

# Matching Bankruptcy Laws to Legal Environments

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## Abstract

We study a model of optimal bankruptcy law in an environment where legal quality can vary along two dimensions: the ability of judges, and the quality of contract enforcement. We show that a judicially-influenced bankruptcy process can enhance the efficiency of incomplete contracts by conditioning the allocation of control rights in bankruptcy on ex-post information about firm quality when this is difficult to describe in a contract. We consider the optimal balance of debtor and creditor interests as a function of the legal environment, and show that the optimal degree of “creditor-friendliness” in the bankruptcy law increases as judicial ability to recognize firm quality falls and as the quality of contract enforcement deteriorates. Our model contributes to the existing law and finance literature in demonstrating that optimal bankruptcy laws, in particular the degree of optimal creditor protection, depends heavily on the existing legal environment. Our model is also able to explain cross-country patterns in the content and usage of bankruptcy laws around the world as reported in existing empirical research.

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# 1 Introduction

Bankruptcy and debt collection laws are increasingly being recognized as fundamental institutions, necessary for the growth of credit markets and entrepreneurship in developing economies. In practice, the design of these laws varies substantially across countries, along dimensions such as the allocation of control rights, priority rules, protection of secured creditors, and the discretion given to third-parties such as judges and administrators.

Empirical evidence from the law and finance literature, most notably that of La Porta, et al. (1997, 1998) find positive relationships between the degree of creditor-friendliness of reorganization laws and desirable outcomes such as the size of debt markets. This empirical finding raises two important questions. First, what does bankruptcy law contribute to the efficient implementation of contracts between firms and their lenders that could not be achieved without it? Second, why have many developed countries, such as Germany and Japan, recently introduced reorganization laws that resemble U.S. Chapter 11, which scores among the lowest in the world on these creditor protection indices? The fact that the degree of creditor protection in reorganization law varies widely across countries suggests that the appropriate law, and the appropriate balance of debtor and creditor interests, may depend on extant characteristics of the economy. Indeed, as Hart (2000) notes:

*It is unlikely that “one size fits all.”... Which procedure a country chooses or should choose may then depend on other factors, e.g., the country’s institutional structure and legal tradition. One can also imagine a country choosing a menu of procedures and allowing firms to select among them. It is important to recognize that bankruptcy reform should not be seen in isolation: it may be necessary to combine it with legal and other reforms, e.g., the training of judges, improvements in corporate governance and the strengthening of investor rights, and possibly even changes in the international financial system.*

This paper takes a first step toward formally integrating the design of appropriate bankruptcy procedures<sup>1</sup> into the larger framework of legal institutions and private contractual mechanisms that govern interactions between borrowers and lenders. Recent contributions in the empirical law and finance literature make distinctions between the quality of the legal code and the quality of enforcement, finding that both are important for development. Our paper

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<sup>1</sup>We use the terms “bankruptcy law” and “reorganization law” interchangeably. In doing so, we have in mind laws in which creditor rights are potentially restrained in the effort to preserve the going-concern value of efficient but failed firms.

focuses on the appropriate matching of the bankruptcy code to the quality of enforcement, taking as given that the former is more flexible than the latter.<sup>2</sup> Empirical evidence suggests that legal code is often responsive to exactly these concerns. For example, Pistor, Raiser, and Gelfer (2000) reports significant improvement in shareholder and creditor rights in transition economies during the 1992-1998 period, which they attribute to lawmakers' response to weak shareholder/creditor protection in those countries during the privatization process.

We consider the role of bankruptcy laws as part of an optimal contracting problem between firms and their creditors when contracts are incomplete and laws are imperfectly enforced. While there are many common characteristics that define reorganization laws, we focus on the role of judicial discretion in affecting control rights over the firm's assets. The existing incomplete financial contracting literature starts with the premise that some future states are too difficult to describe adequately in contracts. Furthermore, liquidity constraints in default states can prevent efficient outcomes from arising naturally through ex-post bargaining. Faced with this situation, firms and lenders might write contracts that allocate control rights contingent on imperfect signals, such as cash flows or other describable performance measures (Aghion and Bolton, 1992). In this paper, we consider a different possibility; namely, that contracting parties might prefer to contractually allocate control rights contingent on the report of a third party, which we interpret as a bankruptcy judge. Given that a judge can act on information that arrives after contracts are written, and can make decisions based on "soft" information that is difficult to describe, judicial discretion may enhance the efficiency of contracts.

In adding a new interpretation to the standard incomplete contracting perspective, our model can shed light on important issues surrounding the design of bankruptcy codes. For example, the fact that judges lack the information and incentives available to market participants has been used to argue for mandatory auctions instead of a traditional reorganization procedure (Baird, 1986). In contrast, our model explains why a judicially-administered bankruptcy process might be included as part of an optimal credit contract, even though judges' decisions are subject to bias and/or error. This remains true under the reasonable supposition that judges have inferior information ex-post than both managers and creditors.

More importantly, the fact that bankruptcy judges play an active role in our model allows us to analyze how bankruptcy codes interact with the quality of the judges that enforce them. The lack of adequately trained, specialized bankruptcy judges has been cited as a critical

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<sup>2</sup>To give an example, the Bankruptcy and Composition Act in the Slovak Republic has been amended 14 times in 10 years according to a World Bank/IMF study. The law has added creditor-protection features based on the perception that the law did not provide enough protection previously (Johnson et al. 2002b)

shortcoming in many countries that have attempted bankruptcy reforms (Johnson, 2001, 2002a, 2002b). Our model not only formalizes the notion that judicial expertise matters, but also explains how the bankruptcy code optimally adjusts when it is lacking. When creditors are biased toward liquidation, a bankruptcy law that enables more managers to retain control is preferred from an ex-post perspective. From an ex-ante perspective, however, too much managerial control can be harmful. Creditors rely on the liquidation threat in order to induce repayment, so this threat must be strong enough to encourage lending. We find that implementation of a debtor-friendly code requires sufficient capability on the part of judges to identify viable firms. When judges' ability to separate out viable from non-viable firms is poor, firms prefer a more creditor-friendly law. Given judges' limited capacity, bankruptcy should focus on the more limited task of guaranteeing creditor repayment. As judges' discernment capabilities increase, the efficiency of contracts are enhanced more by debtor-friendly laws which provide greater balance of ex-ante and ex-post considerations.

In the second part of our paper, we give a new interpretation to the standard incomplete contracts assumption that cash flows are not fully "verifiable", which is also based on the quality of the legal environment. The ability of firms to credibly pledge future cash to lenders depends crucially on debt collection laws and the quality of their enforcement. For example, many countries do not have registries for property interests in assets that can be used as collateral, making secured loans based on these assets infeasible. In other legal systems, delays and inefficiencies in the courts make debt collection a costly process. Where these laws are less effective, or do not exist at all, it is harder for lenders to prevent diversion of cash flows to perk projects, inefficient risk-taking activity, or even outright theft.

