



ELSEVIER

European Economic Review 41 (1997) 487–497

EUROPEAN
ECONOMIC
REVIEW

Optimal bankruptcy law and firm-specific investments ¹

Elazar Berkovitch ^{a,*}, Ronen Israel ^b, Jaime F. Zender ^c

^a Faculty of Management, Tel Aviv University, P.O. Box 39010, Ramat Aviv, Tel Aviv 69978, Israel

^b The University of Michigan, Ann Arbor, MI 48109, USA

^c The University of Utah, Salt Lake City, UT 84112, USA

Abstract

In this paper we characterize an optimal bankruptcy law that takes into consideration the incentives of managers to invest in firm-specific human capital. We show that the optimal bankruptcy law is biased towards the management team, and may be implemented by the use of a ‘restricted auction’ mechanism, in which creditors have the right to refuse bankruptcy, but are not allowed to bid for the firm. The bankruptcy law is needed as a commitment device to implement the optimal outcome.

JEL classification: G33; G38

Keywords: Bankruptcy law; Firm-specific investment; Restricted auction mechanism

1. Introduction

In this article we characterize an optimal bankruptcy law that provides a framework for decision making by the firm both before and after it enters into situation of financial distress. The purpose of bankruptcy law is considered to be dictating the structure within which the claimants bargain over the firm’s assets. When it is appropriately structured, the bargaining results in an *ex post* efficient allocation of resources by directing the assets of a distressed firm to their highest

* Corresponding author. Fax: +972 3 640-9560.

¹ The analysis in this article, which presents an approach to the design of bankruptcy law based on the development of human capital, borrows from our work on this issue in the context of the classical moral hazard problem. See Berkovitch et al. (1992).

valued use; it also provides the firm's decision maker with optimal ex ante incentives by placing him in a superior bargaining position in the bankruptcy negotiations. We show that the optimal bargaining outcome may be implemented by the use of a 'restricted auction' mechanism, in which the creditor has the right to refuse the use of bankruptcy proceedings, but is not allowed to bid for the firm.

The bankruptcy law serves as a commitment device and is required to enforce the bargaining structure ex post. A bankruptcy law is required to achieve this commitment because a law may impose an environment within which the claimants must bargain; if the two claimants attempt to privately contract ex ante to establish the same bargaining environment, they will find it beneficial to renegotiate the contract ex post.

Criticism has been leveled against the current U.S. bankruptcy code on several accounts. Bebchuk (1988), Jensen (1991), and Aghion et al. (1992) have suggested market-based alternatives to the current code in order to ensure the efficient allocation of resources. The essence of these proposals is that upon entering bankruptcy the firm be sold via a market mechanism designed to ensure that the assets of the firm are directed to their highest value use, and to uphold the absolute priority of the existing claims. In particular, neither the shareholders nor the incumbent management receives any advantage in the resolution of distress.² The restricted auction mechanism developed in this paper adds to these market-based proposals in that the restrictions bias in favor of the incumbent management in any reorganization. This aspect of our proposed bankruptcy law is important because it provides correct ex ante decision-making incentives.

The rest of the paper is organized as follows. Section 2 presents the model. In Section 3 the first-best solution to the entrepreneur's decision problem is provided as a benchmark. Section 4 provides the results, assuming that unrestricted bargaining resolves financial distress. Section 5 presents an analysis of the design of a bankruptcy law that provides efficient ex ante decision-making incentives. Section 6 compares an unrestricted auction to the restricted auction mechanism proposed here. Section 7 extends the analysis to more general settings, and Section 8 concludes.

