Optimal "Soft" or "Tough" Bankruptcy Procedures

Paul Povel
University of Mannheim

This article describes optimal bankruptcy laws in a framework with asymmetric information. The key idea is that the financial distress of a firm is not observed by its lenders for quite a while. As early rescues are much cheaper than late rescues, it may pay if the creditors are forgiving in bankruptcy, thereby inducing the revelation of difficulties as early as possible. Either "tough" or "soft" bankruptcy laws can be optimal, depending on the parameters. This implies that *mandatory* one-size-fits-all bankruptcy procedures cannot be optimal. "Hybrid" procedures, which try to combine elements of soft and tough procedures, are found to be redundant, and possibly harmful. Absolute priority rules may be helpful as a part of tough procedures, but their introduction is (partly) inconsistent with the design of soft procedures. The article also reinterprets much of the evidence on the performance of Chapter 11, the "rather soft" U.S. reorganization procedure, questioning many negative conclusions.

1. Introduction

Even though the *causes* of a bankruptcy may be exogenous, the timing, that is, the *start* of a formal procedure is highly endogenous. "Bankruptcy" does not hit a firm like a flash. There are plenty of ways for a firm to hide or cover up financial difficulties. Cash flows can be freed to finance current losses, for example, by cutting R&D or replacement investments, or by reducing the quality of the firm's products. Changes in accounting practices can achieve the same goal. Artificial reductions in the valuations of obligations and increases in those of assets can generate additional "income." Typically these methods

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are easy to implement, and it is difficult to observe or even prove that a business decision was not based on sound principles.

One advantage of delaying formal bankruptcy by hiding financial difficulties is that this also delays (or possibly even prevents) its usually unpleasant consequences for the managers and owners of the firm. Another advantage is that the difficulties could be of a temporary nature, and that the "breakthrough" (or "turnaround") will come later than expected. The manager/owner of the firm could simply "wait and pray," and if he is lucky nobody else can tell that there had ever been difficulties. The costs of doing so are borne by the creditors: early rescues of a firm are typically cheaper than late rescues, and are more likely to be successful. Delays cause opportunity costs because the assets of the firm cannot be brought to their most efficient use. Further costs arise if the delay is achieved by cutting investments in the future of the firm (R&D, plants and machinery, reputation, etc.). Not only does this make it more costly to rescue the firm (as more wrong decisions must be corrected), but a rescue may even become impossible.

In this article we analyze the trade-off between two conflicting goals of a firm's creditors. On the one hand, they want a bankruptcy procedure to be "tough" on the borrower, as a harsh punishment may increase his incentive to generate sufficient earnings to repay. On the other hand, the creditors want to prevent the waste of resources that takes place if a rescue is necessary but not undertaken in time. Clearly, if bankruptcy is a strong punishment, a borrower keeps the unpleasant information to himself and prefers to wait and pray. An obvious method to obtain the necessary information is to reward its revelation. However, this implies that the borrower is rewarded for poor outcomes. This works against the "effort" incentives: it limits the extent to which the borrower can be punished, and if effort is relevant, its provision must be ensured by raising the entrepreneur's payoff after good outcomes. Thus the creditors have to trade off a waste of resources if a rescue is possible for higher costs of effort provision. It is not clear a priori whether one of the incentive problems is more relevant, or if both can be solved at the same time.

More concretely, we model an entrepreneur who can start a project by investing both effort and a fixed amount of capital. The outcome can be good or poor. Effort has the disadvantage that it causes disutility, but it also increases the probability of realizing a good outcome. The entrepreneur does not have the funds to invest, and must therefore borrow from an investor. Writing a financial contract is made difficult by two types of asymmetric information. First, the entrepreneur's effort choice is unobservable. The contract can only be contingent on the final outcome, and a wedge between the entrepreneur's respective payoffs after good and poor outcomes is necessary to provide an incentive to invest enough effort. Given that limited liability prevents very low payoffs for the entrepreneur after poor outcomes, the wedge must be created by offering a sufficiently high payoff if a good outcome is realized.

Second, at an intermediate stage the entrepreneur receives a signal about the prospects of his project. This signal is not observable by anyone except himself. The creditor would be interested in this information, however, as it could be possible and profitable to invest more money in a bad project. If she wants to realize such an efficiency gain (or reduce her expected loss), she has to "buy" the information from the entrepreneur. She cannot rely on him to just inform her that he needs more money, as he could also choose a wait and pray strategy: If no additional money is invested, a bad project may nevertheless become a good project with some probability. The revelation of bad news is costly in terms of effort incentives: a reward for telling the truth is paid when poor outcomes are likely. This drives up the payoff that the entrepreneur must receive if a good outcome is realized, to make sure that he invests the high effort level. This trade-off between being "soft" and "tough" when the prospects are bad (in "bankruptcy") is exacerbated by another (realistic) assumption: if a borrower demands more funds for a rescue, the creditor cannot tell whether a rescue is really worth undertaking, or whether the borrower is simply going to use up those funds to keep the firm afloat for a while (the latter is a complaint that can be heard in many Chapter 11 cases). Thus a misuse of the creditor's softness may be quite expensive, and the equilibrium contract must prevent such waste.

The equilibrium contract will include a bankruptcy clause, provisions for the case that the project's prospects or outcome are poor. The bankruptcy clause can be either soft on the manager, inducing an early revelation of information, or tough, that is, treating him as badly as possible if poor outcomes are realized. From this we can derive several implications for the design of bankruptcy laws.

First, the result that two very different bankruptcy clauses could be chosen by the contracting parties calls for a justification of the existence of *mandatory* bankruptcy laws. A debtor and a lender who agree that a tough contract is optimal for them could find it impossible to write such a contract if their country's mandatory bankruptcy law is soft—the debtor cannot credibly promise *not* to file for (soft) bankruptcy once in trouble. Similarly, a lender's promise to be soft is not credible if the mandatory bankruptcy law is tough. Thus we generalize the result in Schwartz (1997) that mandatory bankruptcy laws may lead to inefficient investment decisions.

Next, "optimal bankruptcy laws" are identified as those bankruptcy clauses that the parties would have added to their contract if there were no transaction costs in relation to writing such a "complete" contract. A bankruptcy law is thus optimal if it replicates the optimal contract in a transaction cost-free environment. One result is that either tough procedures or soft procedures may be optimal, but mixed procedures, which contain elements from both types of procedures, may be much worse than the two pure procedures. This result is relevant for the bankruptcy laws in many countries. In the UK and in Germany, for instance, there have been attempts to introduce softer bankruptcy laws. At the same time the drafters of the new legislation tried to preserve the "punishing role" of bankruptcy. Our article shows that this can backfire. In the UK, the procedure called CVA is rarely used, as a creditor who holds a floating charge can opt out and start a much tougher procedure (administrative receivership); similar results should be expected in the daily practice of the new *Insolvenzordnung* in Germany, where the bargaining position of the manager or owner has not been significantly improved, compared with the current law.

A third result concerns the usefulness of absolute priority rules. These rules establish a creditor's right to object to payoffs that holders of lower ranked claims (for instance equityholders) receive if this creditor's claim has not been repaid. Our result is that a soft procedure must violate absolute priority rules to some degree. The entrepreneur must be rewarded if he cooperates in a rescue by revealing information early, whether the debtors have been repaid or not. In the extreme, he should be rewarded even if the firm must be liquidated and no debt is repaid at all. This extreme result highlights the difficulties that a consistently designed soft procedure might encounter in practice, in particular if confronted with much more appealing (and traditional) arguments in favour of tough procedures. Note, however, that this violation of absolute priority rules concerns only the ranking of debt and equity. Nothing is implied about the use of absolute priority rules between different classes of debt.

Finally, there are striking similarities between the soft bankruptcy procedure in this article, and Chapter 11, the procedure that is used in the United States for reorganizations. One of the major differences is that there are no "direct rewards" in Chapter 11. Quite the contrary, there are absolute priority rules which are supposed to be strictly enforced (if the parties disagree). We argue that indirect reward systems are being used instead. Equity can earn a reward in Chapter 11 cases because it is endowed with a strong bargaining position. We argue that this need to reward indirectly is the main source of many inefficiencies that are blamed on the procedure, and that much of the bad press of Chapter 11 needs to be revised or targeted more precisely. It is also an inefficient way of rewarding, as a lender's bargaining position determines the payoff, not the usefulness of his cooperation in filing early.

