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## Financial Distress and the Role of Capital Contributions by the Owner Manager

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# **Financial Distress and the Role of Capital Contributions by the Owner Manager\***

by

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## **Financial Distress and the Role of Capital Contributions by the Owner Manager**

### **Abstract**

This paper examines the implications of bankruptcy law for owner managed firms. These firms are typically (i) smaller, (ii) their value is closely tied to the skills of the owner manager, and (iii) the owner manager represents a feasible source of capital contributions if the firm is in financial distress. The terms of such capital infusions, codified as the new value exception (NVE) to the absolute priority rule (APR), has been the source of considerable controversy, both in terms of its existence, and the economic benefit, if any, that it provides. We show that when the owner manager cannot contribute capital to the distressed firm, creditors allow him to retain some residual value (i.e. APR is violated) in order to create the appropriate incentives for the manager to exert effort. In this setting, we then examine the role of capital contributions by the manager, when his required return is increasing in the amount that he contributes. We consider both the case of symmetric and asymmetric information about the manager's ability to contribute such capital. Such infusions are shown to provide superior outcomes to both creditor financing and external financing. Creditors are better off because of the impact of the infusions on the incentives of the manager. As a consequence, deviations from APR are less severe than they would have been in the absence of these infusions. Moreover, some firms that would have been liquidated in the absence of such capital contributions are now able to continue operations. These results suggest that the current debate over the optimal design of bankruptcy procedures should address the role for capital contributions by owner managers as well.

## **Financial Distress and the Role of Capital Contributions by the Owner Manager**

### **I. Introduction**

A large and evolving literature in financial economics focuses on the performance of the current laws governing corporate bankruptcies. While empirical studies have examined the various aspects of firms before, during and after financial distress, theoretical studies have tried to understand the conflicting incentives created in these situations.<sup>1</sup> There have also been several attempts to articulate the features that should be present in an optimal bankruptcy code.<sup>2</sup> While these studies, for the most part, have assumed that the same bankruptcy rules should apply to all firms, several legal scholars have argued that bankruptcy procedures should recognize that differences in the ownership characteristics of small versus large firms creates very different incentive problems, thus potentially requiring different methods for resolving these problems as well.<sup>3</sup> This concern is also reflected in the (failed) attempt by Congress in 1992 to pass a bankruptcy reform bill that included a new small business chapter (Chapter 10) that would apply to firms with debts of less than \$2.5 million (Tabb (1993)).<sup>4</sup>

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<sup>1</sup> Some prominent examples from the vast empirical literature include Franks and Torous (1989), Weiss (1990), Eberhart, Moore and Roenfeldt (1990), Gilson, John and Lang (1990), and Brown, James and Mooradian (1993). Theoretical papers include Brown (1989), Giammarino (1989), and Gertner and Scharfstein (1991), among others. John and John (1992), John (1993) and Senbet and Seward (1993) provide comprehensive surveys of this growing literature.

<sup>2</sup> Examples of this include Harris and Raviv (1993), Bebchuck (1988), and Aghion, Hart and Moore (1992,1994).

<sup>3</sup> See, for example, LoPucki (1993), Nimmer (1987), Skeel (1993) and Tabb (1993).

<sup>4</sup> The Bankruptcy Act (pre-1978) contained two separate procedures (Chapter X and Chapter XI) which provided such a solution. The need to design laws to cater specifically to small firm is attested to by their importance to the economy. For example, a recent study by the Small Business Administration finds that "... the nations smallest firms created virtually all the new jobs between 1989 and 1991".

Certain aspects of smaller companies distinguish them from their larger counterparts. First, managers of these firms typically maintain a significant ownership position as well. Second, much of the value of these firms is critically dependent on the talent and ability of the owner manager. Finally, the owner manager, in addition to the preexisting creditors of the company and outside lenders, represents a potential source for any capital infusions that might be required as a part of the successful reorganization of the firm. These aspects have typically been ignored in the ongoing debate in the finance literature on the optimal design of bankruptcy rules.

The legal rules governing capital contributions by owner managers in return for an equity stake in the firm are codified as the "new value exception" to the absolute priority rule.<sup>5</sup> This exception has been a source of considerable contention between debtors and creditors, and there is also a large legal literature that discusses this aspect of the bankruptcy code.<sup>6 7</sup> The "new value exception" was a well established doctrine under the Bankruptcy Act (pre-1978). It was based on the argument that the participation of the owner manager in the reorganized firm provided benefits through continuity and the preservation of the firm's reputation. It was also recognized, however, that if such an exception was not carefully monitored, there was also the possibility that managers could

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<sup>5</sup> A summary of the relevant aspects of the new value exception is provided in Section II of the paper.

<sup>6</sup> Miscioscia (1993) provides a useful survey of the legislative history and the academic debate over the new value exception. Baird and Picker (1991) examine the implications of the automatic stay, cramdown and the new value exception. However, as pointed out by Carlson (1992), it is difficult to isolate the effects of the new value exception in their model. Nimmer (1987) discusses some of the policy implications of the new value exception for small businesses, while Epling (1991) provides one of the few available discussions of what such an "exception" should look like in practice.