2. The model

Consider a model with three dates, 0, 1, and 2. On date 0, an entrepreneur, who owns the rights to a project, contracts with an outside investor to raise the initial

² Jensen (1991, p. 30), for example, states: "Current court practices – especially the failure to enforce absolute priority and to limit the period of management's monopoly rights to propose a restructuring to 120 days – are very difficult to justify on efficiency grounds. I can see no argument for violating the contractually agreed-upon priority of valid claims."

investment, I . To focus on bankruptcy, we restrict attention to debt financing, assuming that the firm issues debt with face value F . After the debt is issued, the entrepreneur establishes the firm, and allocates one ‘unit’ of human capital between firm-specific human capital that increases the value of the firm, and general human capital that increases his outside wage.³ At date 1, the entrepreneur and the creditor observe a precise but nonverifiable signal concerning the final cash flow at period 2. Based on this signal, the entrepreneur must decide whether to liquidate the firm, continue operations under the original debt contracts, or attempt to renegotiate the debt contracts. We assume that all agents are risk neutral and that the risk-free interest rate is zero.

We now describe the payoffs from continuation and liquidation, deferring the analysis of the negotiations to Section 4. If the entrepreneur decides to operate the firm until date 2, the firm is assumed to generate a final cash flow equal to

$$\tilde{y}(h) = h + \tilde{\varepsilon}, \quad (1)$$

where h denotes the level of firm-specific human capital developed by the entrepreneur at date 0, and $\tilde{\varepsilon}$ is a productivity shock. As the entrepreneur’s choice of h at date 0 is not verifiable to a third party (a court of law), the parties cannot write a contract contingent on the choice of h . The productivity shock ε has a probability distribution $G(\varepsilon)$, density function $g(\varepsilon)$, and support $[\underline{\varepsilon}, \bar{\varepsilon}]$. In order to focus on the relationship-specific investment problem, we assume this describes the firm’s entire production process.

If the firm is liquidated at date 1, the claimants receive, at that time, cash flow equal to L . We assume that the value of L is common knowledge. The liquidation value L also represents the value of the firm to an outside party bidding to replace the incumbent manager. When the manager is replaced in liquidation, he takes alternative employment. His wage in alternative employment is $w(1-h)$, where w is increasing and concave in the amount of general human capital, $1-h$, developed by the entrepreneur. The reason that the wage function depends on the level of general human capital, $1-h$, is that the entrepreneur’s future compensation will reflect his actual productivity in future employment.

If the required investment, I , is larger than the liquidation value L , the debt is risky, and $F > I$. We can divide the possible date 2 cash flow (and the date 1 signal) into three regions. We label the defining values for the three regions $\varepsilon_1 = L + w(1-h) - h$ and $\varepsilon_2 = F + w(1-h) - h$. For simplicity we will assume that $\bar{\varepsilon} \geq \varepsilon_2$ and $\varepsilon \leq \varepsilon_1$. For values of $\varepsilon \leq \varepsilon_1$, which we label region 1, the firm is not economically viable and in financial distress. For values of ε such that $\varepsilon_2 \geq \varepsilon \geq \varepsilon_1$, which we label region 2, the firm is economically viable but in financial distress. Note that for a given level of F (as determined by I) the firm

³ The assumption that the types of human capital are perfect substitutes is extreme and is made only for simplicity. For our results, we require only that they be substitutes at the margin.

may enter distress either due to poor realization of $\tilde{\varepsilon}$ or due to a low choice of h by the entrepreneur. In other words, distress may be caused by bad luck or by bad management. Finally, for values of $\varepsilon \geq \varepsilon_2$, which we label region 3, the firm is both economically and financially viable.

3. The first-best solution

The first-best solution is the outcome that the entrepreneur will achieve if he has sufficient capital to finance the project.⁴ If he does not invest in the project, the entrepreneur develops only general human capital and has wealth at date 2 equal to $I + w(1)$. If the project is undertaken, the entrepreneur's expected payoff is

$$\pi(h) = \int_{\underline{\varepsilon}}^{\varepsilon_1} (L + w(1 - h)) g(\varepsilon) d\varepsilon + \int_{\varepsilon_1}^{\tilde{\varepsilon}} (h + \varepsilon) g(\varepsilon) d\varepsilon. \quad (2)$$

When the firm is economically viable, the entrepreneur receives the cash flow $h + \varepsilon$. In region 1, when the firm is not economically viable, the firm will be liquidated and the entrepreneur will receive L from selling the firm's assets and compensation equal to $w(1 - h)$ from alternative employment.