Our model shows that in countries where debt collection is poor (when the verifiability of cash flows is lower), firms prefer a more creditor-friendly reorganization law. All else equal, the optimal bankruptcy code compensates lenders through control rights within bankruptcy for the difficulty in collecting on their loans outside of bankruptcy. As enforcement of debt contracts improves, focusing on ex-post efficiency is a more feasible goal. We believe we are the first to explicitly consider how bankruptcy laws and their debtor/creditor orientation depend on other features of the legal system and the quality of enforcement.

Our model provides theoretical foundations for several empirical findings in the law and finance literature. La Porta, et. al. (1997, 1998) were the first to proxy for the strength of creditor protection by using indices based on reorganization laws. They find a positive but statistically insignificant relationship between "creditor-friendly" features of bankruptcy codes and the size of debt markets. Our model emphasizes that a higher "creditor rights" score does

not imply a better bankruptcy code; rather, that the right amount of creditor protection in bankruptcy is higher in countries with weak enforcement and an inefficient judiciary. Indeed, this pattern is present in their data: the creditor rights measure is lower on average in richer countries, which tend to have more efficient judicial systems and better enforcement of laws according to a variety of measures. The data suggest that bankruptcy codes in practice reflect some of the efficiency concerns that are present in our model.

Along similar lines, Claessens and Klapper (2002) examine usage rates of bankruptcy laws, finding that a more creditor-friendly code and better enforcement are substitutes in encouraging contracting parties to use the law to resolve distress. In other words, a more debtor-friendly code does not discourage the use of bankruptcy as long as the judiciary is sufficiently skilled. Our model supports this finding, as the necessary amount of creditor-protection required to support lending is increasing in judicial error. Where the code does not provide enough creditor protection to make lending feasible, our model predicts that contracts will be written to resolve distress outside of bankruptcy.

Among the class of models of bankruptcy that address similar issues and/or apply similar approaches are Acharya, John and Sundaram (2004), von Thadden, Berglof and Roland (2003), Povel (1999), and Berkovitch and Israel (1999). Acharya, John and Sundaram (2004) note the distinct differences between U.S. and U.K. bankruptcy law in their debtor/creditor orientation and examine their effects on the ex-post efficiency of bankruptcy outcomes. Firms respond to these potential ex-post inefficiencies through ex-ante adjustments in capital structure. Unlike our model, their model takes bankruptcy codes as given and focuses on optimal contracting. von Thadden, Berglof and Roland (2003), similar to our model, examines the role of bankruptcy in a model of non-verifiable cash flows. Bankruptcy is identified by states in which conflicting claims among multiple creditors are resolved. Unlike our model, they do not consider the role of judicial influence over outcomes, as the optimal bankruptcy procedure would arise from a multilateral private contract without a role for courts. Povel (1999), similar to our model, addresses trade-offs between tough (pro-creditor) and soft (pro-debtor) bankruptcy laws, where the timing of bankruptcy is the critical decision variable, rather than control of assets. Berkovitch and Israel (1999), similar to our model, considers the dependence of optimal bankruptcy laws on the extant environment. In their paper, the difference between systems is modeled by the information structure of lenders rather than the quality of investor protection and enforcement, as we consider here.

Another novel feature of our paper is the explicit modeling of the effects of judicial expertise on ex-ante contracts and ex-post outcomes. Although it has been recognized in the

legal literature (for example, see Miceli, 1990), the role of judicial error has not been widely recognized in the economics and finance literature. Giammarino and Nosal (1996) analyzes one-sided error (the failure to recognize strategic default), finding that it reduces the use of bankruptcy law. Chen and Sundaresan (2003) introduces an imperfect signal regarding firm’s viability in a continuous time model of bankruptcy, upon which the judge decides when to reorganize or to liquidate via Bayesian updating. The result of their model show that debt contracting may take form of Chapter 11, private workouts or liquidation depending on the parameters of the model.

The paper proceeds as follows. In Section 2, we introduce the formal model and solve for an optimal contract when third-party discretion is not available. In Section 3, we add the role of the bankruptcy judge, clarifying the value of judicial discretion and how the optimal bankruptcy code varies with the legal environment. In Section 4, we discuss extensions to the model, including inefficient continuations, multiple creditors, and the optimal scope of bankruptcy. Section 5 concludes.

## 2 The Base Model: Out-of-Court Distress Resolution

### 2.1 Model Setup

We consider an economy similar to Bolton and Scharfstein (1996), in which cash flows from investment projects can be (partially) diverted by borrowers, making the threat of liquidation necessary to enforce repayment. The risk-neutral manager of each firm owns a two-period investment project, which requires an outlay of  $K$  at an initial date 0 for the purchase of a physical asset. The firm is wealthless and borrows  $I \geq K$  from a lender operating in a competitive credit market. To keep the analysis simple, we will restrict attention to a single creditor; we will discuss how multiple creditors can affect the outcome in Section 4.

At date 1, the project produces a random cash flow of  $x$  with probability  $\theta$  or zero with probability  $1 - \theta$ . As in the Bolton/Scharfstein framework, we assume that both the first period and the second period cash flows are observable to both parties but are (partially) non-verifiable to the third party. This can result from managerial perquisite consumption or direct expropriation of cash flows. In either case, we expect that the amount of cash flows that can be pledged to creditors will depend, at least in part, on the quality of legal enforcement. In the base model, we assume that all cash flow is non-verifiable; we consider partial verifiability in Section 3.

In this setting, contracts can not be based on realized cash flows but are instead based

on payments made by the firm. The optimal contract specifies that if the firm admits to the high cash flow, it makes a payment  $R_x$ , and the creditor takes control of the assets with probability  $\beta_x$ . If the firm claims instead that cash flow is low, it repays  $R_0$ , and the creditor takes control with probability  $\beta_0$ . Since the creditor acts competitively, the manager makes a take-it-or-leave-it offer of a contract  $\{I, R_x, R_0, \beta_x, \beta_0\}$  to the creditor at date zero.

Since cash flows are not verifiable, the firm can choose whether or not to repay  $R_x$  when cash flow is  $x > R_x$ . If cash flow is zero, of course, the firm must default on its debt. We use the standard terminology of *strategic default* to refer to the situation in which the firm has cash but chooses not to repay, and *liquidity default* to refer to the situation in which the firm cannot repay because cash flow is low.

To make the role of reorganization law non-trivial, we depart from the Bolton/Scharfstein framework in adding uncertainty about the going-concern value of the firm at date 1. The continuation and liquidation values of the firm after date 1 depends on a random state of nature  $\tilde{\nu} \in \{\nu_g, \nu_b\}$  which is not realized until after the first period cash flow is realized. The state is observable to the manager and the creditor, but is not (perfectly) verifiable. With probability  $\varphi$ , the firm's assets are worth more in the hands of its existing manager, who can generate gross value  $y < x$  by running the firm through date 2. When the existing manager is efficient ( $\tilde{\nu} = \nu_g$ ), creditors can generate  $\gamma y$ , where  $0 < \gamma < 1$ , through a liquidation. Liquidation could entail a piece-meal sale of the firm's assets to an outsider, or a sale as a going concern to an outside manager who is not wealth-constrained. With probability  $1 - \varphi$ , the existing manager is inefficient ( $\tilde{\nu} = \nu_b$ ) and can generate only  $\gamma y$  by running the firm himself, while the outside buyer can generate  $y$  with the assets<sup>3</sup>. After period two, no fixed assets remain in the firm and the game ends. The timing of the game is represented graphically in Figure 1.