This article adds to the literature on bankruptcy (see, e.g., Baird, 1995; White, 1996, for a survey) by showing how the softness of a bankruptcy procedure may improve the *timing* of restructuring decisions. For the purpose of clarifying the analysis only, we are ignoring other important aspects of bankruptcy. In particular, we assume that there are no collective action problems on the side of the creditors. These problems have been discussed in earlier contributions, and possible solutions have been suggested (see, e.g., the mechanisms suggested by Bebchuk, 1988; Aghion, Hart, and Moore, 1992, 1994). While these articles concentrate on ex post bargaining problems, in this article we concentrate on ex ante incentive problems, that is, decisions of firms outside of bankruptcy.

Several articles have analyzed the effects that the U.S. procedures for Chapter 7 and Chapter 11 have on a firm's incentive to cooperate either outside or in bankruptcy (or both). These include Bebchuk (1991), Bebchuk and Chang (1992), Mooradian (1994), and White (1994). Our article differs from these in two dimensions. First, we do not start with exogenously given bankruptcy procedures, but derive optimal procedures from first principles. Second, we study a situation in which the essence of a debtor's "cooperation in bankruptcy" is to actually start it in time. The start of a bankruptcy (and therefore the timing of ex ante and ex post) is not exogenously decided, but depends on the debtor’s revelation of bad news. A bankruptcy procedure may need to secure the entrepreneur’s cooperation in *starting* a rescue, which is a relatively new topic.[1]

Related articles in which “forgiveness” plays a role in eliciting information include Boot and Thakor (1993), Heinkel and Zechner (1993), Dewatripont and Tirole (1994), Gromb (1994), Berkovitch, Israel, and Zender (1995), Fudenberg and Tirole (1995), Giammarino and Nosal (1995), Aghion, Bolton, and Fries (1996), Forsyth (1996), and Levitt and Snyder (1997). A potential further application of our model is the Golden Parachute. Knoeber (1986) could be extended to include the manager’s fight against (or maybe his encouragement of) a takeover by using our model.

The rest of the article is structured as follows. In Section 2 the model is presented. In Section 3 we discuss the equilibrium contracts. In Section 4 we derive implications for bankruptcy laws: we describe inefficiencies that are caused by having mandatory bankruptcy laws; we discuss the role of absolute priority rules; and we compare the soft procedure with Chapter 11, and review and reinterpret evidence of its performance. All proofs are in the Appendix.

2. The Model

There is an entrepreneur, who can start a project but has no wealth of his own, and an investor. She may offer to finance the entrepreneur’s project if they can find a contract under which both parties break even.

The project extends over up to five periods. In period 1, an amount K must be invested, and the entrepreneur must invest effort $e \in [0, 1]$, which the investor cannot observe. Providing an effort level e causes disutility $\frac{c \cdot e^2}{2}$ to the entrepreneur. In period 2, the type of the project is realized. It is γ (“good”) with probability e, β (“bad”) with probability $a(1-e)$, and ϕ (“failure”) with probability $(1-a)(1-e)$. Thus, if the entrepreneur did not invest effort in period 1, the type must be either β or ϕ. The type can be observed by the entrepreneur only. In period 3, the project can be refinanced by investing an amount J (a “rescue”). This money could be necessary to install a new organizational structure, say, or to start a price war. If the project type is γ, the payoffs are unchanged, as a firm that is doing well presumably does not have to change its organization or market strategy. If the type is β, the project becomes a good project (type γ). Here a reorganization of the firm’s policies might be helpful, and for simplicity we assume that it is guaranteed to be successful. Finally, with the ϕ type we model a firm that should be liquidated. We assume that it would starve publicly in period 4, but if it is refinanced, the additional funds J allow the project to continue until $t = 5$. In period 4, a ϕ type that was not refinanced in period 3 “starves” publicly and must be liquidated. A β type that was not refinanced becomes a γ type with probability b. The idea is that the entrepreneur has a “wait and pray” strategy, that is, he can hope

1. The conjecture that soft procedures may be useful to induce early bankruptcy filings can be found in Jackson (1986: ch. 8), White (1989, 1996), Baird (1991, 1993, 1995), and Aghion, Hart, and Moore (1992, 1994).

that there will be a breakthrough or turnaround of his business (if he is lucky in the end, the investor is not able to tell that there had been difficulties at an intermediate stage). Finally, in period 5, the (verifiable) payoffs are earned. A γ project earns Y, a β project $y < Y$. A ϕ earns nothing, whether it has been refinanced or not. If the project was not terminated earlier, the entrepreneur additionally earns a private benefit r. That is, if the project type was ϕ, and it was not refinanced, the entrepreneur does not earn the private benefit r, while in all other cases he does.

The entrepreneur must make two decisions. First, he must decide how much effort to invest in period 1. Second, he must decide whether to reveal his information in period 3. If the type of his project is β, he can make its rescue possible by revealing the type. He can also claim that the type is γ, and hope for a breakthrough in period 4. If he is lucky with this wait and pray strategy, the investor will not be able to tell whether the type was really γ or not. Notice that this is not a simple problem of asymmetric information: there are two sequential agency problems in this model, which are not independent. The effort choice in the first agency problem determines the entrepreneur's private information in the second agency problem, and the provision of incentives to solve one problem will affect the incentives in the second problem as well.

The players' utility functions are linear in monetary incomes. The entrepreneur's utility also depends in an additive way on his effort provision (providing effort e reduces his utility by $\frac{c \cdot e^2}{2}$) and on the private benefit r that he earns only if the project is completed.

While the entrepreneur is perfectly informed about every variable as the project progresses, the investor cannot observe the effort decision, nor can she observe the type of the project in period 2. This captures the idea that while the *causes* of financial distress may be exogenous, the *start* of "bankruptcy" is not an exogenous event, but can in most cases be delayed or triggered early by a distressed firm. As was outlined in the Introduction, a firm can change its accounting practices and value assets and obligations differently. Similarly, it can economize on its investments in order to be able to finance current losses. We have simplified the structure of the model by using discrete time intervals, only one period in which there can be a rescue, and only one period in which a β-type project may become a γ type. One would expect the same results from a more complicated model, for example, with continuous time. This is what a reinterpretation of the elements of the model as "real options" would suggest.[2] There is no need to assume that a rescue is successful with probability one (the probability should be decreasing in time); the wait and pray strategy could become less and less attractive as time proceeds (e.g., the probability of a breakthrough could decrease in time); and so on. We observed in the Introduction that late rescues are more costly and less likely to succeed than early ones. We model this by assuming that early rescues (in period 3) are

2. We thank a referee for stressing this point.

profitable,

$$Y - J > bY + (1 - b)y,$$

while later rescues are impossible. While the rescue of a β type is profitable ex post (in period 3), ex ante it is not:

$$Y - J < K.$$

We also assume that a ϕ type project should not be refinanced:

$$J > r.$$

There is no monetary profit from refinancing a ϕ project, and the entrepreneur's private benefit from completing the project is smaller than the cost of rescuing.

We assume that the investor has all bargaining power from the start. She designs the contract initially, and once the project has started, the entrepreneur can be replaced at any instant, without affecting the payoffs. This may seem to be a strong or even unrealistic assumption: in most corporate finance models, it is assumed that the borrowers have all bargaining power, not the lenders. The main reason for making this assumption is that we want to *isolate* the investor's willingness to forgive debt in order to allow for an early rescue if this is necessary. If the entrepreneur had all bargaining power, the investor's willingness to forgive would be mixed with her poor bargaining position, and the results would be less clear. The results do not depend on the assumption, however: we have solved the model with investor bargaining power and find that the results are qualitatively the same as in our model (there is a trade-off between tough and soft procedures). Note that the investor's bargaining power is not unrestricted, however: the entrepreneur is protected by *limited liability*. He cannot receive negative transfers, and the worst punishment that can be inflicted on him is a loss of control over the project and of any income.

We make some assumptions on the parameters of the model to ensure interior solutions for the effort decision:

$$Y + r - a[bY + (1 - b)y + r] < \frac{2 - ab}{1 - ab}\, c, \tag{1}$$

and

$$Y + r - a[Y - J + r] > \frac{ab}{1 - ab}\, c. \tag{2}$$

The two assumptions restrict the costs of providing effort (c), such that it is never optimal to invest less than a zero effort level, or more than one (we make this assumption because we interpret e as the probability of obtaining a γ type; an alternative approach would be to specify a more complicated effort cost function, with marginal disutility approaching zero if $e = 0$ and infinity if $e = 1$).