If the entrepreneur undertakes the project, he chooses h to maximize $\pi(h)$. We assume that the project is worth undertaking, i.e., $\pi(h^*) > I + w(1)$, where h^* maximizes $\pi(h)$.⁵ Thus, h^* is the solution to

$$-G(\varepsilon_1(h^*))w'(1 - h^*) + [1 - G(\varepsilon_1(h^*))] = 0. \quad (3)$$

The first term in Eq. (3) is the entrepreneur's marginal reduction in expected outside wage from increasing h , which is his marginal cost of developing firm-specific human capital. The second term is the marginal increase in firm value from his developing firm-specific human capital.

4. The unrestricted bargaining outcome and the resulting choice of firm-specific human capital

When the firm is financed with debt, the first-best outcome is not obtained because the possibility of financial distress distorts managerial incentives. We assume that, without institutional or legal restrictions, the *unrestricted bargaining*

⁴ In this case, there are only two regions because in the absence of debt region 2 does not exist.

⁵ We assume that the project's net present value is large enough for it to be financed with a debt contract (i.e., there exists an F such that the investor is willing to pay I for the debt) that cannot be renegotiated. See Berkovitch and Israel (1995) for the implications of debt capacity for the design of bankruptcy law.

game described below characterizes the negotiations between the creditor and the entrepreneur when the firm enters financial distress. We then consider the effect of the bargaining outcome on the entrepreneur's development of human capital.

The entrepreneur approaches the outside investor to initiate negotiations. If the investor declines to negotiate, the entrepreneur either liquidates the firm or continues under the original contracts. Otherwise, the parties negotiate, and the payoffs are determined according to the generalized Nash bargaining solution, where $w(1-h)$ and L are the disagreement points for the entrepreneur and the creditor, respectively, and γ represents the entrepreneur's bargaining power.⁶ The negotiation payoff for the entrepreneur is therefore given by

$$V_e = w(1-h) + \gamma[h + \varepsilon - L - w(1-h)]. \quad (4)$$

It is clear that only in region 2 will the entrepreneur be able to successfully renegotiate the debt contract. The negotiation results in continued production (and therefore an ex post efficient allocation of resources) and a new face value for the debt, defined by the bargaining outcome.

At date 0, anticipating the outcome of the unrestricted bargaining, the entrepreneur chooses h to maximize

$$\begin{aligned} \pi^u(h) = & \int_{\underline{\varepsilon}}^{\varepsilon_1} w(1-h)g(\varepsilon)d\varepsilon + \int_{\varepsilon_1}^{\varepsilon_2} V_e g(\varepsilon)d\varepsilon \\ & + \int_{\varepsilon_2}^{\bar{\varepsilon}} (h + \varepsilon - F)g(\varepsilon)d\varepsilon. \end{aligned} \quad (5)$$

A comparison of Eq. (5) to the entrepreneur's problem given in Eq. (2) reveals that the bargaining payoff to the entrepreneur, V_e , replaces the firm cash flow, $h + \varepsilon$, in region 2. The first-order condition for the entrepreneur's problem becomes

$$\begin{aligned} 1 - [w(1-h_s) + \gamma(F-L)]g(\varepsilon_2) - (1 + w'(1-h_s))[1 - \gamma]G(\varepsilon_2) \\ + \gamma G(\varepsilon_1) = 0. \end{aligned} \quad (6)$$

A comparison of Eq. (3) and Eq. (6) reveals that $h_s < h^*$. The entrepreneur develops too little firm-specific human capital because, at the margin, he receives only a fraction γ of the resulting increase in firm value. Differentiating the left side of Eq. (6) with respect to γ , we obtain that, under some regularity conditions on the density function of ε , h_s increases with γ .⁷ Intuitively, as γ increases the manager captures a larger fraction of his investment in firm-specific human capital, and the incentive to make the specific investment is greater.

⁶ Our results are robust to changes in the specification of the unrestricted bargaining game, as long as the entrepreneur's bargaining power is limited.

⁷ The condition is $g(\varepsilon_2) < (1 + w')(G(\varepsilon_2) - G(\varepsilon_1))/(F - L)$. It holds for every continuous distribution with large enough variance.