<sup>7</sup> The primary focus of this discussion, however, is primarily on whether the failure of Congress to explicitly mention it in the Bankruptcy Reform Act of 1978 implies that the feature is no longer a part of the Code.

misutilize the features. Consequently, the exception required that the owner had to contribute a "substantial amount of capital", that such capital was not available from other sources, and that the ownership interest was "reasonably equivalent" to the capital contribution. It is not obvious, however, what role such capital contributions from owner managers play in improving the efficiency of the reorganization process. Nor is it clear that such infusions represent a source of financing that provides benefits that are unavailable when the firm utilizes either creditor financing or external financing. In fact, Baird (1993a) goes so far as to suggest (page 266) that "the new value exception should become a focal point for debate about bankruptcy policy because it admits of no such easy resolution".

In order to investigate whether or not such a feature should be a part of the current Bankruptcy Code, this paper develops a model of an owner managed firm that is in financial distress. Specifically, the firm currently has insufficient funds to make the promised payment to the single creditor in the firm. Consequently, the manager and the creditor are renegotiating to restructure the claims and continue operations, if possible. The alternative is to liquidate the firm (which can also be interpreted as the sale of the firm to a less efficient owner manager). If the firm is to continue operations, two critical inputs are required. First, a capital infusion is required to sustain operations, and second, the manager has to exert effort that determines the ultimate cash flows generated by the firm. This effort is not observable and hence cannot be contracted upon. Consequently, the outcome of the renegotiation process depends critically on both the level of capital infusions required and the incentives created by any restructuring of the promised payments to the creditor.

We begin by considering the case where the creditor provides the required capital

and restructures his debt claims. The optimal restructuring of the debt claim is based on the trade-off between a higher promised payment and the adverse effects that this has on the incentives of the manager to exert effort.<sup>8</sup> Consequently, violations of the absolute priority rule are required to provide incentives for the manager to put in the effort required to maintain the value of the assets.<sup>9</sup> Moreover, conditional on continuing operations, managerial effort is still less than optimal, due to the well known debt overhang problem (Myers (1977)). This lower effort level also implies that firms are liquidated suboptimally. In the model, these results are unaffected by whether the capital infusion that is required is provided by the preexisting creditor or by a new lender.

We then consider the implications of the owner manager having sufficient personal wealth to provide some or all of the capital infusion required to sustain the assets, with this information being common knowledge. We assume, however, that the economic rents required by the manager in return for providing such capital are increasing in the fraction of the capital that he provides. This would be the case, for example, if the manager is risk averse or has alternate uses for his (scarce) capital. We show that the creditor prefers to have a part of the capital by raised through cash infusions from the manager. In return, the creditor lowers the required payment from the firm relative to what would have been required in the absence of capital infusions by the owner. This leads to an improvement in effort incentives, and also results in some firms that would have been inefficiently liquidated in the absence of cash infusions by the owner now continuing operations.

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<sup>8</sup> This is similar to the trade-off identified in Bulow and Shoven (1979) and Froot, Scharfstein, and Stein (1989).

<sup>9</sup> This rationale for APR violations is similar to argument in Eberhart and Senbet (1993), Harris and Raviv (1993) etc.

We finally consider the consequences of uncertainty on the part of the creditor on whether or not the owner manager has funds available to make a capital infusion. The symmetric information solutions are shown not to be feasible. Specifically, a "rich" owner manager always has the incentive to mimic the "poor" owner manager. The creditor is therefore forced to adjust the offers that he makes. To ensure nonmimicry, the creditor increases the required payment in the offer to the "poor" manager, while reducing the required payment in the offer to the "rich" manager. However, the creditor simultaneously increases the capital infusion required of the "rich" owner. This has implications for both the effort incentives and the continuation policy of the firm.

The remainder of the paper is organized as follows. Section II contains a brief description of the terms and judicial history of the new value exception. Section III develops the model of financial distress, and examines the restructuring decision in the absence of owner capital infusions. Sections IV and V examine the role of capital infusions by the owner under symmetric and asymmetric information respectively. The implications of these results for the new value exception are discussed in Section VI, where we also consider some possible extensions.

## **II. The Legislative History of the New Value Exception to the Absolute Priority Rule:**

The Absolute Priority Rule (henceforth APR), that forms the core of the 1978 Bankruptcy Code, mandates that a junior claimant cannot receive any property under a reorganization plan unless all senior claimants have consented to the plan or that the



senior claimants have been paid the full amount that was due to them.<sup>10</sup> In applying APR, courts have frequently been confronted by situations where the equity holders of the firm propose that they be allowed to maintain a stake in the reorganized firm, in exchange for contributions that they make. If this proposal results in existing creditors not receiving their full payment, one could argue that the proposal violates the rule of Absolute Priority. However, under specific circumstances, referred to as the "new value exception", courts have deemed that such a proposal is acceptable. Specifically, under this rule, equity holders who contribute capital are allowed to retain an interest in the corporation (even if creditors are not being made whole) as long as the court decides that

- i. The proposed contribution is necessary.
- ii. The contribution is in the form of cash.
- iii. The claim in the reorganized firm is "reasonably equivalent" to the new infusion of capital.

The courts have rationalized this exception by appealing to situations in which only the debtors are willing to contribute capital to the firm, i.e. they are the lenders of last resort. Furthermore, courts have also recognized the potential benefits to the firm in terms of maintaining continuity, preserving the firm's reputation, etc., in justifying this new value exception. However, the courts have also insisted that any contribution has to be in the form of cash (and not cash equivalents like the promise for future labor) for the exception to apply (see *Case v. Los Angeles Lumber*).