Let us first (as a benchmark) analyze the first-best decisions. Given the assumption that a β project should be rescued, while a γ or ϕ project shouldn't, we can find the efficient effort level

$$e^{FB} = \arg\max_e e(Y+r) + (1-e)a(Y-J+r) - \frac{c \cdot e^2}{2},$$
$$= \frac{(1-a)r}{c} + \frac{(1-a)Y + aJ}{c}.$$

An entrepreneur with considerable funds (larger than $K + J$) would invest in the project, continue a γ type, rescue a β type, and let a ϕ type starve (as $r < J$).

3. Optimal Contracts

In this section we derive and compare the contracts that the investor may want to propose in equilibrium. In a first-best environment, the entrepreneur would invest the efficient effort level e^{FB}, and the investor would have the necessary information for an efficient rescue decision. With asymmetric information, this is not necessarily the case. When searching for the contract that maximizes her payoff, the investor must take into account several constraints: the entrepreneur should accept the contract, he should invest effort, he should reveal the project type if the investor needs to know it, and the limited liability constraint must be met. We use the revelation principle to find the optimal contract. As we follow a standard procedure, the maximization program and its solution are presented in the Appendix.

We find two types of contract (a tough contract $\mathcal{C}^T$ and a soft contract $\mathcal{C}^S$), of which one will be the equilibrium contract, depending on the parameters of the model. Both contracts leave the effort choice to the entrepreneur and determine the partition of the project's payoffs. In addition, the soft contract endows the entrepreneur with two put options: he can dump the whole project (and its future returns) with the investor and obtain a payment instead, which may be contingent on future actions, and which is determined in the contract. By exercising one of these (mutually exclusive) options, the entrepreneur reveals his private information about the type of the project, and the investor can, for example, refinance a β type.

Tough Contract $\mathcal{C}^T$

§1 *At $t = 1$, the entrepreneur receives K from the investor and invests it in his project.*

§2 *If at $t = 3$ the investor has evidence that the project is of either a "bad" or a "failure" type, the entrepreneur is fired immediately, and all eventual earnings belong to the investor. She may refinance or liquidate the project and keep the returns for herself.*

§3 *If §2 does not apply, and the return is Y, the entrepreneur makes a payment D^T to the investor. If the entrepreneur cannot make this payment, the returns of the project belong to the investor.*

The tough contract has some similarity with a standard debt contract, in that it specifies a promised repayment $D^T < Y$ if the project returns are high, that is, the entrepreneur receives a monetary payoff; also, the entrepreneur's income is zero if the project returns are insufficient to repay the investor. It is not necessarily a debt contract, however, for two reasons. First, while §1 and §3 specify the size of the loan K and the repayment D^T if the project was successful, the promised repayment can also be a "lottery ticket" with the same expected value. Indeed, in a more general model with stochastic earnings for each type, the repayment function can have, but need not have, the structure of a debt contract.[3]

Second, §2 makes provisions for the case in which the entrepreneur has told the investor that he may not be able to repay the amount specified in §3. §2 can be interpreted as a bankruptcy clause, which could also be omitted if there were an equivalent bankruptcy law. This bankruptcy law would be a liquidation[4] procedure: if the investor discovers that the project type is either β or ϕ, she may take over control of the assets and of all returns. Obviously the entrepreneur has no incentive to reveal a β or ϕ type under a tough bankruptcy regime, as the payoff from remaining silent is strictly higher for type β and unchanged for type ϕ. Thus, by proposing a tough contract, the investor willingly ignores the possibility to rescue the project early. Before we discuss possible reasons for doing this, we present the alternative contract.

Soft Contract $\mathcal{C}^S$

§*1* *At $t = 1$, the entrepreneur receives K from the investor and invests it in his project.*

§*2.a* *If at $t = 3$ the entrepreneur admits that the project is of a "bad" type, the investor refinances the project, and if at $t = 5$ the return after rescuing is Y, the entrepreneur receives $b \cdot (Y - D^S)$ and the investor the rest.*

§*2.b* *If at $t = 3$ the entrepreneur admits that the project is a "failure," the project is liquidated and the entrepreneur receives a payment r from the investor.*

§*3* *If* §*2 does not apply, and the return is Y, the entrepreneur makes a payment D^S to the investor. If the entrepreneur cannot make this payment, the returns of the project belong to the investor.*

Like the tough contract, $\mathcal{C}^S$ contains elements of a financial (e.g., debt) contract (§1 and §3) and bankruptcy clauses (§2.a and §2.b). The financial parts of the two contracts differ only in the size of the repayment D^S in the last period (it is still the case that the entrepreneur earns a monetary benefit if the project's returns are high, that is, $D^S < Y$). The bankruptcy elements of $\mathcal{C}^T$ and $\mathcal{C}^S$ differ considerably, as the entrepreneur can choose an action from several alternatives. Basically he can do nothing (and §3 will apply), or he can execute one of two *put options*: §2.a gives him the right to sell the project (including its returns) to the investor, who commits to rescue the project; the execution

3. Additional constraints on the contracting problem are necessary to generate debt contracts; see, for example, Gale and Hellwig (1985) or Bolton and Scharfstein (1990).

4. "Involuntary" liquidation, to be more precise: the entrepreneur has no incentive to start a procedure if the investor does not.

price is $b \cdot (Y - D^S)$, and is conditional on the success of the rescue (a simple way to achieve this would be to give a fraction of the shares of the rescued firm to the entrepreneur). §2.b gives the entrepreneur the right to sell the firm (and eventual returns) to the investor for an execution price r.

Under a soft regime, the entrepreneur decides (in equilibrium) to reveal his type in the third period, which allows the investor to make efficient continuation decisions. If the type is β, the entrepreneur receives a payoff which is the same as his expected payoff if he decided to wait and pray, that is, if he pretended that the project was a γ type. It is also higher than the value of the second option, since with the other two alternatives he earns a private benefit r anyway, while he doesn't if the project is liquidated. Similarly, the entrepreneur will choose the right option if the type of his project is ϕ. Executing the put option in §2.b earns him r, while the best alternative, executing the option that leads to a rescue (§2.a), would earn him exactly the same payoff (the rescue is not successful and the monetary income therefore zero, but the entrepreneur earns the private benefit r). In comparison, the options that the tough contract $\mathcal{C}^T$ offers are less attractive to the entrepreneur. For simplicity, the contract does not even mention any options; the entrepreneur may "put" a β- or a ϕ-type project, but the strike price is zero in both cases, and the alternative, "do nothing," is not worse (if the project type is ϕ) or even strictly better (if the project type is either γ or β).

Proposition 1. Either the "tough" contract $\mathcal{C}^T$ or the "soft" contract $\mathcal{C}^S$ is optimal: no other contract ever achieves a strictly higher payoff for the investor.

The central element of the model is a trade-off between incentives to invest effort and incentives to reveal private information about the project's type. The former requires a harsh treatment after bad outcomes, while the latter requires some type of reward scheme for information revelation: due to limited liability constraints, the entrepreneur must earn nonnegative (monetary) payoffs after each outcome; therefore, the provision of extra effort can only be ensured by *increasing* the entrepreneur's payoff after γ outcomes. "Information revelation" is thus *expensive* in terms of "effort incentives":

Proposition 2. The equilibrium effort level that is induced by a "soft" contract is strictly lower than that induced by a "tough" contract.

The costliness of information revelation is driven by the need to offer *two* put options to the entrepreneur: while the option for the β type leaves him indifferent between exercising it and not, the option for the ϕ type is strictly more valuable if exercised than if not. The reason for this is that the entrepreneur with a ϕ type should not have an incentive to exercise the bad-type option: both options earn him a payoff of r, but the latter involves a loss of J for the investor. This reward, which is earned by the ϕ type, decreases the "wedge" between γ and β or ϕ types, and therewith the incentive to provide effort. The only choice that the investor has is to *increase* the payoff for "good" outcomes if she wants the effort level to increase. Depending on the parameters, this might be quite expensive compared with the gain that can be made by rescuing a β project. In this case, the investor prefers to ignore this possibility, and the (tough) contract aims only at providing effort incentives.