It is important to note that throughout the model, we assume that efficient renegotiation always takes place between the contractual owner of the assets and the buyer. The outside buyer is not wealth constrained; thus, when the outsider is efficient, he will always buy the firm, from either the creditor or the inefficient manager. Ex-post inefficiency only occurs, then, if the existing manager is efficient but wealth-constrained and loses control of the assets (in the base case, with probability  $\beta_0 > 0$  conditional on failing). If this occurs, the creditor will prefer to sell to the inefficient outside buyer who can offer the largest price for the assets. This assumption leads to a departure from the existing bankruptcy literature in that inefficient

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<sup>3</sup>The assumption that the efficient manager always generates  $y$  and the inefficient manager always generates  $\gamma y$  makes the exposition simpler without affecting any of the main results.

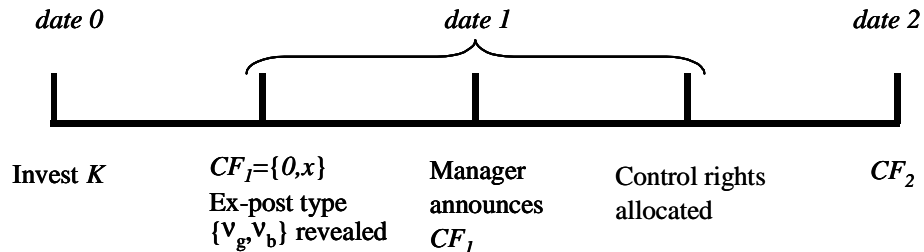


Figure 1: Timing of the Game

*liquidations* will occur, but inefficient *continuations* will not. We have solved the model with inefficient continuations and our results do not depend on the difference; we discuss this more formally in Section 4.

We also assume that the owner has all the bargaining power with respect to the buyer, and thus makes a take-it-or-leave-it offer for ownership of the assets. In an earlier version of the paper, we solved the model under a general division of bargaining power; this adds some complexity but does not affect the main conclusions.

The key assumptions driving the model are that the state (the ex-post firm type) is observable at date 1, but is sufficiently complex that it cannot be described in a contract written at date 0. This contractual incompleteness, combined with the potential ex-post inefficient liquidation of the firm's assets due to managerial wealth-constraints, can give rise to a role for courts. For now, we consider out-of-court distress resolution, which does not involve intervention by third-parties in contracts.

## 2.2 The Optimal Contract

The optimal contract uses the threat of liquidation to encourage the manager to repay. After the firm's announcement of the first period cash flow, the creditor receives the contractually-specified payment and liquidates the project with the ex-ante contracted probability.

In order to induce the manager to make payments in the first period upon realizing cash flow  $x$ , the manager's incentive-compatibility constraint must be satisfied. Given that the manager sees his type before deciding whether or not to repay, there are two relevant constraints, one for the good manager and one for the bad. In the out-of-court solution, however, the two constraints are the same:

$$x - R_x + (1 - \beta_x)y \geq x - R_0 + (1 - \beta_0)y$$

For both the good and the bad manager, conditional on first period success (a realization of  $x$ ), he may either report truthfully and pay  $R_x$ , which entitles the manager to keep the asset with probability  $(1 - \beta_x)$ , or report falsely and repay  $R_0$ , which results in keeping the asset with probability  $(1 - \beta_0)$ . For either manager, control of the asset results in a payoff of  $y$ , since the inefficient manager can sell the asset for  $y$  to the (efficient) outside buyer, while the efficient manager can continue to run the firm.

It must be the case that the repayment when the low cash flow is claimed is zero ( $R_0 = 0$ ), since the manager is wealthless and  $R_0 < 0$  is strictly suboptimal. In addition, contracts can never be improved by setting  $\beta_x > 0$ , since an equivalent contract can always be found that sets  $\beta_x = 0$  with a higher  $R_x$ . We thus assume  $\beta_x = 0$ . The incentive compatibility constraint for both types can be simplified to

$$R_x \leq \beta_0 y$$

Following a success, both types will repay at most what they would lose by defaulting, and the incentive constraints will bind at an optimum. Plugging  $R_x = \beta_0 y$  into the firm's ex-ante expected profit yields the following expression:

$$\Pi_F = \theta x + (1 - \beta_0)y + I - K$$

and the creditor's ex-ante expected profit is

$$\Pi_C = \theta \beta_0 y + (1 - \theta)\beta_0\{\varphi \gamma y + (1 - \varphi)y\} - I$$

The optimal contract is the one which maximizes the firm's expected profit subject to the creditor's participation constraint  $\Pi_C \geq 0$  and the project feasibility constraint  $I \geq K$ .<sup>4</sup> The resulting optimal contract is summarized in the following lemma.

**Lemma 1** *An optimal contract  $\{I, R_x, \beta_x, R_0, \beta_0\}$  is given by  $I = K$ ,  $R_x = \beta_0 y$ ,  $\beta_x = 0$ ,  $R_0 = 0$ , and  $\beta_0 = \frac{K}{\theta y + (1 - \theta)[\varphi \gamma y + (1 - \varphi)y]}$ .*

The proof follows the logic in Bolton and Scharfstein (1996) and is thus omitted. The numerator of  $\beta_0$  is the initial investment made by the creditors, and the denominator is the expected return to the creditor per unit of control rights. For future reference in the following

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<sup>4</sup>In the base model,  $I = K$  is optimal because a lower  $I$  allows for a lower  $\beta_0$ , which is strictly preferred. In Section 5, however, with the introduction of the inefficient continuation, allowing for  $I > K$  can be welfare-improving.

sections, the total surplus can be evaluated by summing the firm and the creditor’s payoffs, which is given by

$$\Pi_S = \Pi_F + \Pi_C = \theta x + y - K - \beta_0(1 - \theta)\varphi(1 - \gamma)y$$

The first three terms represent the net present value of the project, and the last term represents the efficiency loss when the physical asset goes to the inefficient outside buyer following a liquidity default. Total surplus, as well as the firm’s equilibrium profit, is strictly decreasing with the liquidation probability  $\beta_0$ .

Note also that the creditor and the firm will not agree to continuation upon liquidity default even if the existing manager is known to be efficient; in other words, the creditor has an inherent *liquidation bias* relative to ex-post efficiency. This ex-post debtor/creditor conflict stems from the non-verifiability of the second period cash flow, in that the second period cash flow cannot be pledged by the financially distressed manager in return for the continuation of the project. Upon letting the efficient manager continue the project, the creditor will receive zero payment at date 1, and also zero payment at date 2. On the other hand, if the creditor liquidates the project, he can receive a positive amount from the sale of the physical asset, even though the asset ends up in the hands of the inefficient outside buyer.

We now proceed to analyze the role of bankruptcy courts, which can condition control rights on (noisy) ex-post information about the manager’s quality. The goal of the court is to increase the efficiency of contracts by liquidating inefficient firms while preventing liquidation of efficient managers who are liquidity constrained. As we will see, however, this may exacerbate the tendency of managers to strategically default, and can damage lending markets when the law does not provide sufficient creditor protection.