Subsequent to the reform of the Bankruptcy Code in 1978, there has been

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<sup>10</sup> Markell (1991) provides a comprehensive discussion of both the origins of the Absolute Priority Doctrine and the legislative history of the new value exception. Consistent with the legal literature, we will refer to the pre-1978 bankruptcy laws as the Bankruptcy Act and the post-1978 laws as the Bankruptcy Code.

considerable debate in legal circles about whether or not this new value exception still exists. Much of the debate can be traced back to *Ahlers v. Norwest Bank Worthington*, where the Supreme Court first raised questions about whether or not the exception still existed under the Code. While the subsequent debate has focussed on interpreting the language of both the Bankruptcy Code and additional cases, there now seems to be growing agreement that the Bankruptcy Code does implicitly contain rules on the manner in which contributions of capital by equity holders must be treated when the firm is in financial distress.

While such a debate is obviously useful, it raises an obvious policy issue. What is the economic role of capital contributions by owner managers? Answering this question is the obvious first step to any discussion of whether or not rules resembling the new value exception should be a part of the Bankruptcy Code. There are two contrasting views of this in the legal literature. Markell (1991) suggests that the NVE is not an exception at all, but in fact a corollary to the APR. He argues that while owner managers should be allowed to participate in the reorganization process, they should do so in a competitive environment, such as an auction. The benefit of this, in symmetric information environments, is that competition prevents the owner manager from exploiting creditors, while under asymmetric information, the bids of the owner manager provide valuable information to other bidders.<sup>11</sup>

In his discussion, Markell implicitly assumes that the owner manager of the firm brings no specific skills that are not available under alternate management. This makes the participation of owner managers effectively equivalent to that of outsiders. However,

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<sup>11</sup> For a slightly different perspective on the implications of asymmetric information for the role of auctions in bankruptcy proceedings, see Baird (1993b) and the response by Jackson (1993).

Baird (1993a) argues that in the pre-1978 Bankruptcy Act, the new value exception was especially relevant only for firms that would have filed under Chapter XI. These were firms where the stockholders were typically also the owner managers of the firm. In such firms, value is largely dependent on the special skills that the managers bring to the firm. Consequently, Baird views capital contributions by the owner manager in exchange for a stake in the reorganized firm as providing an "equitable" sharing of the benefits of managerial skills between the creditors and the shareholders. If this is the role of NVE, then it is not obvious that it is an unreasonable feature of the Bankruptcy Code.

The model developed in the next section incorporates these elements discussed by Baird in order to better understand the special role, if any, that capital contributions by owner managers might have, in affecting the outcome of the bankruptcy process. This analysis should provide a better understanding of the need, either in its current form or in an alternate guise, of an "exception" to the absolute priority rule.

### III. A Model of Debt Restructuring

The economy lasts over three time periods, indexed by  $t_0$ ,  $t_1$  and  $t_2$  respectively. The manager of a firm, who is also its owner, has to make a decision at  $t_0$  on the best possible use of the assets under his control.<sup>12</sup> If the decision is made that the assets should not be utilized, they can be sold off at their liquidation value, which is normalized to zero.<sup>13</sup> If the manager decides to continue utilizing the assets, an additional investment of  $I_0$  dollars is required at  $t_0$  to upgrade the facilities. Subsequently, the

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<sup>12</sup> For convenience, we will subsequently refer to the owner manager of the firm as the manager.

<sup>13</sup> This "liquidation" can be interpreted as the sale of the assets to another management team (Giammarino and Nosal (1994)).

manager needs to exert effort,  $q$ , at  $t_1$  in order to maximize the value of the assets. The choice of effort, directly influences the probability of generating a value (cash flow) of  $X$  dollars at  $t_2$ , with zero cash flows being generated otherwise. The effort exerted by the entrepreneur costs him  $Kq^2$  units (in dollar units) of disutility.<sup>14</sup> This effort is unobservable (and can therefore not be explicitly contracted upon) to other participants in the economy. All participants in the economy are assumed to be risk neutral, and the risk free rate is normalized to zero. Finally, all the parameters of the model are assumed to be common knowledge. This assumption is relaxed in Section V.

### *First Best*

In deciding whether or not to continue operations at  $t_0$ , the manager first needs to know the optimal amount of effort that he would exert conditional on continuing, and the value associated with doing so. Conditional on continuing operations, the manager's choice of effort is the solution to

$$\max_q [qX + (1-q)0] - Kq^2 \quad (1)$$

implying an optimal effort level of

$$q = \frac{X}{2K} \quad (2)$$

To ensure that this optimal effort level is a feasible probability, we restrict  $K$  to be greater than  $X/2$  for the purposes of subsequent analysis. The value to the manager from

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<sup>14</sup> The quadratic cost function is assumed primarily for analytical convenience. The flavor of the results will remain unchanged for a generic cost function with the usual properties.

exerting this effort is

$$qX - Kq^2 = \frac{X^2}{4K} \quad (3)$$

At  $t_0$ , therefore, the entrepreneur would consider it worthwhile to upgrade the assets and continue operations only if the benefit to him exceeds the investment  $I_0$ , i.e. whenever

$$\frac{X^2}{4K} \geq I_0 \quad (4)$$

As can be seen from (4), the manager is more likely to continue operations when the managerial cost parameter,  $K$ , and the cost of refurbishing the assets,  $I_0$ , are low, and/or the magnitude of the future cash flow,  $X$ , is high. We examine the implications of preexisting promised payments to outsiders on the continuation and effort decisions of the managers next.