Proposition 3. Define

$$\Delta := \left(1 - \frac{e^S}{2} - \frac{e^T}{2}\right) a[(1-b)(Y-y) - J] - \frac{1-a}{1-ab}\, r,$$

where e^T and e^S are the equilibrium effort choices with a "tough" and a "soft" contract, respectively (cf. the appendix). The "soft" contract $\mathcal{C}^S$ is optimal if $\Delta \geq 0$, and the "tough" contract $\mathcal{C}^T$ is optimal if $\Delta \leq 0$.

Δ is the difference between the investor's payoff from offering $\mathcal{C}^S$ and from offering $\mathcal{C}^T$, and is derived in the Appendix. It is determined by the monetary payoffs (the final payoff minus the investment(s)) and the information rents that have to be paid to the entrepreneur. A complex bundle of effects determines the trade-off, but of interest, the solution is simple "sudden" regime switch: *either* a soft *or* a tough contract is optimal. The reason for this lies in the binary nature of the decisions that have to be made: *either* the information is revealed *or* it is not; *either* a rescue is undertaken *or* it is not. Starting from a near-first-best world, a worsening of the incentive problems eats into the investor's expected payoff (it increases the entrepreneur's information rents and it weakens incentives to provide effort), and at some level the information rents that are connected with the soft regime are so high, and the incentives to provide effort so low, that the tough regime becomes more attractive.

At this point it is useful to describe the intuition underlying Propositions 1, 2, and 3. In a first-best world, the entrepreneur would be required to supply effort, and to warn the investor if the project's prospects are poor. With asymmetric information, these tasks conflict. When hearing that the prospects are poor, the investor must conclude that the entrepreneur has not supplied effort; the contract must trade off the benefits of inducing entrepreneurial effort against early detection of project failure. When choosing a contract the parties agree on which task they want to encourage. When early detection is more important to the investor, she rationally induces the entrepreneur to report the project's type truthfully, by offering a soft contract. The entrepreneur is penalized if he reports poor prospects, but not too much; this sacrifices incentives for the entrepreneur to perform, however. When effort provision is more important to the investor, she induces the entrepreneur to perform, by offering a tough contract. The entrepreneur is penalized as severely as possible, whenever the project type is not good; naturally, the entrepreneur never reveals the prospects of the project. However, he supplies more effort, knowing he will only be rewarded if the project succeeds.

If we had assumed that the entrepreneur has all bargaining power, we would also get a regime switch caused by changes in monetary payoffs and rents. The switch would not be sudden, however. The investor's participation constraint always binds in this alternative model, that is, the entrepreneur always is the "residual claimant," and he is therefore not exposed to the same agency problems. His interests are more closely aligned with welfare maximization, and because he holds all relevant information, achieving this is much easier for him than it is for the investor in our model.

Coming back to our model, where the investor designs the contract, we can say more about some elements in the trade-off. Δ obviously increases in the net gain from rescuing a β project, $[(1-b)(Y-y)-J]$, that is, in a decrease of J, for example. It decreases in the size of r for two reasons. First, r is the "bribe" that must be paid to the ϕ type. Second, under a "tough" contract the private benefit increases the entrepreneur's incentive to invest effort, at no cost to the investor; under a soft contract, the entrepreneur always receives a payoff r, either as a private benefit or as a transfer payment, and it does not have the beneficial effect on effort provision. Δ is increasing in a because higher values of a mean that the ϕ type is less likely; furthermore, the probability of the possibility to realize a rescue gain is increasing in a. Finally, Δ is increasing in c. The reason for this lies in the trade-off between effort incentives and incentives to reveal private information. If "effort" becomes more expensive, the solution of the other incentive problem becomes relatively more attractive.

Proposition 1 states that either a soft or a tough contract will be optimal. While under the soft contract the entrepreneur's incentive to invest effort is reduced (cf. Proposition 2), it is not destroyed completely. In fact, the transfer scheme is designed to reward sufficiently a revelation of information, but not to reward in excess: A soft contract is soft, but not too soft when we consider the effort choice problem, while it is tough, but not too tough if we look at the information revelation problem.

The statement that other contracts are dominated may seem abstract. We can construct a simple example, however, which shows that a small change can have a major effect:

Hybrid Contract $\mathcal{C}^H$

§*1* *At* $t=1$*, the entrepreneur receives* K *from the investor and invests it in his project.*

§*2.a* *If at* $t=3$ *the entrepreneur admits that the project is of a "bad" type, the investor refinances the project. The entrepreneur receives a payment only if all debt has been repaid, including the costs of a rescue.*

§*2.b* *If at* $t=3$ *the entrepreneur admits that the project is a "failure," the project is liquidated. Payments as in* §*2.a.*

§*3* *If* §*2 does not apply, and the return is* Y*, the entrepreneur makes a payment* $Y-D^H$ *to the investor. If the entrepreneur cannot make this payment, the returns of the project belong to the investor.*

As in the case of $\mathcal{C}^S$ and $\mathcal{C}^T$, the "hybrid" contract contains a financial contract part and a bankruptcy clause. Similarly to $\mathcal{C}^S$, the hybrid contract endows the entrepreneur with two put options. The option in §2.a allows him to sell the project and its returns to the investor, who commits to rescue it. The strike price is not fixed in the contract, but with the assumptions above it is clear that it is zero (as $Y-J-K<0$). The put option in §2.b has exactly the same payoff structure, except that the investor is not committed to rescuing the project. If the project type is ϕ, the entrepreneur would earn a private benefit r if he chooses to exercise the put option in §2.a, while he does not if he exercises the put option in §2.b. If the project type is β, neither of the put options will be attractive: with the second, the project is liquidated, and the entrepreneur's payoff is zero; with the first, the project is rescued, but the entrepreneur's monetary payoff is zero (he does earn the private benefit r, however); without the options, his *expected* monetary payoff is strictly positive, and he earns the private benefit r, as well. The same holds for the case of a γ type: the options are not valuable.

Corollary 1. The "hybrid" contract $\mathcal{C}^H$ is strictly worse for the investor than both the "tough" contract $\mathcal{C}^T$ and the "soft" contract $\mathcal{C}^S$.

The hybrid contract achieves results that are worse than what either the soft or the tough contract achieve: a β project is not rescued, because wait and pray is the best strategy for a β type; the soft contract is better here, because with that contract β types are rescued. On the other hand, with a hybrid contract a ϕ is refinanced, because the put option connected with a commitment to rescue is valuable (to the entrepreneur) in this case; this does not happen with the other two contracts.

3.1 Simplifications and Extensions

The model in this article is somewhat unusual in that it has three types of projects (good, bad, and failure) instead of the usual two. The reason for this is that the results become unrealistic if the model is too simple. More precisely, if there were only a good and a bad type, the investor could obtain the entrepreneur's private information at no cost. She could make the entrepreneur with a bad type exactly indifferent between revealing his information and claiming to have a good type without affecting the incentive to invest effort. This is easy to see if we assume that $r = 0$: Δ in Proposition 3 would always be strictly positive. Obviously it is not realistic that all potentially insolvent firms should be rescued. Similarly, it is realistic to assume that the managers of a firm who know that it should be liquidated would nevertheless try to have it refinanced by claiming that a rescue is both possible and profitable. Finally, it is realistic to assume that it is hard for outsiders to tell whether a firm should be rescued or whether the managers just claim that it should. The failure type ϕ is a simple way to introduce these elements of realism to the model. Note that the relevant aspect that ϕ adds is not the enlarged type space. With many bad types, even with a continuum, the results remain degenerate (see Povel, 1996). The relevant aspect that ϕ adds is a new truth-telling constraint, which is binding. The failure type can claim to be a bad type, and must be prevented from doing so, at a cost.

We have assumed for simplicity that the private benefit r is verifiable. This may seem unusual, too. Note, however, that the optimal contracts do not refer to r as "the private benefit," but instead treat it as a figure, the size of a transfer that has to be made under certain circumstances. If we assume that the private benefit is observable but not verifiable, the optimal contracts would specify the same transfers, and induce the same effort levels, as the contracts in our model. The situation is more complicated if the private benefit is unobservable. In this case, the investor faces a third incentive problem (asymmetric information at the contracting stage). She may have to offer a "menu of contracts" (possibly some of them soft, others tough) to a randomly picked entrepreneur, who then chooses one and thereby reveals his level of r. Solving this more complex triple incentive problem is beyond the scope of this article, and it is not clear whether it would add any meaningful results to the present analysis.