5. The optimal bankruptcy law

Unrestricted bargaining between the claimants provides for ex post efficiency but it distorts the entrepreneur's ex ante incentives. The objective in designing bankruptcy law should be to achieve ex ante efficiency. Bankruptcy law can achieve an efficient outcome by placing restrictions on the bargaining that occurs between the entrepreneur and the investor when the firm is in financial distress. Consistent with our view of bankruptcy and our modeling of the unrestricted bargaining game, we consider the choice between alternative structures for the bankruptcy law to be determined by the level of the entrepreneur's bargaining power, γ . Since the manager develops more firm-specific human capital as he receives a larger fraction from the increase in the firm's cash flow, the optimal bankruptcy outcome is achieved if the bankruptcy law implements $\gamma = 1$.

There are several ways to implement the optimal bankruptcy outcome. To facilitate a comparison with the market-based proposals mentioned above, we present here a restricted auction mechanism that will implement the optimal bankruptcy outcome in the current and in more general settings (see the discussion below). We shall assume that there is at least one outside bidder, other than the creditor, who is willing to bid the known value from liquidation.

Proposition 1: The restricted auction mechanism:

The following restricted auction implements the optimal bankruptcy outcome

1. The investor has the right to refuse bankruptcy proceedings. If he refuses, the court enforces the original contracts regardless of any private agreement the parties may have reached.
2. If the investor approves the bankruptcy procedure, the entrepreneur and any other bidder, other than the investor, may participate in a second-price sealed-bid auction for the firm.
3. The proceeds from the auction are paid out according to the original contracts.

We now sketch the proof of the proposition and explain how the restricted auction mechanism works. The investor's right to refuse bankruptcy prevents the strategic use of bankruptcy by the entrepreneur in region 3. This restriction does not affect ex post efficiency or managerial incentives. Without this restriction, however, the entrepreneur may not be able to finance the project. Enforcing the original debt contract if the investor rejects bankruptcy prevents the investor from abusing the refusal option; without this feature, the investor could achieve the unrestricted bargaining outcome by always refusing bankruptcy.

The investor is prevented from participating in the auction because he has an incentive to bid above L , thereby, forcing the entrepreneur to pay out more than L in region 2. This incentive arises from the investor's claim to the proceeds of the auction. As is shown below, this overbidding causes an inefficient outcome

because it results in the payoffs from the unrestricted bargaining resolution of financial distress.

The outcome of the restricted auction is that the entrepreneur bids $y - w$ and wins the auction, paying L for the firm. The entrepreneur may pay L in one of two ways: first, he can issue a new debt claim to raise this amount; alternatively, he can simply reduce the face value of the existing claim. The investor for his part is indifferent to the manner in which he receives the liquidation value at time 1. As Aghion et al. (1992) have suggested, there may be advantages to using the original claimants as risk bearers for the newly reorganized firm.

The essence of the restricted auction mechanism is that it effectively increases the bargaining power of the entrepreneur when efficiency requires that the firm be reorganized under his control, and direct the assets of the firm to their highest valued alternative use (removes the entrepreneur) otherwise. This bias in favor of the entrepreneur who continues with the firm prevents the creditor from appropriating any of the entrepreneur's quasi-rents and so increases the incentives for the entrepreneur to develop firm-specific human capital.

6. The unrestricted auction outcome

We now analyze the recommendation, promoted by Jensen (1991), that the bankruptcy law require firms in distress to be auctioned off, and compare it with our restricted auction mechanism. We interpret this recommendation as an 'unrestricted' auction, as follows. When the firm commences bankruptcy, an auction for the firm is run by the bankruptcy court; the bankruptcy court collects the bids, announces the winner, and distributes the proceeds to the existing claimants according to the absolute priority of the original claims. The winner of the unrestricted auction can either liquidate the firm, run the firm himself, or employ an alternative manager (perhaps the entrepreneur) to continue operations. If the entrepreneur is hired to run the firm, his compensation is determined by the unrestricted bargaining game.