### *Debt Restructuring*

Suppose now that the firm needs to make a payment of  $B_0$  dollars at  $t_0$  to its creditor (assumed to be a single, homogeneous entity).<sup>15</sup> This liability can be interpreted as having arisen because of past borrowing conducted by the firm. Since the firm currently has no cash or liquid assets to pay this liability, in the absence of renegotiation, the firm is immediately liquidated, yielding zero dollars to both the creditor and the

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<sup>15</sup> The assumption of a single creditor is made primarily for simplicity. As pointed out by Gertner and Scharfstein (1991) and Mooradian (1994), the presence of multiple creditors creates a variety of additional incentive problems as well.

owner manager (recall that the liquidation value is zero). It is also possible, however, that the creditor can provide the funds required at  $t_0$ , i.e.  $I_0$  dollars, in exchange for a promised payment of  $B_2$  dollars at  $t_2$ . If he is willing to do so, we assume that the creditor can make a take it or leave it offer to the manager. The ability to make a take it or leave it offer obviously confers considerable bargaining strength to the creditor. This bargaining strength is restricted, however, by the fact that the manager subsequently makes the unobservable effort choice, which depends on the terms of the creditor's offer. The equilibrium under these circumstances is identified next.

**Proposition 1:** If  $X^2 / 8K \geq I_0$ , the optimal strategy for the creditor is to provide the firm with  $I_0$  dollars, adjust the promised payment to  $B_2$  to  $X / 2$  and continue operations. If  $X^2 / 8K < I_0$ , the creditor does not provide funds and the firm is liquidated.

**Proof:** Suppose the creditor does provide the funds to allow the firm to continue. The creditor recognizes that when there is a promised payment of  $B$  dollars due at  $t_2$ , the manager's optimal level of effort solves

$$\text{Max}_q q[X - B] + (1 - q)0 - Kq^2 \quad (5)$$

implying an optimal choice of effort, as a function of the debt outstanding, of

$$q(B) = \frac{X - B}{2K} \quad (6)$$

Consequently, the creditor's optimal choice of  $B_2$  solves

$$\max_B q(B)B \quad (7)$$

where  $q(B)$  satisfies (6). This implies that  $B_2 = X / 2$ . For the decision to provide funds to

have been rational *ex ante*, it must be true that

$$q(B_2)B_2 > I_0 \quad (8)$$

Substituting for the optimal level of  $B_2$  leads to

$$\frac{X^2}{8K} \geq I_0 \quad (9)$$

■

The preceding condition is more stringent than that required for the project to be positive NPV (see equation (4)), implying that even when debt can be renegotiated, there are situations where viable projects are prematurely liquidated due to the lack of funds to sustain ongoing operations. The results can also be interpreted as highlighting the role of violations of the absolute priority rules in providing superior incentives. This credible threat of the manager to run down the assets is frequently used to justify both the observed deviations from absolute priority and to highlight the need for allowing for (selective) violations of APR.<sup>16</sup> Our result is also related to Diamond's (1993) argument that long-term debt should allow the issue of additional future debt that is senior, since the issuance of senior debt in the future effectively dilutes the claims of existing creditors in the same way as APR violations, which could improve managerial incentives.

*Public Debt:*

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<sup>16</sup> The violation of APR in bankruptcy has been pointed out by Daigle and Maloney (1994), Eberhart, Moore and Roenfeldt (1990), Franks and Torous (1989) and Weiss (1990) among others. Papers that have examined the benefits of APR violations include Brown (1989), Giammarino (1989), Bergman and Callen (1992) and Eberhart and Senbet (1993) among others.

Instead of providing all of the capital,  $I_0$ , required at  $t_0$  and having to settle for a promised payment of  $B_2$  dollars at  $t_2$ , the creditor could make available only a fraction,  $\alpha I_0$ , with the remainder having to be obtained externally ( $1 \leq \alpha \leq 0$ ). The creditor requires  $B_c$  dollars at  $t_2$  in exchange for providing these funds. The outside claimant (referred to as the public) receives  $B_p$  in exchange for providing  $(1-\alpha) I_0$ . Notice that the structure of the model, namely only two possible cash flows, with the lower one set to zero, results in there being no difference between debt and equity, or any difference based on the priority of claims.

In this case, assuming that the firm is not liquidated, the maximization problem faced by the creditor can be written as

$$\text{Max}_{\{\alpha, B_p, B_c\}} qB_c - \alpha I_0 \quad (10)$$

subject to

$$q = \frac{X - (B_p + B_c)}{2K} \quad (11)$$

$$qB_p \geq (1-\alpha)I_0 \quad (12)$$

where (10) represents the creditor's expected payoff, (11) represents the effort incentives of the manager when obligations of  $B_c$  and  $B_p$  are due to other claimants at  $t_2$ , and (12) represents the conditions under which outsiders are willing to provide funds. The next proposition characterizes the solution and compares it to the case where the creditor provides all the funds.