## 3 Distress Resolution in Bankruptcy

### 3.1 Setup and Optimal Reorganization Law

In our model, the fundamental difference between reorganization law and out-of-court distress resolution is the presence of a third-party (a judge or administrator) who is given the power to condition outcomes on information available when the firm defaults. This additional flexibility relative to out-of-court distress resolution can result in benefits to using reorganization law. At this stage, we should emphasize that although we interpret our third-party decision-makers as bankruptcy judges, our model does not seek to address whether the reorganization procedure should be administered by the state or run privately. Indeed, private third-party arbitrators

may serve a role similar to bankruptcy judges if given the legal authority to do so; this decision involves its own costs and benefits<sup>5</sup>. Instead, we take as given that the distinction between the reorganization procedure and the out-of-court workout alternative is the presence or absence of third-party discretion, since this is usually the case in practice.

Bankruptcy in this model involves two factors: a judge, who gathers and reports information about the firm's quality, and the bankruptcy code, which translates the judge's information and the manager's report into probabilities that the creditor is given control rights. We assume that at date 1, the judge issues a report  $\tilde{s} \in \{s_g, s_b\}$  regarding the manager's ex-post type. In terms of notation, a bankruptcy code is a choice of two creditor control probabilities  $\{\beta_g, \beta_b\}$  which depend on the judge's report.<sup>6</sup> For simplicity, we assume that bankruptcy is costless, but the manager prefers to avoid court when he is indifferent.

Given that the ex-post firm type is observable to the creditor and firm at date 1, but both parties have an incentive to mislead the court, we expect that an information revelation process would produce imperfect information about the firm's viability. We also might expect that judges can be biased in favor of one party and will skew their reports toward managers or creditors. To model the potential fallibility and/or bias of the judge, we assume he reports an imperfect signal regarding the manager's type, where the signal of the manager being a good type,  $s_g$ , is more likely when the manager is efficient, and vice versa<sup>7</sup>:

$$\begin{aligned} \Pr(\tilde{s} = s_b | \tilde{\nu} = \nu_g) &= \alpha_1 & \Pr(\tilde{s} = s_g | \tilde{\nu} = \nu_g) &= 1 - \alpha_1 \\ \Pr(\tilde{s} = s_g | \tilde{\nu} = \nu_b) &= \alpha_2 & \Pr(\tilde{s} = s_b | \tilde{\nu} = \nu_b) &= 1 - \alpha_2 \end{aligned}$$

This setup is flexible enough to incorporate both judgment error and bias. For example, a perfectly informed judge with a bias in favor of creditors may always report the low signal when it occurs, and report the high signal probabilistically when the manager is good. This would imply that  $\alpha_2 = 0$  and  $\alpha_1 > 0$ . We assume that the judge's signal is always partially but not fully informative; i.e.  $0 < \alpha_1 < \frac{1}{2}$  and  $0 < \alpha_2 < \frac{1}{2}$ . As before, the optimal contract allows the manager to keep full control of the assets if  $R_x$  is paid in the first period, and to file

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<sup>5</sup>An effective law will require that the creditor has the power to forcibly remove the assets from the manager when the third party reports a negative signal; whether states should allow private enforcement of this type is beyond the scope of this paper.

<sup>6</sup>We continue to assume, since it is without loss of generality, that the liquidation probabilities are zero when the firm repays.

<sup>7</sup>It is without loss of generality that we assume one judge type  $\{\alpha_1, \alpha_2\}$ . One can show that dispersion among judges does not affect our results about the optimal design of the code. Thus, the  $\alpha_1, \alpha_2$  can be interpreted as average error probabilities across varying judge types.

for bankruptcy if  $R_0 = 0$  is paid. Also following the prior section, the optimal contract is determined by the maximization of firm profit subject to the creditor's participation constraint, i.e.  $\Pi_C \geq 0$ , the feasibility constraint  $I \geq K$ , and the managers' incentive compatibility constraints. Unlike the previous section, however, the incentive compatibility constraints now depend on the manager's type. The efficient manager's incentive constraint is given by

$$x - R_x + y \geq x + (1 - \alpha_1)(1 - \beta_g)y + \alpha_1(1 - \beta_b)y$$

If the manager repays  $R_x$ , he receives the period two cash flow  $y$  with certainty. If he defaults, he gets  $y$  only if he is allocated control rights by the court; this occurs with probability  $(1 - \beta_g)$  when the judge reports the positive signal, and with probability  $(1 - \beta_b)$  when the judge reports the negative signal.

The incentive compatibility constraint for the efficient manager reduces to

$$R_x \leq \bar{\beta}_{\alpha_1} y$$

where  $\bar{\beta}_{\alpha_1} = (1 - \alpha_1)\beta_g + \alpha_1\beta_b$  is the "true" creditor control probability for the efficient manager. Similarly, the incentive constraint for the ex-post inefficient manager is given by

$$x - R_x + y \geq x + \alpha_2(1 - \beta_g)y + (1 - \alpha_2)(1 - \beta_b)y$$

which reduces to

$$R_x \leq \bar{\beta}_{\alpha_2} y$$

where  $\bar{\beta}_{\alpha_2} = \alpha_2\beta_g + (1 - \alpha_2)\beta_b$  is the "true" creditor control probability for the inefficient manager.

In this setup, it can be shown that the optimal contract elicits different repayments from the efficient and inefficient manager. In the out-of-court case, both managers have the same incentive to repay conditional on success because either type can generate  $y$  dollars in period two (the efficient manager by running the firm, the inefficient manager from selling it). Since the liquidation penalty from defaulting is the same ( $\beta_0$ ), the incentives to repay are the same for both manager types. When courts are involved, however, the optimal bankruptcy code is more lenient on the efficient manager. Anticipating this, the efficient manager will be less willing to repay for a given  $R_x$ . In order to separate the types, the optimal contract allows the good manager to strategically default in equilibrium. Thus, the attempt to preserve viable firms has an important adverse consequence; namely, that ex-ante moral hazard problems will increase among the firms the law attempts to treat leniently ex-post.

