. Skinner: *An Empirical Investigation of the Relation between Accounting Choice and Dividend Policy in Troubled Companies.* Working Paper, University of Michigan. 1990.

Franks, J. and W. Torous: *An Empirical Investigation of U.S. Firms in Reorganization. Journal of Finance.* vol. 44, 1989, 747-769.

Franks, J. and W. Torous: *How Firms Fare in Workouts and Chapter 11 Reorganizations.* Working Paper. University of California, Los Angeles. 1990.

Fundenberg, D. and J. Tirole: *Game Theory.* The MIT Press, 1991.

Gertner, R.: *Capital-Structure Signalling in Distressed-Debt Workouts.* working paper. Graduate School of Business, University of Chicago. 1992.

Gertner, R. and D. Scharfstein: *A Theory of Workouts and the Effects of Reorganization Law.* Journal of Finance. vol. 46, 1991, 1189-1222.

Giammarino, R.: *The Resolution of Financial Distress. The Review of Financial Studies.* vol. 2, 1989, 25-47.

Gilson, S: *Management Turnover and Financial Distress. Journal of Financial Economics.* vol. 25, 1989, 241-262.

Gilson, S.: *Bankruptcy, Boards, Banks, and Blockholders: Evidence on Changes in Corporate Ownership and Control when Firms Default. Journal of Financial Economics.* vol. 27, 1990, 355-387.

Gilson, S.: *Managing Default: Some Evidence on How Firms Choose Between Workouts and Chapter 11. Journal of Applied Corporate Finance.* vol. 4, 1991, 62-70.

Gilson, S., K. John, and L.Lang: *Troubled Debt Restructurings: An Empirical Study of Private Reorganization of Firms in Default. Journal of Financial Economics.* vol. 27, 1990, 315-353.

Grossman, S. and M. Perry: *Perfect Sequential Equilibrium. Journal of Economic Theory.* vol. 39, 1986, 97-119.

Hart, O. and J. Moore: *The Economics of Bankruptcy Reform.*working paper, M.I.T., 1992.

Shleifer, A. and R. Vishny: *Asset Sales and Debt Capacity.* working paper, Harvard University, 1991.

Snaith, I. : *The Law of Corporate Insolvency.* London, Waterlow Publishers, 1990.

Weiss, L.: *Bankruptcy Resolution: Direct Costs and Violation of Priority of Claims. Journal of Financial Economics.* vol. 27, 1990, 285-314.

White, M.: *Corporate Bankruptcy as a Filtering Device.* Department of Economics, University of Michigan, 1991.

White, M.: *Bankruptcy Costs and the New Bankruptcy Code. Journal of Finance.* vol. 38, 1983, 477-504.

White, M.: *Public Policy Toward Bankruptcy: Me-First and Other Priority Rules. Bell Journal of Economics.* vol. 11, 1980, 550-564.

Wruck, K.: *Financial Distress, Reorganization, and Organizational Efficiency.*

Journal of Financial Economics. vol. 27, 1990, 419-444.