Our information structure implies that the creditor and the entrepreneur know the realization of y and the liquidation value L and, therefore, which region has occurred. Outside bidders know only the liquidation value, L . Consequently, outside bidders can only distinguish between region 3 (when the firm continues) and regions 1 and 2 (when an auction is held).

The creditor will refuse to auction off the firm in region 3. In region 2, the creditor bids at least his value from the unrestricted bargaining, $y - V_e > L$. The creditor is willing to bid at least that amount because if he wins he can rehire the entrepreneur and obtain this value after unrestricted bargaining over the entrepreneur's wage. Moreover, the creditor does not face the entire cost of this bid, because he receives the proceeds of the auction. In region 1, the entrepreneur and the investor bid L . Outside bidders always bid L in the auction. Thus, the outcome

of the unrestricted auction, in region 2, is identical to the unrestricted bargaining outcome described in Section 4 and results in the same distortion of incentives for the entrepreneur to develop human capital. Therefore, while the suggested auction solution to financial distress appears to promote the efficient allocation of resources, it distorts incentives for ex ante decision making. Once again, the distortion appears because in the negotiations on the entrepreneur's wage the entrepreneur may capture a fraction γ of the increase in firm value resulting from his development of firm-specific human capital.

7. Multiple unknown liquidation values, multiple creditors, and non-entrepreneurial firms

In this section we show that our restricted auction mechanism implements the optimal bankruptcy outcome in more general settings where (i) there are multiple bidders for the firm each with his own privately known value in liquidation, (ii) there are multiple creditors with different seniority, and (iii) the firms are non-entrepreneurial.

7.1. Multiple bidders and value discovery in bankruptcy

Consider the more realistic case of multiple alternative uses for the firm's assets with asymmetric information concerning the value of the assets in these alternative uses. With multiple privately known alternative uses for the firm's assets, the bankruptcy process must reveal whether the assets of the firm are more valuable under current management or in some alternative use, and allocate the assets to their highest valued use. Despite this change, the optimal bankruptcy procedure must still ensure that the entrepreneur receives all the marginal benefits from exerting effort.

To consider the value-discovery role of the bankruptcy process, we adapt the model as follows. Suppose that there are $N > 1$ potential bidders, the value of the firm under the management of each being denoted by L_j , $j = 0, \dots, N$. Each L_j is independently drawn from the interval $[L_{\min}, L_{\max}]$ according to some probability distribution. Each bidder j privately learns his own valuation at time 1, after the entrepreneur has made his effort decision. We maintain the definition of $\varepsilon_1(e)$ with L_{\max} replacing L . Under these assumptions, the entrepreneur should run the firm in regions 2 and 3. In region 1, the entrepreneur should run the firm if the highest *realized* alternative value, denoted L_H , satisfies $y > L_H + w$, and should be replaced otherwise. The firm must now enter bankruptcy in region 1 (as well as region 2) to determine whether it should continue under existing management.

The restricted auction mechanism implements the optimal bankruptcy outcome when there are multiple, privately known, liquidation values. The reason for this is as follows. In region 3, the entrepreneur continues to control the firm and the

original contracts are unchanged. In regions 1 and 2, the entrepreneur commences bankruptcy with the creditor's consent. In the ensuing auction, with the restriction against the creditor's participation, it is a dominant strategy for each outside bidder to bid his own value, L_j , and for the entrepreneur to bid $y - w$. If the entrepreneur submits the winning bid, he retains control of the firm and 'pays' the value of the highest of the outside bids, L_H . When the entrepreneur does not submit the highest bid, which may occur in region 1, the outside bidder with the highest valuation wins and pays the value of the second highest bidder (possibly the entrepreneur). The entrepreneur is dismissed, obtains his alternative wage, and the proceeds of the auction are distributed according to the original contracts.

It is important to note that the correct *ex ante* managerial effort incentives were provided by the restriction against the creditor's participation in the auction. This restriction prevents the creditor from taking control of the firm when it is most valuable under the entrepreneur's management and employing the entrepreneur to manage the firm at a lower wage, thereby capturing some of the value created by the entrepreneur's effort.