Other changes in the assumptions do not affect the qualitative results, as long as the changes are not too large. Introducing equity, for instance, has small effects, as long as the entrepreneur's initial wealth is not sufficient to finance the project. The same is true if the project earns a lower income if it is separated from the entrepreneur. The "outside option principle" applies in this case: up to a certain degree the additional bargaining power does not change the results. If the need for his presence endows him with a strong bargaining position in renegotiations, however, the entrepreneur need not fear bankruptcy anymore, and he may be willing to reveal a β type even without a soft contract.

Unlimited liability affects the results considerably. It allows the investor to punish the entrepreneur for bad outcomes, and therefore he cannot capture any information rents. The investor can easily guarantee first-best decisions, and if the punishments are transfer payments (say, the entrepreneur expects a high exogenous income in the last period), the investor can even achieve her first-best payoff.

4. Implications for Bankruptcy Laws and Practice

The main result of our analysis is that in equilibrium the parties will write either a soft or a tough contract. A soft contract involves a reward scheme that provides for transfers to the debtor, if he is unable to repay. We can derive several implications for bankruptcy laws and practice. At a general level, our results show that a single *mandatory* bankruptcy procedure leads to inefficient investment decisions (see Section 4.1). The model also generates clear results concerning the usefulness of *absolute priority rules* (see Section 4.2). Finally, we compare the soft procedure with the rather soft Chapter 11, the U.S. reorganization procedure (see Section 4.3).

4.1 Why Are Bankruptcy Laws Mandatory?

Schwartz (1997) has recently questioned the rationale behind the fact that in most countries bankruptcy laws are *mandatory*: the parties to a financial contract (e.g., borrower and lender) are not allowed to circumvent them in their contract. Unlike in other areas of business law, the rules are not simply default rules, which define the parties' rights and obligations if they did not specify them explicitly in their contract; instead, the rules have to be followed strictly, and agreements which contradict them are not valid. For instance, in the United States a firm cannot commit *not* to file for the rather soft Chapter 11.[5]

Schwartz analyzes a model with borrowers and lenders, and two given (non-mandatory) bankruptcy procedures, one for liquidations, one for reorganiza-

5. There seem to be loopholes, however; see Baird (1995).

tions. He shows that the parties may sometimes want to write a contract that specifies which of the procedures should be used, but they may also write a contract without specifying this because they want to rely on negotiations if the firm cannot repay a loan. Thus, depending on the parameters, the contracting parties may write contracts with very different bankruptcy sections. In other words, a mandatory one-size-fits-all bankruptcy law leads to inefficient contracting and investment decisions.

We advance from this result. In our model, the bankruptcy rules are derived endogenously, and depending on the parameters, a tough or a soft procedure will be optimal. This is true despite the introduction of an investment stage, in which the entrepreneur makes an unobservable effort decision. As one would expect, a lenient treatment in bankruptcy worsens the effort incentives, but a soft contract may nevertheless dominate a tough one, which concentrates on the effort incentives only. Thus, mandatory bankruptcy procedures may lead to inefficient investment decisions: contracting parties may not always want to be as soft or tough as a country's bankruptcy laws require. Our results therefore call for a justification of the fact that bankruptcy laws are indeed mandatory in most countries.

Schwartz (1997) further analyzed the consequences of introducing *several* lenders into his model, with differing lending dates and different preferences over procedures. He showed that this complication does not affect his results, if the parties agree to follow absolute priority rules (APRs): if the borrower's funds are insufficient to repay all obligations, the most senior (high ranked) claims have to be repaid first. The results concerning APRs do *not* contradict, even though APRs are inefficient in our model in some cases (if a soft procedure is optimal), while they are always useful in Schwartz's model. The APRs in Schwartz (1997) refers to priority *within* a class of claims, that is, between secured and unsecured lenders, say. The APR in our model refers to priority *between* different classes, that is, between lenders as a class, and shareholders (the entrepreneur). The two results are thus complementary: debt-equity APRs are inefficient if soft procedures are optimal, while they are helpful if tough procedures are optimal; furthermore, debt-debt APRs are helpful in both cases.

If bankruptcy laws are not helpful as mandatory laws, they may still be useful as *default rules*: like in other areas of business law, they could provide rules that the parties would want to add to their contracts anyway, thereby helping them to save "ink costs." A country's bankruptcy law could thus offer procedures that suit many different needs (say, the basic elements of one soft and one tough procedure), and let the contracting parties "fill in" the details: repayment structure (debt, shares, convertibles, etc.), amounts of money, use of securities (stocks, options, etc.) instead of cash to pay rewards, etc.

There may even be reasons to make some sections of those default rules mandatory, *which have not been modeled here*. The "common pool" problem is a frequently quoted example in which coordination problems and imperfect information make it difficult to renegotiate contracts efficiently. In tort cases, the claimants and the size of their claims may even be unknown. Another potential reason is that renegotiation may undermine a tough contract—a mandatory tough procedure, with a possibility to agree on a soft procedure ex ante, could help to make tough contracts credible.

4.2 Consistent Design of Procedures

The major difference between the three contracts $\mathcal{C}^T$, $\mathcal{C}^S$, and $\mathcal{C}^H$ concerns the bargaining position and expected payoffs of the entrepreneur with different project types. Under a tough regime (with either $\mathcal{C}^T$ or $\mathcal{C}^H$) the monetary payoff is zero if the project type is either β or ϕ, while under a soft regime it is positive. A soft contract therewith contradicts the APRs that can be found in most countries' bankruptcy laws. Broadly speaking, APRs structure the financial claims against a firm in different ranks, and require that repayments be made to these claims sequentially, starting with the highest rank. For instance, secured debt must be repaid in full, before unsecured debt claims can be repaid, and equity is typically found at the bottom rank.

The idea that bankruptcy should be a punishment and serve as a bonding device is still widely accepted, and may be a reason why most bankruptcy laws contain APRs. For example, after reviewing the insolvency practice in the UK, a parliamentary commission wrote:

> It is a basic objective of the law to support the maintenance of commercial morality and encourage the fulfilment of financial obligations. Insolvency must not be an easy solution for those who can bear with equanimity the stigma of their own failure or the responsibility for the failure of a company under their management.
>
> (Cork Report, 1982, Chapter 4:191)

(Similar statements can be found in German legal writings.) APRs are also a generally accepted element of the corporate finance literature, because this literature typically uses bankruptcy as a bonding device in its models.[6] This makes our result that soft procedures may be optimal rather nonstandard. The role of "forgiveness" is made clear in our model by the extent of the violation of APRs that is required by a soft contract: even if the lenders receive nothing, and the project earns nothing, the debtor must receive a payment r.[7] This clearly goes against all ideas of "fairness," and therefore throws a light on the difficulties that a consistently designed soft procedure may encounter in practice. Nevertheless, the results show that the problem of design consistency should be taken seriously.

APRs are no problem if the tough contract is optimal. The effort incentives are maximized if the entrepreneur receives small payoffs after bad outcomes, and APRs can only assist in achieving this goal. On the other hand, APRs contradict the spirit of the soft contract. Violations of APRs are its central element, which give the entrepreneur an incentive to reveal the bad news in time. We

6. Even in Aghion, Hart, and Moore (1992), the need to adhere to APRs is not questioned.

7. The investor gives more money to the "failure" type in our model. With the more realistic assumption of positive liquidation value, this reward would be paid through asset sales.

can observe such violations of APR in the United States, where bankruptcy laws have traditionally been softer than elsewhere. There is a large empirical literature which reports major systematic violations of APRs in U.S. business bankruptcies [started by Franks and Torous (1989); see also Section 4.3]. Also, the predecessor of Chapter 11, Chapter XI of the 1938 Chandler Act, had no APR provisions. This procedure was intended for small business reorganizations, and the conflict modeled in Chapter 2 may have been relevant when the act was drafted [cf. N.B.R.C. (1997b, Working Group Proposal #1) and (1997a, p. 549)]. Requiring that APRs be followed transforms a soft contract into a hybrid contract, and we have shown in Proposition 1 that this leads to poor results.