**Proposition 2:** The optimal solution in the presence of public financing is equivalent to the solution when the creditor provides all the funds  $I_0$ .

**Proof:** Substituting for  $\alpha$  from the rational pricing constraint for the public (equation (12), which must be binding) into the maximand (10) and the incentive compatibility condition (11) allows us to restate the problem as

$$\text{Max}_{\{B_P, B_C\}} q(B_P + B_C) - I_0 \quad (13)$$

Subject to

$$q = \frac{X - (B_P + B_C)}{2K} \quad (14)$$

with the associated solution

$$B_P + B_C = \frac{X}{2} \quad (15)$$

Moreover, the creditor finds such an arrangement to be worthwhile iff

$$\frac{X^2}{8K} \geq I_0 \quad (16)$$

liquidating the firm otherwise.

■

Intuitively, the proposition merely highlights the idea that conditional on the firm being in distress, there is an optimal amount of debt overhang ( $X/2$ ). If only the creditor restructures his claim, he provides all the funding while simultaneously setting the optimal level of the overhang. If financing from the public is available as well, the

combination of the payments to the public and the creditor satisfy the "optimal overhang" requirement (equation (14)), and the creditor reduces the amount of capital he contributes to the firm by the market value of the public debt. However, this changes neither the value to the creditor conditional on continuing operations, nor the circumstances under which operations are continued.

It is interesting to consider these results in the light of the argument that violations of APR can be avoided by appealing to public sources of capital, potentially through an auction. Such an argument presumes, of course, that there is symmetric information about the value of the firm and that any contributions that can be made by existing management can be replicated by others as well. Potential problems with auctions in the presence of asymmetric information have been recognized (Baird (1993b)). The results in Proposition 2 highlight the fact that if current management can provide valuable input not available elsewhere, the reliance on outside funding is not sufficient to mitigate the problems of APR violations. Since creditor and outside funding are equivalent in the context of the model, we ignore the latter for the purposes of subsequent analysis.

#### **IV. Debt Restructuring with Managerial Cash Infusions:**

Now consider the more complicated case where the debtor does possess the capability of providing some capital to the project at  $t_0$ . Moreover, the creditor is assumed to be aware that the manager possesses this capital, allowing him to require that the debtor provide some of the capital required to sustain the assets. Specifically, suppose that the creditor requires that the debtor provide  $E$  dollars ( $0 \leq E \leq I_0$ ), and that the debtor will provide the rest and simultaneously change the promised payment required to

$B_2$ .

Several comments on this modelling structure are in order. The assumption that the creditor is aware that the manager possesses the funds might seem unreasonable. This is relaxed in Section V. Furthermore, if the manager has cash available, an obvious alternative to the renegotiation process developed here is for the manager to either pay the creditor the promised payment at  $t_0$  or to buy back the debt. The first alternative might be unpalatable if  $B_0$  is sufficiently large. For the buyback, an obvious issue that affects the feasibility of the process is the magnitude of the premium demanded by the creditor. If this premium is high enough, the manager might once again decide that it is not worthwhile to conduct a repurchase. The analysis assumes, therefore, that  $B_0$  is sufficiently large, and the premium demanded by the creditor is large enough to preclude a buyback, leaving renegotiation as the only feasible alternative.

Even in renegotiation, however, one might expect that since the problem in this model is created by debt overhang, the optimal solution would be to have the manager provide all the capital required at  $t_0$ . This assumes, of course, that the creditor possesses all the bargaining power in the negotiating process. We assume a slightly different structure to the bargaining. Specifically, if the entrepreneur contributes a fraction  $\lambda(E) = E / I_0$  of the funds required for the continuation of the firm, he insists on getting at least a fraction  $\lambda$  of the benefits.<sup>17</sup> Consequently, a feasible offer  $(B, E)$  to the entrepreneur has to satisfy

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<sup>17</sup> This can be interpreted as an increasing cost of capital schedule for capital provided by the manager. It can be justified by either appealing to outside investment opportunities available to the manager or on the basis of managerial risk aversion. The precise form assumed is primarily to ensure the presence of interior solutions for the amount of capital infusions by the manager, without directly modelling the bargaining game between the creditor and the manager.

$$q[X - B_2] - Kq^2 \geq E + \lambda(E)[qX - I_0] \quad (17)$$

The complete optimization problem now facing the creditor (again, conditional on deciding to continue operations) is given by

$$\max_B qB - (I_0 - E) \quad (18)$$

Subject to

$$q = \frac{X - B}{2K} \quad (19)$$

and

$$q[X - B_2] - Kq^2 \geq E + \lambda(E)[qX - I_0] \quad (20)$$

The optimal solution to the constrained maximization problem faced by the creditor is given in the following proposition.