The moral hazard effect caused by the soft treatment in bankruptcy emphasizes an important aspect of bankruptcy law design that has been recognized in practice, in both corporate and personal laws. For example, in examining the history of the bankruptcy discharge in England, Tabb (1991) emphasizes that pro-debtor changes in bankruptcy laws were continually met by resistance from creditors' interests, who feared pre-bankruptcy misbehavior such as concealing and tunneling of assets. In an attempt to mitigate these concerns, the bankruptcy discharge was originally restricted to merchants, who would presumably benefit most from post-bankruptcy debt relief.<sup>8</sup>

Given that the incentive compatibility constraint for the inefficient manager is binding, which implies  $R_x = \bar{\beta}_{\alpha 2}y$ , the ex-ante expected profit of the firm is the following:

$$\begin{aligned}\Pi_F = & \theta\{x + \varphi(1 - \bar{\beta}_{\alpha 1})y + (1 - \varphi)(y - R_x)\} \\ & + (1 - \theta)\{\varphi(1 - \bar{\beta}_{\alpha 1})y + (1 - \varphi)(1 - \bar{\beta}_{\alpha 2})y\} + I - K\end{aligned}$$

When the manager succeeds in period one and is efficient (which occurs with probability  $\theta\varphi$ ), he defaults strategically and his total payoff is  $x + (1 - \bar{\beta}_{\alpha 1})y + I - K$ . The successful inefficient manager repays, and thus receives  $x - R_x + y + I - K$ , where  $R_x = \bar{\beta}_{\alpha 2}y$  in equilibrium. The failed managers must always default, and thus receive only the initial excess cash  $I - K$  plus their bankruptcy payoffs, which are  $(1 - \bar{\beta}_{\alpha 1})y$  and  $(1 - \bar{\beta}_{\alpha 2})y$  for the efficient and inefficient managers, respectively. Following similar reasoning, the expected creditor profit is given by

$$\Pi_C = \theta\{\varphi\bar{\beta}_{\alpha 1}y + (1 - \varphi)R_x\} + (1 - \theta)\{\varphi\gamma\bar{\beta}_{\alpha 1} + (1 - \varphi)\bar{\beta}_{\alpha 2}\}y - I$$

The total surplus from the contract can be obtained by summing the firm and the creditor expected profit, which reduces to

$$\Pi_S = \theta x + y - K - \bar{\beta}_{\alpha 1}(1 - \theta)\varphi(1 - \gamma)y$$

The total surplus with the bankruptcy court resembles that of the benchmark case without the bankruptcy court. The only difference is the last term in the expression, where the relevant probability  $\beta_0$  in the base case has been replaced with  $\bar{\beta}_{\alpha 1}$ , the true creditor control probability when the manager is efficient. In allowing courts to condition outcomes on new information, the total surplus expression suggests that the firm would like to minimize  $\bar{\beta}_{\alpha 1}$ . Because creditors require control rights in order to be repaid, and because the judge's signal is informative, the optimal code attempts to concentrate creditor control in the bad firms

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<sup>8</sup>Efrat (1999) notes a similar pattern in examining the historical development of Israeli bankruptcy laws.

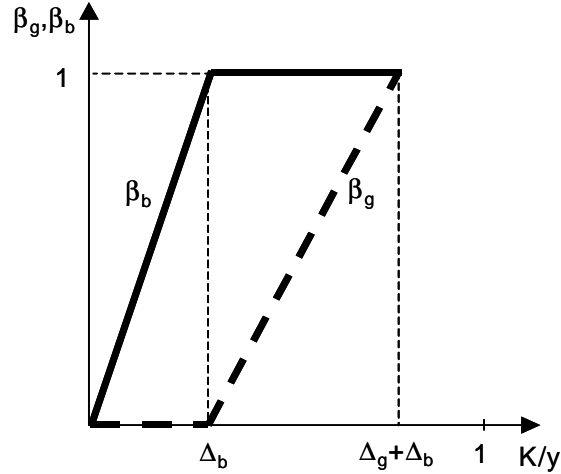


Figure 2: Optimal Liquidation Probabilities as a Function of the Startup Cost

as much as possible. This is accomplished in the optimal contract by setting  $\beta_g$  as low as possible.

When judges make faulty reports, however, the good managers are occasionally seen as bad and vice versa. This reduces the difference between the “true type” control probabilities and makes discrimination between types more difficult, hence  $\beta_g < \bar{\beta}_{\alpha_1}$  and  $\beta_b > \bar{\beta}_{\alpha_2}$ . As we will see, the reduced flexibility of the contract caused by judicial error will result in efficiency losses relative to a perfectly informed and unbiased court. The optimal reorganization law is summarized in the following proposition<sup>9</sup>:

**Proposition 2** *The optimal bankruptcy code sets the probabilities of creditor control upon receiving a good and a bad signal as follows:*

a) For  $K/y \leq \Delta_b$ ,  $\beta_g = 0$  and  $\beta_b = \frac{K/y}{\Delta_b}$ .

b) For  $K/y > \Delta_b$ ,  $\beta_g = \frac{K/y - \Delta_b}{\Delta_g}$  and  $\beta_b = 1$ .

where the coefficients  $\Delta_g$  and  $\Delta_b$  are given by  $\Delta_g = \theta\varphi(1 - \alpha_1) + \theta(1 - \varphi)\alpha_2 + (1 - \theta)\varphi\gamma(1 - \alpha_1) + (1 - \theta)(1 - \varphi)\alpha_2$ , and  $\Delta_b = \theta\varphi\alpha_1 + \theta(1 - \varphi)(1 - \alpha_2) + (1 - \theta)\varphi\gamma\alpha_1 + (1 - \theta)(1 - \varphi)(1 - \alpha_2)$ .

We present the results of the proposition graphically in Figure 2. Intuitively, when the

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<sup>9</sup>For expositional purposes, in defining optimality one may either assume that  $\{\beta_g, \beta_b\}$  are chosen by the manager at time zero and offered along with  $\{I, R_x\}$  as part of an optimal contract that maximizes firm profits, or that a welfare-maximizing social planner chooses and announces  $\{\beta_g, \beta_b\}$  before period zero, understanding how contracts  $\{I, R_x\}$  will respond in equilibrium. The two perspectives are equivalent since creditor profit is always zero in any equilibrium, and in proving the results we adopt the first perspective.

project has a lower startup cost, it is easy to satisfy the creditor’s participation constraint, thus less creditor control rights are necessary. In the low  $K$  case, the code allows all managers receiving the good signal to maintain control, and gives creditors control with positive probability upon receiving the bad signal. For high startup cost projects, the optimal code necessarily becomes more pro-creditor: creditors take control whenever a bad signal is reported and managers with good signals retain control only probabilistically.

Comparing the total surplus for both the out-of-court and the bankruptcy solutions, the following conclusion can be made:

**Lemma 3** *If access to the court is costless, then  $(\Pi_S)^C > (\Pi_S)^{NC}$ , where  $(\Pi_S)^C$  is the total surplus under the optimal reorganization law and  $(\Pi_S)^{NC}$  is the total surplus under the optimal out-of-court contract.*

This result follows from the fact that the court-based procedure allows for greater flexibility regarding ex-post decisions that the private solution does not provide. It should be noted that this result holds despite the fact that the bankruptcy judge has inferior information to the contracting parties regarding the cash flow and the manager’s type. Nevertheless, two important conditions are required for the result to hold: the bankruptcy code must be optimally adjusted to reflect the judges’ expected error/bias, and it must also be matched to the firm’s individual characteristics. Because of the inherent difficulties in achieving this in practice, the efficiency of bankruptcy procedures is far from guaranteed. We discuss these difficulties and potential remedies in Section 4.