Several countries (e.g., Germany and the UK) have reviewed their bankruptcy laws in recent years, motivated by the recognition that their tough procedures did not lead to efficient reorganization decisions. In the U.S., bankruptcy cases in which debtors are treated “too well” cause regular uproar in the media, and many voices are raised to review the laws and make them “tougher.” Our results have important implications for these reviews.

In Germany a new bankruptcy law was introduced in January 1999. The former bankruptcy law consisted of two procedures, a liquidation procedure and one reorganization procedure. In the past few years, the number of firms that ended up in reorganization each year could be counted on one’s fingers, while thousands were liquidated (with or without the use of the liquidation procedure). The aim of the review was to create a “rescue culture.” Unfortunately the new procedure does not guarantee the same protection to the debtor that he would enjoy under a real soft procedure. The new procedure tries to be soft in its wording, but is tough in the incentives that it provides, because in keeping APRs it continues the traditional toughness of German bankruptcy laws. Evidence will show whether the new procedure is a tough procedure, with many redundant provisions, or whether it is closer to being a hybrid procedure.

Similarly, a new procedure called CVA was introduced in the UK in 1986. This procedure was designed to rescue economically viable firms with financial difficulties. In practice, however, the procedure has rarely been used. One reason for this is that while the procedure itself is soft, in the typical situation one of the lenders can opt out: the holder of the “floating charge” can appoint a receiver at any time. The prospect of ending up in “administrative receivership” works to make this soft procedure tough, or even hybrid. While the procedure has some soft elements, the drafters of the law allowed lenders to opt for a tough procedure, and therewith introduce APRs into a soft procedure through the back door.

“Inconsistent” bankruptcy laws can result from problems of renegotiation: once a law (or contract) has been drafted, there may be incentives to change the terms, because the current procedure helps to achieve one goal (for instance, a tough procedure improves a debtor’s ex ante incentives) but is poor at achieving other relevant goals (with a tough procedure rescue decisions are inefficient). In Germany the bankruptcy law is tough, and it is commonly understood that too few companies are rescued. The goal of the recent revision was to improve the law's performance in this dimension, while preserving the traditional toughness. In the United States, on the other hand, it has been recognized that Chapter 11 is rather soft, too soft it seems at times, and many voices have therefore demanded its amendment. Our results show that such attempts to achieve all goals simultaneously can easily backfire.

4.3 Is Chapter 11 the Soft Procedure?

The similarity between the soft bankruptcy clause in $\mathcal{C}^S$ and Chapter 11, the U.S. reorganization procedure, is striking. Both promise some direct or indirect reward to the entrepreneur if he files for bankruptcy. Indeed, it was the intention of the drafters of the procedure to induce firms to admit their difficulties as soon as possible (see H.R. Rep. No. 95-595, 95th Cong., 1st Sess. 233–4 (1977)).

There are two major differences between the two procedures, however. First, the U.S. courts systematically reject filings by firms with a single lender. The argument behind those rejections is that there cannot be any bargaining problems with only two parties (there is no "common pool problem," see Jackson, 1986). However, the reason for rewarding and protecting the entrepreneur under a soft contract was different: he is only willing to reveal his type if this does not make him too vulnerable. If his filing for a reward under $\mathcal{C}^S$ is rejected, he has revealed his type, and is at the mercy of the investor. With the U.S. rejection rule, Chapter 11 is a tough reorganization procedure for borrowers with exactly one lender, and a soft procedure if there are more lenders.

The main difference between the soft procedure and Chapter 11 is that the latter contains APRs, which are supposed to be enforced by the bankruptcy courts. The recent discussions around the "new value exception" (see, e.g., Baird and Jackson, 1988; Baird, 1993: chaps. 3 and 10; Westbrook, 1993) make clear that financial rewards to the entrepreneur, as suggested by the model, are not desired. Nevertheless, Chapter 11 has characteristics that make it a soft procedure. It provides a system of indirect rewards, which the entrepreneur can earn, because Chapter 11 endows him with considerable bargaining power. If he files for protection under Chapter 11, this puts a stay on all claims against the firm. No trustee is appointed, and the entrepreneur cannot easily be removed from his position. As a "debtor in possession," he can take on new debt, which has higher priority than all earlier debt, to keep the firm running. Finally, and most importantly, he has the exclusive right to propose a reorganization plan for at least a couple of months, possibly for years. There is ample evidence that this system of indirect rewards is effective and actually being used (see, e.g., Franks and Torous, 1989).

Unfortunately this indirect type of reward has proved costly. Rescues are delayed, unnecessary uncertainties are created, and the assets of a distressed firm are not used in the most efficient way. Furthermore, large legal and administrative costs are associated with Chapter 11 cases. There is a large literature now, which analyzes the various costs or inefficiencies that are commonly attributed to the procedure (a frequently quoted article is Bradley and Rosenzweig, 1992). Chapter 11 is judged as being inefficient because the entrepreneur has too much bargaining power. Chapter 11 is accused of protecting bad or lazy managers from the market for corporate control, both outside and in bankruptcy; managers can file for protection from their creditors whenever it pleases them, and that this possibility is being made use of without real need (i.e., much too frequently). The softness of Chapter 11 is thought of as directly or indirectly responsible for its costliness, and a frequent conclusion is that it should therefore be made tougher.

The model shows that soft procedures may be optimal. The criticism of Chapter 11 therefore needs to be focused carefully: some effects that seem to be inefficient may actually be desired, or they may be caused by the poor implementation of the procedure’s softness.

Consider the idea that firms find bankruptcy more attractive, and that this leads to more frequent filings by more healthy firms. This is a *desired* effect (firms are supposed to file earlier, when it is easy to rescue them), and the increased frequency of filings is a *necessary* effect [under a tough contract, the probability of bankruptcy is $(1 - e^T)(1 - ab)$, which is smaller than the probability of bankruptcy under a soft contract, $(1 - e^S)$, because $e^T > e^S$ and $a, b \in (0, 1)$]. The reason is that under the tough regime, firms that need to be rescued prefer to wait and pray, and only the unfortunate ones end up in bankruptcy; under the soft regime, all unsuccessful firms end up in bankruptcy.

Thus it could be that the negative evidence, when reinterpreted, actually implies that Chapter 11 is doing quite well. Its introduction in 1978 seems to have had a positive effect on both the number of filings, and on the economic conditions of the filing firms, as was the intention of the creators of the law.

Similarly, other arguments can be reviewed. Consider the idea that the bonding role of debt is weakened. We have seen that a procedure can be soft and *nevertheless* preserve the bonding role of debt. In the model, the effort incentive constraint is always binding, and the entrepreneur always invests the high effort level. The key is that the procedure should be soft, but not *too soft*. Chapter 11 is soft on the manager: LoPucki and Whitford (1993) found 5 in 43 studied cases, in which the CEO of a firm in Chapter 11 received considerable payments during the proceedings (these payments were agreed to as employment contracts). However, it is not too soft: even though the entrepreneur is treated well in Chapter 11, he is not invulnerable. Gilson (1990) and Gilson and Vetsuypens (1993) show that directors and CEOs of publicly traded firms that file for Chapter 11 frequently lose their jobs (about one in two) and that the remuneration of the remaining managers is significantly reduced.

Thus, in Chapter 11 cases, we observe that managers are treated badly, but not too badly. The lower bound to the reward is determined by the alternatives that the entrepreneur can choose. Typically these consist of a later bankruptcy that may be much more harmful than Chapter 11. Thus, there is evidence both for the sufferings of managers in Chapter 11 and for a reward for filing, and the bonding role of debt may still be effective.

Similarly, one has to be precise when arguing that a soft procedure increases the cost of capital. While this may be true from an ex post perspective (once a bankruptcy procedure has been started), the relevant variable should be the ex ante costs of capital. In our model the investor also takes into consideration the gains from a more efficient rescue decision. If these are high, she prefers to offer the soft contract, which indicates (since she keeps all profits) that the ex ante costs of capital are *lower* than the ex ante costs with a tough contract.

Other lines of criticism of Chapter 11 are well taken: the procedure is time consuming and can involve considerable costs. This is a problem of poor implementation, however, not of softness: as was mentioned in the last section, these inefficiencies are required because the entrepreneur cannot, presently, *expect* a direct reward. As reorganizations in other countries and informal workouts show, there is no need for a reorganization to be costly or time consuming. Thus, if one wants to make the procedure more efficient, the question should be whether direct rewards can be introduced, and to what extent APRs should be enforced in Chapter 11.