**Proposition 4:** The optimal face value of debt,  $B$ , and the optimal capital infusion,  $E$ , by the entrepreneur, are given by

$$B = \frac{X}{2} - \frac{I_0 K}{2X} \quad (21)$$

and

$$E = \frac{X - B}{2X} I_0 = \frac{I_0}{4} \left[ 1 + \frac{I_0 K}{X^2} \right] \quad (22)$$

**Proof:** Notice, first that the creditor's problem (18)-(20) is equivalent to solving

$$\max_B \frac{(X - B)B}{2K} - I_0 + \frac{(X - B)}{2X} I_0 \quad (23)$$

This follows directly from substituting from the incentive compatibility condition (19) and the rational pricing constraint (20) for the manager. The first order condition (for (23)) leads to the optimal value of  $B$  in (21). Solving out for  $E$  from (20), which must be binding, leads to the value of  $E$ .

■

There are a few aspects of this solution that are worth highlighting. The first two terms in (23) are similar to those that the creditor would consider when he is the sole provider of funds at  $t_0$ . The last term captures the effects of allowing the manager to contribute capital to the project. As can be seen from (21), the creditor sets the face value of their promised payment to be lower than it would have been in the absence of managerial cash infusions.<sup>18</sup> This leads to better effort incentives. Moreover, the promised payment to the creditor is decreasing as the cost of managerial effort,  $K$ , increases. Finally, it follows from (23) that the capital infusion required from the manager is increasing in  $K$  and the initial investment  $I_0$ .

Finally, we consider the implications of this additional flexibility provided by entrepreneurial cash infusions on the decision on whether or not to continue operations.

**Proposition 4:** When managerial cash infusions are feasible, renegotiation results in the firm continuing operations under a larger set of circumstances.

**Proof:** The profit to the creditor from the acceptance of a proposal  $(E, B)$  is given by

$$\pi_c(E, B) = q(B)B - (I_0 - K) \tag{24}$$

For the creditor to agree to the terms characterized in proposition 4, it must be the case

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<sup>18</sup> Recall that in the absence of cash from the entrepreneur, the creditor sets the face value of the debt to  $X/2$ .

that the profits under these terms are non-negative. Substituting for the terms, and rearranging, leads to

$$\frac{X^2}{8K} \geq I_0 - \left[ \frac{I_0}{4} + \frac{I_0^2 K'}{8X^2} \right] \quad (25)$$

as the condition under which the creditor is willing to participate in the transaction. Comparing this to equation (9), one can see that the right hand side of (25) is smaller, implying that the creditor is willing to continue operations under a larger set of circumstances.

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The analysis of this section suggests, therefore, that the ability of managers to make cash infusions enhances the efficiency of the renegotiation process in two ways. First, the reduction in the debt overhang in the reorganized firm creates superior incentives for the manager. Second, as a consequence of this superior effort exerted by the manager, firms that might have been liquidated in the absence of such infusions can now emerge successfully from financial distress. The analysis does suggest, however, that cash infusions are not sufficient to ensure that all efficient firms continue operations.

## V. Capital Infusions and Private Information

A concern about the equilibrium described in the previous section is that the assumption that the creditor knows that the manager has the funds available to contribute to the firm. In most circumstances, the creditor might in fact be uncertain about the wealth of the manager, making it difficult to implement the solutions described. We therefore examine the implications of relaxing this assumption here. For simplicity,

suppose managers fall into two categories: Rich managers (type R) have sufficient capital to satisfy any capital infusion request that might be required, while poor managers (type P) do not have any capital available. The creditor does not know the type of the manager, knowing only the probability,  $\delta$ , that the manager is rich.

Recall that under symmetric information, the creditor will offer to restructure the debt in the poor entrepreneur's firm to  $X/2$ . At the same time, the creditor will require a cash infusion from the rich manager and set the face value of debt to less than  $X/2$  (see Proposition 4). If the creditor offers these two alternatives under asymmetric information, it is possible that the rich entrepreneur might find it worthwhile to hide the fact that he is rich in order to avoid contributing capital.<sup>19</sup> We show in the next proposition that this is in fact always the case.

**Proposition 5:** If the creditor offers the symmetric information package, the rich manager will always mimic the poor entrepreneur by picking the package that does not require cash infusions.

**Proof :** See Appendix.

The creditor can try and screen the managers by offering two different packages  $(B_R, E_R)$  and  $(B_P, 0)$ , and designing the parameters of these offers so that the rich manager selects the packages  $(B_R, E_R)$ , while the poor manager selects  $(B_P, 0)$ .<sup>20</sup> We assume, for

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<sup>19</sup> The poor manager, since he has no capital, obviously cannot select the offer meant for the rich manager. The assumption that the poor manager has no capital thus simplifies the analysis considerably by requiring that we only need to check the non-mimicry constraint for the rich manager.

<sup>20</sup> Recall that by assumption the poor entrepreneur has no capital. Therefore,  $E_P = 0$  is the only feasible component of his package.

now, that the creditor finds it valuable to have both manager types continue operations. The complete contracting problem faced by the creditor is to design these packages in order to maximize expected wealth, i.e.

$$\underset{\{(B_R, E_R), (B_P)\}}{\text{Max}} \delta [q(B_R)B_R - (I_0 - E_R)] + (1 - \delta) [q(B_P)B_P - I_0] \quad (26)$$

Subject to

$$q(B_R)(X - B_R) - Kq(B_R)^2 - E_R \geq q(B_P)(X - B_P) - Kq(B_P)^2 \quad (27)$$

$$q(B_R)(X - B_R) - Kq(B_R)^2 - E_R \geq \frac{E_R}{I_0} [q(B_R)X - I_0] \quad (28)$$

where  $q(B) = (X - B) / 2K$ . The expected payments to the creditor are represented by (26). The self selection constraint for the type-R entrepreneur is represented by (27), while (28) represents his participation. Notice that the corresponding conditions for the poor entrepreneur are not needed since (i) he cannot mimic a rich entrepreneur due to the lack of funds, and (ii) the poor entrepreneur will always participate in the transaction since his expected from doing so are strictly positive (since liquidation leads to a payoff of zero). The solution to this problem is provided next.