### 3.2 Matching Bankruptcy Laws to Legal Environments

Our analysis to this point has offered a new efficiency-based rationale for the existence of bankruptcy laws, based on the benefits of third-party discretion in completing incomplete debt contracts. The model also establishes the trade-offs involved in choosing the debtor/creditor balance of the bankruptcy code. From an ex-ante perspective, a law that is more pro-creditor is beneficial because lending will not take place without sufficient creditor control rights. Given this perspective, the empirical finding in LaPorta, et. al (1998) that pro-creditor bankruptcy laws predict larger debt markets is sensible. Our analysis also reveals, however, that a law that is too tough on managers entails efficiency losses ex-post due to the creditor liquidation bias. In this respect, the ideal bankruptcy law involves a balancing of managers’ and creditors’ interests, and the optimal balance may vary across countries. In this section, we discuss how this balance depends on the characteristics of the legal environment.

We first examine the impact of judicial ability on the optimal bankruptcy code. Many countries have recently passed bankruptcy laws that allow for significant judicial discretion to affect the balance of power between managers and creditors; for example, Japan's Civil Rehabilitation Law, enacted in 1999, gives judges the ability to dismiss management and lift a stay on debt collection (Wagatsuma, 2001). We would expect that the experience and ability of judges would have an important impact on the efficiency of outcomes. Less obvious, however, is the way the characteristics of the law should optimally adjust to account for judicial ability. The following proposition shows how judicial error affects the optimal bankruptcy code:

**Proposition 4**  $\frac{\partial \bar{\beta}_{\alpha_1}}{\partial \alpha_1} > 0$  and  $\frac{\partial \bar{\beta}_{\alpha_1}}{\partial \alpha_2} > 0$ ; as judges' reports become more accurate (less accurate), the optimal bankruptcy law becomes more debtor-friendly (creditor-friendly).

Intuitively, the decision to allow good firms to survive over creditor objection brings an ex-post efficiency benefit and a cost, namely that the creditor's participation constraint is more difficult to satisfy. Judicial error, both in favor of managers and in favor of creditors, increases the cost of attempting to save the efficient but unlucky manager. As error of either type increases, keeping  $\bar{\beta}_{\alpha_1}$  (the true creditor control probability of the good types) constant would necessarily require a lower  $\bar{\beta}_{\alpha_2}$ : a greater fraction of bad managers will also retain control. This is not feasible, however, since the creditor's participation constraint would no longer be satisfied. This implies that  $\bar{\beta}_{\alpha_1}$  must rise in order to preserve the creditor's willingness to lend in equilibrium when judicial error of either type is higher.

A related corollary is that total surplus created in the optimal contract decreases with both types of errors ( $\alpha_1$  and  $\alpha_2$ ). Since the optimal code unwinds any bias in the judge's report, both types of error affect the problem in the same way. In the extreme, when judges report only positive signals ( $\alpha_1 = 0$  and  $\alpha_2 = 1$ ), the optimal code sets  $\beta_g = \beta_0$ , the optimal out-of-court liquidation probability. Similarly, when judges report only negative signals ( $\alpha_1 = 1$  and  $\alpha_2 = 0$ ), the code sets  $\beta_b = \beta_0$ . This makes the total surplus the same in both extremes, since  $\bar{\beta}_{\alpha_1} = \beta_0$  in both cases.

Proposition 4, in explicitly linking the bankruptcy code to the judges that enforce it, highlights the limitations in transplanting a legal code such as Chapter 11 when judicial behavior affects its implementation. In Germany, for example, insolvency law amendments made in 1999 give judges discretion to allow managers to remain in control of firms, similar to U.S. Chapter 11. The change has had minimal impact, however, since judges have exhibited a strong preference toward appointing receivers in lieu of maintaining managerial control.<sup>10</sup>

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<sup>10</sup>See Gerard Wynn, "Europe legislates to cut stigma of bankruptcy" at <http://www.reuters.co.uk>, Septem-

### 3.3 Partial Verifiability: The Impact of Debt Collection Laws

We now turn our attention to the effect of contract enforcement on the optimal reorganization law. We assume that a fraction,  $0 < \rho < 1$ , of the first and the second period cash flows are verifiable. The parameter  $\rho$  reflects each country's quality of debt contract enforcement. As enforcement improves, the creditor can claim a larger portion of the manager's future cash flows as payment in lieu of liquidating the project. Concretely, this represents, for example, the legal cost of collecting on unpaid debts through the courts. In the Czech Republic, for example, collecting on unsecured debt claims requires court action to obtain a judgment and an order to sell property. Completion of this process typically takes 2-4 years, during which the value of the debtor's property may deteriorate significantly, limiting creditor recovery (Johnson, 2001). It can also represent the effectiveness of fraudulent conveyance laws that prohibit below-market transfers of assets in an attempt to defraud creditors.

Introducing this parameter allows for a distinction between cash flow rights and control rights and allows us to clarify the role of the judge in bankruptcy. When  $\rho = 0$ , a transfer of control to the manager necessarily carries with it the entire cash flow rights from the second period project, making the two identical. When cash flows are partially verifiable, the judge's role is to confer control rights over the firm's assets to one of the two parties based on the signal he receives about managerial quality. With respect to cash flow rights, we assume that the creditor always has priority over the manager. The creditor maintains the legal right to the entire second period cash flow. He will not receive full repayment, due to the imperfect verifiability, whenever the manager is allocated control by the court.

When  $\rho > 0$ , there are two separate cases to consider, with different sets of constraints. When  $\rho < \gamma$ , the creditor continues to have a liquidation bias when given control: selling the assets to the outsider returns  $\gamma y$ , while leaving the assets with the existing manager returns only  $\rho y$ . For  $\rho > \gamma$ , however, the creditor prefers to allow the manager to retain control as long as he is efficient. We discuss these two cases in turn.

#### 3.3.1 Case 1: Liquidation Bias Persists ( $\rho < \gamma$ )

Following similar arguments as in the previous section, the incentive compatibility condition for the good manager becomes

$$x - R_x + y \geq (1 - \rho)x + (1 - \alpha_1)(1 - \beta_g)(1 - \rho)y + \alpha_1(1 - \beta_b)(1 - \rho)y$$

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If the good manager earns the high cash flow and defaults, he can successfully divert  $(1 - \rho)x$ , and he retains a stake in the second period output  $(1 - \rho)y$  when he is allocated control rights by the bankruptcy court.<sup>11</sup> The constraint reduces to

$$R_x \leq \rho x + \rho y + (1 - \rho)\bar{\beta}_{\alpha 1}y$$

The incentive compatibility condition for the bad manager is

$$x - R_x + y \geq (1 - \rho)x + \alpha_2(1 - \beta_g)(1 - \rho)y + (1 - \alpha_2)(1 - \beta_b)(1 - \rho)y$$

Similar to the good manager case, when the bad manager has cash and defaults, he successfully diverts a fraction  $(1 - \rho)x$ . If he is allocated control by the court, the manager will sell to the outside buyer for  $y$ , of which he is also able to divert a fraction  $(1 - \rho)$ .