7.2. *Multiple creditors with different seniority*

So far we have considered firms with a single class of debt. An important question concerns how these results extend to firms with multiple classes of debt. In the present model, with costless bankruptcy, the presence of distinct classes of debt does not alter our results. The only modification to our restricted auction mechanism is that now it must specify a procedure for the creditors to exercise the refusal option that prevents the entrepreneur from strategically commencing bankruptcy in region 3. This issue can be resolved in a number of ways because there is no conflict of interest between the creditors in region 3. For example, a committee of representatives of all debt classes will always vote as a single creditor would. Alternatively, the same result can be achieved by granting the refusal option to the most junior creditor, which is the class that would suffer first from strategic filing in region 3. Therefore, as long as priority is upheld *among* the debt classes, the results need simply be changed to read 'the proceeds are distributed to debtholders according to the priority of their claims'.

7.3. *Non-entrepreneurial firms*

Our analysis extends to non-entrepreneurial firms. As an example, consider the argument that shareholders provide an important input into the production process by monitoring the firm's management. Monitoring is a relationship-specific activity, and if the financial claims must be renegotiated, the incentives for investment in monitoring by shareholders can be increased by placing restrictions on the negotiations in bankruptcy, as developed in our model. It should be noted that when more than one party invests in relationship-specific activities, the optimal

bankruptcy outcome is for each party to be compensated for its marginal contribution to the firm. The complexities of implementing this optimal bankruptcy outcome are beyond the scope of this paper.

8. Conclusion

The main contribution of this article is its characterization of an optimal bankruptcy law. We show that modifying the bargaining game between the entrepreneur and the creditor by conducting a 'restricted auction' for firms in financial distress implements the optimal bankruptcy outcome. By providing a way for the claimants to commit themselves to ignoring the entrepreneur's true bargaining position, the derived bankruptcy law provides a way in which the superior information of the claimants may be used to ensure an ex post efficient allocation of resources. It also structures the post bankruptcy payoffs to provide incentives for efficient ex ante investment.

There are similarities and differences between our restricted auction proposal and the earlier market-based proposals discussed above. The most important similarity is that the valuation of the firm is done via a market mechanism, rather than being left to a bankruptcy court. This is largely the perceived strength of the earlier proposals and is clearly an important aspect of ours. It ensures an ex post efficient allocation of the assets of distressed firms. The most important difference lies in the bias toward the incumbent management of the firm (when the incumbent management continues to run the firm after reorganization) that the additional restrictions in our proposal provide. In other words, the distribution of value ex post plays an important role in establishing ex ante incentives. Providing this bias requires that the court play a more active role in the bankruptcy process than is required by earlier proposals.

Acknowledgements

We are grateful for helpful comments from David T. Brown, Peter DeMarzo, Mike Fishman, Rob Gertner, Rick Green, Oliver Hart, Avner Kalay, Karin Lithell, Avri Ravid, Artur Raviv, Alan Schwartz, Duane Seppi, and seminar participants at Carnegie Mellon University, Hong Kong University of Science and Technology, London Business School, the University of Michigan, Michigan State University, Northwestern University, Stockholm School of Economics, Tel Aviv University, the University of Utah, the 1994 WFA meeting, the 1994 EFA meeting, the 1995 AFA meeting, and the Eleventh Annual Congress of the EEA.

References

- Aghion, P., O.D. Hart and J. Moore, 1992, The economics of bankruptcy reform, *Journal of Law, Economics, & Organization* 8, 523–546.

- Bebchuk, L.A., 1988, A new approach to corporate reorganizations, *Harvard Law Review* 101, 775–804.
- Berkovitch, E. and R. Israel, 1995, Optimal bankruptcy laws across different economic regimes, Working paper, Carnegie Mellon University.
- Berkovitch, E., R. Israel and J.F. Zender, 1992, The design of bankruptcy law: A case for management bias in bankruptcy reorganizations, Working Paper, University of Michigan.
- Jensen, M. 1991, Corporate Control and the Politics of Finance, *Journal of Applied Corporate Finance* 4, 13–33.