**Proposition 6:** The optimal offers by the creditor satisfy

$$B_R = \frac{\delta + \mu}{2\delta + \mu} \left[ X - \frac{KI_0}{X} \right] \quad (29)$$

$$B_P = \frac{\mu - (1 - \delta)}{\mu - 2(1 - \delta)} X \quad (30)$$



where  $\mu$  is the Lagrange multiplier associated with the participation constraint (24). The equity infusion  $E_R$  is implicitly defined by the equation

$$E_R = \frac{X - B_R}{2X} I_0 \quad (31)$$

**Proof:** See Appendix.

Several aspects of this solution are worth noting. First, the lagrange multiplier,  $\mu$ , must be less than or equal to zero (Novshek (1993)). If  $\mu$  is zero, the solutions revert back to those characterized in Proposition 3 (i.e the symmetric information solutions). We know, from Proposition 5 that this solution is not feasible under asymmetric information, implying that  $\mu$  must be strictly less than zero. If  $\mu$  is negative, however (or equivalently, if the participation constraint (27) is binding), several observations can be made about the terms of the contracts under asymmetric information relative to the symmetric information counterparts.

**Proposition 7:** If the Lagrange multiplier  $\mu$  is strictly negative, the following must hold:

- i. The value of  $B_R$  is less than its symmetric information counterpart.
- ii. The value of  $E_R$  is greater than its symmetric information counterpart.
- iii. The value of  $B_P$  is greater than its symmetric information counterpart.

**Proof:** See Appendix.

The manner in which the creditor adjusts the terms of the offers to the two managers in response to asymmetric information is quite intuitive. To discourage the rich manager from selecting the package meant for the poor type, the creditor requires a higher payment (i.e. he scales down his claim less) from the manager who cannot

contribute capital than he would have under symmetric information. Simultaneously, he makes the offer intended for the rich manager more attractive by (i) scaling down the claim more than would have been the case under symmetric information, and (ii) requiring greater equity participation, which increases the "rents" paid to the manager. However, there is still a role to be played by such equity contributions, since, once again, they lead to superior incentives (at least for the rich manager).

The preceding analysis has assumed that it is worthwhile for the creditor to make offers to ensure that both types of managers accept and continue operations. It is possible, however, that under some situations, the creditor might find it worthwhile to only allow the manager who is willing to contribute capital to continue operations, while liquidating the firm where such capital contributions are not forthcoming. Even in these equilibria, however, there is a positive role to be played by the contribution of capital by the owner manager.

## **VI. Implications and Extensions**

A growing body of literature examines the implications of various aspects of the Bankruptcy Code in promoting efficiency. An investigation of the role of capital contributions by the owner manager of a firm that is in financial distress represents an area that has largely been overlooked by this literature. While such contributions might not typically be forthcoming in the context of large publicly traded firms, they are a feasible source of financing for smaller firms. The terms under which such contributions can be made has been the source of considerable judicial wrangling. Much of this debate, however, has been over the interpretation of the language in the Bankruptcy Code. This paper, on the other hand, examines the economic benefits, of such capital infusions, in a

model that incorporates the features that distinguish these smaller firms from their larger counterparts.

The results of the paper suggest that for closely held firms, where future value is largely dependent on managerial effort, APR violations are very likely to occur. This result by itself is not new, having been identified by a variety of different authors (see footnote 16). We show that allowing for capital contributions by the owner manager can reduce the magnitude of these APR violations, while simultaneously improving the manager's incentive to exert effort. This results in restructured firms having a lower leverage, and allows firms that would have been liquidated in the absence of such infusions to continue operations. These benefits occur despite the fact that the required return of the owner manager increases as a function of the capital that he contributes to the firm. Finally, we also show that the spirit of these results remains unchanged when one moves to an environment where there is uncertainty about the ability of the manager to contribute capital to the firm. While these results highlight the effect that these infusions have on the incentives of the manager of the firm, and thus have important implications for the current debate on the new value exception, it is useful to consider some aspects of the problem that have not been formally modelled.

Under the terms specified in the model, bondholders would like to have the manager contribute capital to the firm. This might seem inconsistent with the litigation (frequently initiated by creditors) associated with the NVE. One explanation for this might be the judicial indecision about the status of the NVE, which might make it rational for the bondholders to expect to benefit from appealing to the judicial system. Moreover, such litigation might also be rational if (i) there is disagreement about the value of the assets in the firm, (ii) there are multiple creditors in the firm, or, (iii) if the

rents demanded by the manager in exchange for capital infusions are significantly greater than the manner in which they are modelled in this paper. These dimensions represent interesting potential extensions of the model.