This constraint reduces to<sup>12</sup>

$$R_x \leq \rho x + \rho y + (1 - \rho)\bar{\beta}_{\alpha 2}y$$

As before, it can be shown that it is optimal to allow strategic default for the good managers and collect more from the bad managers; thus, only the bad manager's constraint will bind in equilibrium. The ex-ante expected profit of the firm and the creditor are given by

$$\begin{aligned} \Pi_F &= \theta\{\varphi[(1 - \rho)x + (1 - \bar{\beta}_{\alpha 1})(1 - \rho)y] + (1 - \varphi)[x - R_x + y]\} \\ &\quad + (1 - \theta)\{\varphi(1 - \bar{\beta}_{\alpha 1})(1 - \rho)y + (1 - \varphi)(1 - \bar{\beta}_{\alpha 2})(1 - \rho)y\} + I - K \end{aligned}$$

$$\begin{aligned} \Pi_C &= \theta\{\varphi[\rho x + (1 - \bar{\beta}_{\alpha 1})\rho y + \bar{\beta}_{\alpha 1}y] + (1 - \varphi)R_x\} + (1 - \theta)\{\varphi[(1 - \bar{\beta}_{\alpha 1})\rho y + \bar{\beta}_{\alpha 1}\gamma y] \\ &\quad + (1 - \varphi)[(1 - \bar{\beta}_{\alpha 2})\rho y + \bar{\beta}_{\alpha 2}y]\} - I \end{aligned}$$

The total surplus  $\Pi_F + \Pi_C$  reduces to

$$\Pi_S = \theta x + y - K - \bar{\beta}_{\alpha 1}(1 - \theta)\varphi(1 - \gamma)y$$

As can be seen from above, the mathematical form of total surplus is unchanged when cash flows are partially verifiable, and the loss is incurred when the judge rules to liquidate the good manager upon liquidity default. The optimal value of  $\bar{\beta}_{\alpha 1}$  will depend on  $\rho$ , however, because the increased transfer from the firm to the creditor through improved debt collection relaxes the creditor's participation constraint.

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<sup>11</sup>We do not allow the bankruptcy code or the judge's behavior to depend on the collected first period cash flow (either  $\rho x$  or 0), which would amount to perfect verifiability of strategic default given the simple cash flow structure. Though such an assumption does not seem realistic to us, we do not expect that allowing for this would affect Proposition 5.

<sup>12</sup>It is possible to have  $R_x > x$ , because the manager can borrow against the verifiable portion of second period cash flow to repay. The equilibrium  $R_x$  is always feasible for  $x > y$ , which is assumed throughout (and required as part of the solution in Bolton and Scharfstein, 1996).

### 3.3.2 Case 2: No Liquidation Bias ( $\rho \geq \gamma$ )

If second period cash flow is sufficiently verifiable, the creditor's liquidation bias disappears. The creditor, when allocated control, prefers that the liquidity-constrained efficient manager keeps control of the assets rather than selling to the inefficient manager. The manager can credibly promise the creditor  $\rho y > \gamma y$  with a debt contract payable in period two, keeping  $(1 - \rho)y$  for himself.

While the incentive-compatibility constraints remain the same, the firm and creditor profit functions become

$$\begin{aligned} \Pi_F &= \theta\{\varphi[(1 - \rho)x + (1 - \bar{\beta}_{\alpha 1})(1 - \rho)y] + (1 - \varphi)[x - R_x + y]\} \\ &\quad + (1 - \theta)\{\varphi(1 - \rho)y + (1 - \varphi)(1 - \bar{\beta}_{\alpha 2})(1 - \rho)y\} + I - K \end{aligned}$$

$$\begin{aligned} \Pi_C &= \theta\{\varphi[\rho x + (1 - \bar{\beta}_{\alpha 1})\rho y + \bar{\beta}_{\alpha 1}y] + (1 - \varphi)R_x\} + (1 - \theta)\{\varphi[(1 - \bar{\beta}_{\alpha 1})\rho y + \bar{\beta}_{\alpha 1}\rho y] \\ &\quad + (1 - \varphi)[(1 - \bar{\beta}_{\alpha 2})\rho y + \bar{\beta}_{\alpha 2}y]\} - I \end{aligned}$$

Compared to Case 1, the changes to the constraints above occur when the manager is efficient but wealth-constrained, which happens with probability  $(1 - \theta)\varphi$ . All else equal, the firm's profit in this state of the world changes from  $(1 - \bar{\beta}_{\alpha 1})(1 - \rho)y$  to  $(1 - \rho)y$ ; in other words, the manager does not require the judge's approval in order to retain surplus, because the creditor will prefer to grant it voluntarily if the judge does not. The creditor profit in this state changes from  $(1 - \bar{\beta}_{\alpha 1})\rho y + \bar{\beta}_{\alpha 1}\gamma y$  to simply  $\rho y$ ; like the manager, the creditor's payoff also does not depend on the judge.

The total surplus in Case 2,  $\Pi_F + \Pi_C$ , reduces to

$$\Pi_S = \theta x + y - K$$

which clearly is independent of  $\bar{\beta}_{\alpha 1}$  and thus independent of the bankruptcy law in place. In effect, this case returns us to the pure Coasian scenario where control rights in bankruptcy are irrelevant ex-post, since renegotiation can resolve any inefficiencies. All bankruptcy codes that satisfy the creditor's participation constraint are equivalent. This leads us to the following proposition:

**Proposition 5** *For all  $\rho < \gamma$ ,  $\frac{\partial \bar{\beta}_{\alpha 1}}{\partial \rho} < 0$ ; the optimal “debtor-friendliness” of the bankruptcy law depends positively on the degree of enforcement ( $\rho$ ). For  $\rho \geq \gamma$ , the allocation of control rights is irrelevant as long as lending takes place: any  $\{\beta_b, \beta_g\}$  such that  $\Pi_C \geq 0$  achieves the first-best.*

Starting from  $\rho = 0$ , as in the base case, increasing verifiability makes the creditor’s participation constraint easier to satisfy. This means the optimal code can attempt to preserve control for a higher fraction of good managers without sacrificing the creditor’s willingness to lend. This is relevant as long as the creditor’s liquidation bias persists. As  $\rho$  increases beyond a certain limit, however, the court eventually becomes unnecessary. We should point out, however, that a liquidation bias can come from factors other than imperfect enforcement, such as a creditor run (Jackson, 1986) or private benefits (Aghion and Bolton, 1992). We have not addressed such features in this model, hence it would be premature to conclude that bankruptcy is irrelevant in the absence of enforcement problems. We discuss extending the model in this way when we consider multiple creditors in Section 4.

The primary implication of this subsection is that bankruptcy laws should not be studied in isolation; rather, they are part of a package of legal institutions that affect interactions between lenders and borrowers. In environments where debt collection laws and their enforcement differ, the responses to the bankruptcy system may differ greatly. For example, Stromberg (2000) analyzes a cash auction procedure in Sweden, finding that asset “sale-backs” to managers often occur, particularly when asset markets are illiquid (in our model, when  $(1-\varphi)$  is low). Our model suggests that giving creditors control over such a procedure is more likely to be efficient when  $\rho$  is high enough; that is, when laws protect creditors enough such that they prefer a debt contract to a cash sale when insiders are efficient. When  $\rho$  is low, creditor control is more likely to produce inefficient liquidations.

## 4 Extensions

In this section we discuss potential extensions to the model.