To summarize, the evidence of the performance of Chapter 11 leads to some negative results for the design of the procedure, but it does not follow that a soft procedure does worse than a tough procedure. Early rescues may pay, and, as was shown in the model, even with limited liability, which makes the revelation of project types costly, the incentive to invest effort can be sufficiently strong.

5. Conclusion

This article discusses both the effort decision of an entrepreneur and his decision whether and when to reveal to his lenders that his firm is in financial distress in order to initiate a reorganization. As early rescues are likely to be more successful and cheaper than delayed rescues, the creditors want to receive this information as early as possible. The entrepreneur must be convinced to reveal his information, as he could carry on, playing a wait and pray strategy at the creditors' expense. It may pay for the latter to be "forgiving," if the entrepreneur admits that he lost their money, even if they are in a much stronger bargaining position than the entrepreneur. This may also be too expensive in terms of ex ante incentives of the entrepreneur, however, and the creditors could prefer to ignore the possibility of more efficient rescue decisions in this case.

Assuming that "optimal laws" should replicate the clauses of those "optimal contracts" that the parties would write if the transaction costs of contracting were sufficiently low, we derive implications for the design of bankruptcy laws. First, both soft and tough bankruptcy laws may be optimal in equilibrium, depending on the parameters. A procedure which contains both soft and tough elements, however, is never better than both of the other two, and may be strictly worse. A soft bankruptcy law requires that a reward is paid to the entrepreneur, if he successfully cooperated in a rescue by starting it early. This reward violates the so-called absolute priority rules, because it must be paid even if some of the debt of the firm is not repaid. At the extreme, it must be paid even if the firm must be liquidated, and the returns are negligible (as with a failure type in the model). This may seem unfair at first. It makes clear, however, how important it is to separate clearly between the different goals that a bankruptcy procedure is supposed to achieve, and how important it is to design a procedure consistently.

Second, the result that either a soft or a tough procedure may be optimal generalizes the results in Schwartz (1997): mandatory bankruptcy laws may lead to inefficient investment and rescue decisions. For instance, the contracting parties may agree that a tough procedure would be optimal, because of the relative importance of the debtor's ex ante incentives, compared with the potential losses from a delayed rescue. The right of a U.S. debtor to file for Chapter 11 (a rather soft procedure) makes this impossible. Similarly, tough bankruptcy laws make a lender's promise to be forgiving noncredible, and soft contracts become impossible to write.

Third, we derive results concerning Chapter 11, the U.S. reorganization procedure. It has much in common with soft bankruptcy law, but there are some relevant differences. The most important of these is that the creditors can demand that the absolute priority rule be enforced, which prohibits payments to equity if claims with higher ranks have not been repaid. Nevertheless, Chapter 11 is a soft procedure. It provides the entrepreneur with indirect rewards: by endowing him with bargaining power, he can extract a payoff from the creditors. This may be an inefficient reward scheme, but the main goal of a soft procedure, inducing early bankruptcy filings, may be achieved. While there are undoubtedly severe inefficiencies in a Chapter 11 procedure, these are not necessary elements of a soft procedure. The arguments against Chapter 11 may be valid, but they do not imply that the softness of the procedure should be reduced.

Appendix: Proofs

The direct mechanism consists of

- a message space $M = \{\gamma, \beta, \phi\}$
- rescue decisions $P_\gamma, P_\beta, P_\phi \in [0, 1]$
- monetary transfers (from I to E) $Z\colon \{Y, y, 0, Y - J, -J\} \times M \to \mathbb{R}_+$.

Denote with $Z_{Y\gamma}$ the transfer to E if he revealed type γ and the outcome was Y, and with $Z_{\gamma Y}$ the payoff if he revealed type γ, the project was rescued, and earned income Y [in other words, a second subscript γ, β, or ϕ refers to transfers without a rescue, while if these are the first subscript the transfer follows a rescue (attempt)].

The optimal direct mechanism is found by solving two sequential incentive problems: effort choice, then truth telling. The analysis proceeds as follows: first we analyze what contract is optimal if I wants E to choose some specific effort level e; then we choose the effort level which maximizes I's payoff. We assume for simplicity that the investor either rescues or liquidates a project if she discovers that it is a ϕ type, but she does not let it starve. If instead we assumed that she lets it starve, the results would be unchanged.

The optimal contract which implements an effort choice e is the solution to the following program:

$$\begin{aligned}\max_{Z_{\cdot,\cdot}, P_{\cdot}} & e\left(P_\gamma(Y - J - Z_{\gamma Y}) + (1 - P_\gamma)(Y - Z_{Y\gamma})\right) \\ & + (1 - e)a(P_\beta(Y - J - Z_{\beta Y}) + (1 - P_\beta)[b(Y - Z_{Y\beta}) + (1 - b)(y - Z_{y\beta})]) \\ & + (1 - e)(1 - a)(P_\phi(-J - Z_{\phi 0}) + (1 - P_\phi)(-Z_{0\phi})) - K \qquad (Max)\end{aligned}$$

such that

$$
\begin{aligned}
e = \arg\max_{\tilde{e}} \tilde{e}(P_\gamma Z_{\gamma Y} + (1 - P_\gamma) Z_{Y\gamma} + r) \\
+ (1 - \tilde{e}) a (P_\beta Z_{\beta Y} + (1 - P_\beta)[b Z_{Y\beta} + (1 - b) Z_{y\beta}] + r) \\
+ (1 - \tilde{e})(1 - a)(P_\phi Z_{\phi 0} + (1 - P_\phi) Z_{0\phi} + P_\phi r) - \frac{c \cdot \tilde{e}^2}{2} \qquad (IC'_e)
\end{aligned}
$$

$$P_\gamma Z_{\gamma Y} + (1 - P_\gamma) Z_{Y\gamma} + r \geq P_\beta Z_{\beta Y} + (1 - P_\beta) Z_{Y\beta} + r \qquad (IC_{\gamma\beta})$$

$$P_\gamma Z_{\gamma Y} + (1 - P_\gamma) Z_{Y\gamma} + r \geq P_\phi (Z_{\phi 0} + r) + (1 - P_\phi) Z_{0\phi} \qquad (IC_{\gamma\phi})$$

$$
\begin{aligned}
P_\beta Z_{\beta Y} + (1 - P_\beta)[b Z_{Y\beta} + (1 - b) Z_{y\beta}] + r \\
\geq P_\gamma Z_{\gamma Y} + (1 - P_\gamma)[b Z_{Y\gamma} + (1 - b) Z_{y\gamma}] + r \qquad (IC_{\beta\gamma})
\end{aligned}
$$

$$
\begin{aligned}
P_\beta Z_{\beta Y} + (1 - P_\beta)[b Z_{Y\beta} + (1 - b) Z_{y\beta}] + r \\
\geq P_\phi (Z_{\phi 0} + r) + (1 - P_\phi) Z_{0\phi} \qquad (IC_{\beta\phi})
\end{aligned}
$$

$$P_\phi (Z_{\phi 0} + r) + (1 - P_\phi) Z_{0\phi} \geq P_\gamma r \qquad (IC_{\phi\gamma})$$

$$P_\phi (Z_{\phi 0} + r) + (1 - P_\phi) Z_{0\phi} \geq P_\beta r \qquad (IC_{\phi\beta})$$

are satisfied, as well as the limited liability conditions (no transfer Z_{ij} may be negative). The entrepreneur's participation constraint is automatically satisfied if we assume that his outside option gives him a utility level of zero (he can always choose $e = 0$ and have nonnegative payoffs).

The first constraint (IC'_e) is the effort constraint. Instead, we can use the first-order condition:

$$
\begin{aligned}
P_\gamma Z_{\gamma Y} + (1 - P_\gamma) Z_{Y\gamma} + r \\
- a (P_\beta Z_{\beta Y} + (1 - P_\beta)[b Z_{Y\beta} + (1 - b) Z_{y\beta}] + r) \\
- (1 - a)(P_\phi Z_{\phi 0} + (1 - P_\phi) Z_{0\phi} + P_\phi r) = c \cdot e. \qquad (IC_e)
\end{aligned}
$$

The truth-telling constraints are $(IC_{\gamma\beta})$–$(IC_{\phi\beta})$, where the first index refers to the true type and the second to the type the entrepreneur should not pretend to be.