While the results of this paper highlight the benefits of managerial capital infusions, alternate methods for resolving financial distress do exist. Two popular alternatives that have been suggested in the literature are the use of options (Aghion, Hart and Moore (1992, 1994), for example) and the use of auctions for the disposal of assets (see Baird (1993b) and Jackson (1993)). In order to be implemented, both these solutions require well functioning markets. As pointed out by Vishny and Shleifer (1992) the potential buyers of the distressed firm's assets, who might be in the same industry, might also be experiencing financial distress, reducing the possibility that a sale of assets will provide a fair price. Moreover, to the extent that the value of assets is dependent on the manager, this provides him with a bargaining position that is different from that available to the public. Consequently, these solutions are unlikely to be effective in eliminating the problem.

Finally, it is important to recognize that the problems in financial distress are not eliminated by capital infusions by the owner manager either. This paper represents just one part of the complex issue of the optimal design of bankruptcy procedures that trade off the costs of market mechanisms against the bureaucratic costs of judicially mandated rules.<sup>21</sup> However, the analysis of the benefits of capital infusions in the context of certain types of firms raises a more general issue. There is growing concern that the existing

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<sup>21</sup> Bowers (1993) provides an extremely interesting discussion of this tension between the role of markets (based on a perfect markets-zero transactions cost approach (PM-ZTC)) and bureaucratic procedures like bankruptcy (based on implicit zero bureaucratic cost assumptions).

bankruptcy procedures, that apply uniformly to different types of firms, are the primary source of many of the perceived problems. Procedures that recognize the different incentives and relationships that exist in firms as a function of their ownership and financial structure might in fact be the critical element of an optimal bankruptcy code.

## Appendix

### Proof of Proposition 5:

Suppose we designate the packages offered to the poor and rich manager by  $(B_P, E_P)$  and  $(B_R, E_R)$  respectively. Under the symmetric information solution, recall that  $B_P = X/2$  and  $E_P = 0$ , while  $B_R = X/2 - (I_0 K/2X)$  and  $E_R = (X - B_R)I_0 / 2X$ . Moreover,  $q(B) = (X - B)/2K$ . The expected profit to the entrepreneur, conditional on the package  $(B, E)$  selected, is given by

$$q(B)[X - B] - Kq(B)^2 - E \quad (\text{A.1})$$

If the rich entrepreneur selects that package intended for the poor entrepreneur, his expected payoff is

$$\frac{X^2}{16K} \quad (\text{A.2})$$

The expected payoff from selecting the package designed for him yields

$$\frac{X^2}{16K} - \left[ \frac{3I_0^2 K}{16X^2} + \frac{I_0}{8} \right] \quad (\text{A.3})$$

which is clearly lower, implying that the rich manager will always prefer the offer meant for the poor manager. ■

### Proof of Proposition 6:

After substituting for the optimal effort level of the manager at a given level of debt overhang, i.e.  $q(B) = (X - B)/2K$ , the optimization problem faced by the entrepreneur can be rewritten as

$$\underset{\{(E_R, B_R), (0, B_P)\}}{\text{Max}} \delta \left[ \frac{X - B_R}{2K} B_R - (I_0 - E_R) \right] + (1 - \delta) \left[ \frac{X - B_P}{2K} B_P - I_0 \right] \quad (\text{A.4})$$

Subject to

$$\frac{(X - B_P)^2}{4K} - \frac{(X - B_R)^2}{4K} + E_R \leq 0 \quad (\text{A.5})$$

$$E_R - \frac{X - B_R}{2} \frac{I_0}{X} \leq 0 \quad (\text{A.6})$$

The Lagrangian for the problem can now be written as (see Novshek (1993)):

$$L = \delta \left[ \frac{X - B_R}{2K} B_R - (I_0 - E_R) \right] + (1 - \delta) \left[ \frac{X - B_P}{2K} B_P - I_0 \right] + \mu \left[ \frac{(X - B_P)^2}{4K} - \frac{(X - B_R)^2}{4K} + E_R \right] + \gamma \left[ E_R - \frac{X - B_R}{2} \frac{I_0}{X} \right] \quad (\text{A.7})$$

The first order conditions with respect to  $E_R$ ,  $B_R$  and  $B_P$ , when simplified, lead to

$$\gamma = -(\delta + \mu) \quad (\text{A.8})$$

$$B_R = \frac{\delta + \mu}{2\delta + \mu} \left[ X - \frac{KI_0}{X} \right] \quad (\text{A.9})$$

$$B_P = \frac{\mu - (1 - \delta)}{\mu - 2(1 - \delta)} X \quad (\text{A.10})$$

Notice that in this solution,  $\mu$  must be strictly less than zero. Otherwise, the packages are the symmetric information ones, which cannot be a solution (see Proposition 5). Since (A.6) must be binding, one can solve out for the definition for  $E_R$ .

■

#### Proof of Proposition 7:

- Part (i) When  $\mu=0$ , the solutions under symmetric and asymmetric information are identical. If the constraint is binding,  $\mu < 0$ . But the solution for  $B_R$  is increasing in  $\mu$  implying that it is lower.
- Part (ii) Follows directly from (i) and the implicit definition of  $E_R$ .
- Part (iii) Follows from the fact that the coefficient in (27) is equal to one when  $\mu=0$ , and is decreasing in  $\mu$ . Consequently, it is strictly greater than one whenever  $\mu < 0$  (i.e. whenever the constraint is binding).

■

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