The propositions are proved by simplifying the program and by reducing it to case distinctions. For every case we will either derive the optimal transfer scheme or show that it leads to a contradiction.

The first simplification is to set $Z_{y\gamma} = 0$, which cannot violate any ICs, since it appears on the right-hand side of $(IC_{\beta\gamma})$ only. Next, $P_\phi = 0$. Suppose it were strictly positive. Then the investor could profitably "increase" it by some $\varepsilon < 0$, and increase $Z_{0\phi}$ by $\delta_1 = -\frac{Z_{\phi 0} - Z_{0\phi} + r}{1 - P_\phi}\, \varepsilon$, without violating any of the ICs. If $\delta_1 < 0$, and $Z_{0\phi} = 0$, she can instead increase $Z_{\phi 0}$ by $\delta_2 = -\frac{Z_{\phi 0} + r}{P_\phi}\, \varepsilon > 0$, again without violating any of the ICs.

The investor will not set $Z_{0\phi} > r$. Otherwise it could be reduced without violating any of the ICs by reducing other $Z_{..}$. With $Z_{0\phi} \leq r$, $(IC_{\gamma\phi})$ and $(IC_{\beta\phi})$ are redundant, as they must be satisfied from the limited liability constraints.

P_γ must be zero. Otherwise the investor could profitably increase it by $\varepsilon < 0$, at the same time increasing $Z_{\gamma Y}$ by $\delta_1 = -\frac{Z_{\gamma Y} - Z_{Y\gamma}}{P_\gamma}\varepsilon$. She thereby saves $-J \cdot \varepsilon > 0$, and no incentive constraints are violated [the right-hand side of $(IC_{\beta\gamma})$ is increased by $(1-b)Z_{Y\gamma}\varepsilon < 0$]. If $\delta_1 < 0$, and $Z_{\gamma Y} = 0$, she can instead increase $Z_{Y\gamma}$ by $\delta_2 = \frac{Z_{Y\gamma}}{1-P_\gamma}\varepsilon < 0$, which leaves all ICs unchanged and improves the investor's payoff. If $Z_{Y\gamma} = 0$ as well, this leads to $Z_{\beta Y} = 0$ and $Z_{Y\beta} = 0$, because of $(IC_{\gamma\beta})$, and therefore $(IC_{\beta\gamma})$ is redundant. But then the investor could reduce P_γ without affecting any incentive constraint, thereby increasing her own payoff.

With $P_\gamma = 0$, $(IC_{\phi\gamma})$ is always satisfied, and we can omit it. Therefore, $(IC_{\phi\beta})$ must be binding, as the investor could otherwise profitably decrease $Z_{0\phi}$.

Next, $(IC_{\beta\gamma})$ must be binding in equilibrium. Suppose it is not. The investor could decrease either of $Z_{\beta Y}$, $Z_{Y\beta}$, or $Z_{y\beta}$ without violating any of the ICs. At least one must be strictly positive from $(IC_{\beta\gamma})$ and (IC_e). If $Z_{\beta Y} = Z_{Y\beta} = 0$, then $Z_{Y\gamma} = 0$ as well, but we must have $Z_{y\beta} > 0$ from $(IC_{\beta\gamma})$. One can show that the investor wants to increase P_β, which decreases $Z_{y\beta}$. There is no maximum to the investor's program, and therefore no equilibrium with only $Z_{y\beta}$ and $Z_{0\phi}$ strictly positive. This case is uninteresting anyway, as this constellation discourages effort provision compared with a situation in which there are no financial incentives at all.

We now turn to a case distinction: (*a*) $P_\beta = 0$; (*b*) $P_\beta = 1$; and (*c*) $P_\beta \in (0, 1)$. For each case we determine the optimal contract, including the effort level that is induced, and show which contract is dominated under what circumstances.

Case (a). $P_\beta = 0$.

Using the incentive constraints we get

$$Z_{Y\gamma} = \frac{ce - (1-a)r}{1-ab}$$

and

$$bZ_{Y\beta} + (1-b)Z_{y\beta} = bZ_{Y\gamma},$$

which we substitute into (*Max*). Differentiation with respect to e yields the optimal effort level with $P_\beta = 0$, which we denote with e^T,

$$e^T := \frac{Y - a[bY + (1-b)y] + (1-a)r - \frac{abc}{1-ab}}{2c}$$

(notice that because of the assumption in Equation (1), e^T will never be larger than 1); substitution of e^T into (*Max*) yields the maximal expected payoff for the investor (again, with $P_\beta = 0$):

$$V^T := c \cdot (e^T)^2 + a[bY + (1-b)y] + \frac{ab(1-a)r}{1-ab} - K.$$

Case (b). $P_\beta = 1$.

Similar to Case (*a*), we can derive

$$Z_{Y\gamma} = \frac{ce}{1-ab}, \quad Z_{\beta Y} = b\frac{ce}{1-ab},$$

$$e^S := \frac{Y - a[Y-J] + (1-a)r - \frac{abc}{1-ab}}{2c},$$

and

$$V^S := c \cdot (e^S)^2 + a[Y-J] - (1-a)r - K$$

(notice that $e^S < e^T$, and because of the assumption in Equation (2), e^S is always larger than 0). Denote the difference between V^S and V^T with Δ:

$$\Delta := V^S - V^T = \left(1 - \frac{e^S}{2} - \frac{e^T}{2}\right) a[(1-b)(Y-y) - J] - \frac{(1-a)r}{1-ab}.$$

Case (c). $P_\beta \in (0, 1)$.

We obtain

$$Z_{Y\gamma} = \frac{ce - (1-a)(1-P_\beta)r}{1-ab},$$

$$P_\beta Z_{\beta Y} + (1-P_\beta)[bZ_{\beta Y} + (1-b)Z_{y\beta}] = bZ_{Y\gamma},$$

and

$$e^M := \frac{Y - a\left\{P_\beta(Y-J) + (1-P_\beta)[bY + (1-b)y]\right\} + (1-a)r - \frac{abc}{1-ab}}{2c}.$$

The optimal contract with $P_\beta \in (0, 1)$ gives the investor an expected payoff of

$$V^M := c \cdot (e^M)^2 + a\left\{P_\beta(Y-J) + (1-P_\beta)[bY + (1-b)y]\right\} + ab\frac{(1-a)r}{1-ab} - P_\beta\frac{(1-a)r}{1-ab} - K.$$

How does V^M compare with the other payoffs? The investor prefers the tough contract to any mixed contract (with $P_\beta \in (0, 1)$) if $\Delta' := V^M - V^T < 0$, that is, if

$$\Delta' = P_\beta \cdot \left\{\left(1 - \frac{e^M}{2} - \frac{e^T}{2}\right) a[(1-b)(Y-y) - J] - \frac{(1-a)r}{1-ab}\right\} < 0,$$

while she prefers the soft contract to the mixed contract if $\Delta'' := V^S - V^M > 0$, that is, if

$$\Delta'' = (1 - P_\beta) \cdot \left\{ \left(1 - \frac{e^S}{2} - \frac{e^M}{2}\right) a[(1-b)(Y-y) - J] - \frac{(1-a)r}{1-ab} \right\} > 0.$$

Now, using the definition of Δ and the fact that $e^S < e^M < e^T$, we obtain

$$\Delta \geq 0 \Longrightarrow \Delta'' > 0 \Longrightarrow V^S \geq V^T \text{ and } V^S > V^M$$
$$\Delta \leq 0 \Longrightarrow \Delta' < 0 \Longrightarrow V^S \leq V^T \text{ and } V^M < V^T$$

Therefore, any contract with $P_\beta \in (0,1)$ is always dominated by a contract with either $P_\beta = 0$ (yielding V^T) or $P_\beta = 1$ (yielding V^S). In equilibrium, the investor chooses the soft contract (with $P_\beta = 1$) if $\Delta \geq 0$, and the tough contract (with $P_\beta = 0$) if $\Delta < 0$.

This concludes the proof of Propositions 1 (either the soft or the tough contract dominate any other contract) and 3 (whether the soft or the tough contract is optimal depends on the sign of Δ); Proposition 2 (less effort provision under the soft contract) follows from an inspection of e^T and e^S, recalling that $(1 - b)(Y - y) - J > 0$. ∎

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