### 4.1 Inefficient Continuations

Our model assumes complete information and efficient bargaining between the creditor, manager, and outside buyer. This implies that inefficient continuations do not occur in the model, a feature that is often included in the bankruptcy literature. Thus, the optimal law seeks to allow managerial control as often as possible, subject only to satisfying the creditor’s willingness to lend.

If renegotiation is restricted, such that the inefficient manager can not sell the asset when granted control, he will run the firm inefficiently in period two and produce  $\gamma y$  instead of selling the asset for  $y$ . In this sense, a more debtor-friendly bankruptcy law now has two

costs instead of one: in addition to making creditor repayment more difficult, granting more managerial control in bankruptcy can also lead to ex-post inefficiencies when judges make errors. While the model becomes significantly more complicated analytically, the qualitative results are similar.

To see this concretely, it can be shown that the total surplus created by the contract with inefficient continuations is now the following:

$$\Pi_S^{IC} = \theta x + y - K - \bar{\beta}_{\alpha_1}(1 - \theta)\varphi(1 - \gamma)y - (1 - \bar{\beta}_{\alpha_2})(1 - \theta)(1 - \varphi)(1 - \gamma)y$$

The last term in the expression,  $(1 - \bar{\beta}_{\alpha_2})(1 - \theta)(1 - \varphi)(1 - \gamma)y$ , is the additional cost that follows from granting control to inefficient managers. For a given set of parameters, it is possible to show that the law may or may not become more creditor-friendly when inefficient continuations occur. On one side, the payoff from strategic default for the bad manager is now smaller than before, since he cannot sell the assets for a higher price to an outsider. The weaker motive to default strategically leads to a higher repayment  $R_x$  from bad managers, making lower creditor control probabilities feasible in equilibrium. On the other hand, giving control to bad managers now has an ex-post inefficiency cost, which an optimal contract will attempt to minimize. As a result, one can show that  $\bar{\beta}_{\alpha_1}$  increases with the introduction of inefficient continuations when the probability that the manager is efficient ( $\varphi$ ) is sufficiently small, but decreases for larger  $\varphi$ .

More importantly, however, we can show that Proposition 5 continues to hold<sup>13</sup>; namely, that an optimal law becomes more creditor-friendly as judicial error of either type increases:  $\frac{\partial \bar{\beta}_{\alpha_1}}{\partial \alpha_1} > 0$  and  $\frac{\partial \bar{\beta}_{\alpha_1}}{\partial \alpha_2} > 0$ . Thus, the main intuition in the paper, that debtor-friendly bankruptcy codes require expertise to be feasible, is robust to the possibility of inefficient continuations.

## 4.2 Multiple Creditors

So far, we have only allowed for a single-creditor setup. If the firm has a choice of financing with multiple creditors along with a possibility of bankruptcy, further interaction can be explored between the optimal design of the bankruptcy code and the optimal response of firms to the code.

Suppose the firm can choose to finance with concentrated or dispersed creditors. Following the perspective in Diamond (2004) and von Thadden, Berglof and Roland (2003), dispersed creditors can produce value-destroying runs on the assets if they are left free to exercise their

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<sup>13</sup>Formal proof for this section is available from the authors upon request.

individual collection rights. Relative to concentrated creditors, however, this can be preferred because the creditor race creates a hard budget constraint that increases debt capacity.

We can incorporate this logic into our bankruptcy setting as follows. Suppose, as before, that in bankruptcy the judge reports his signal which translates into a probability that the manager keeps control ( $(1 - \bar{\beta}_{\alpha 1})$  when he is efficient). Managerial control can be interpreted as a court-imposed automatic stay on creditors, with managers retaining the right to propose the reorganization plan subject to a structured bargaining with creditors, as in U.S. Chapter 11. Suppose that if managerial control is allowed, the creditor structure does not affect the outcome. The manager can either run the firm or sell to the outsider in a two-player bargaining game as before. Conversely, when the court allocates control to creditors (in practice, by lifting the automatic stay), then creditor structure can matter. Suppose that instead of the single, outside buyer interpretation, let  $\gamma y$  instead be the breakup value of the firm, realized when dispersed creditors race to collect on their debt. From an ex-post perspective, control rights exercised by concentrated creditors is always preferred to control by dispersed creditors, because they can renegotiate efficiently with managers, who can possibly promise them more if left in control of the firm. From an ex-ante perspective, dispersed creditors are preferred, because committing not to renegotiate can reduce the good manager's payoff from strategic default, thereby increasing repayment.<sup>14</sup>

Recalling our earlier result in the single-creditor setup, when debt contracts are enforced sufficiently well (when  $\rho > \gamma$ ), the optimal bankruptcy code does not require any third-party discretion; the law can do no better than granting creditors control with probability one. This result holds because efficient bargaining will take place between the (single) creditor and the good manager, even when the manager has no wealth. With dispersed creditors, however, this may not be the case. If the judge lifts the stay, giving dispersed creditors the right to collect, a creditor run will yield only the breakup value  $\gamma y$  even though creditors would collectively prefer continuation. Since ex-post efficiency is not guaranteed, this re-introduces a role for judicial discretion. The optimal code will again seek to preserve ex-post efficiency by giving some control rights to managers.

This analysis suggests that a dispersed creditor structure and a debtor-friendly code will be *complements*, as will a concentrated creditor structure and a creditor-friendly code, particularly when debt collection laws are enforced well (when  $\rho$  is high). This logic may explain the significant differences in distress resolution in the U.S. and U.K. systems. While both

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<sup>14</sup>Introducing the ex-ante benefit to multiple creditors would require that the manager retains some bargaining power when creditors are given control rights by the court. It would also require that the good manager repays in equilibrium, which could occur in this modified setup if  $\varphi$  is large enough.

countries have sophisticated debt collection systems in place, the U.K. bankruptcy law takes a more “freedom of contracts” perspective with little judicial intervention, while the U.S. code restricts creditors’ collection efforts in order to preserve going-concern value. As a result, creditor concentration is significantly higher in the U.K., and distress resolution is governed by a process known as the “London Approach”, in which a small group of bank lenders privately arrange a plan for reorganizing or liquidating the firm. The repeated, cooperative nature of the interactions between these banks ensure that destructive runs do not occur<sup>15</sup>. In the U.S., such an approach is rarely feasible, because dispersed bondholders make debt restructuring outside of court supervision difficult (Asquith, Gertner, and Scharfstein, 1994). Creditor dispersion is less costly in the U.S. system, however, because Chapter 11 is oriented toward the preservation of going-concern value in bankruptcy.

### 4.3 Inflexible Laws and the Scope of Bankruptcy

In the basic model, we have implicitly assumed that the bankruptcy law adjusts not only to changes in the legal environment, but also to specific characteristics of each firm that might use it. Based on Proposition 3, it is evident that the optimal debtor/creditor balance of the law depends on ex-ante firm characteristics, such as the startup cost  $K$  and the ex-ante probability of success  $\theta$ , that are unlikely to be taken into consideration by a court in practice. When bankruptcy laws cannot be individually tailored to ex-ante firm characteristics, inefficiencies can result. One immediate implication of our model is that allowing for competing bankruptcy venues can be beneficial, as long as firms can commit to their choice in advance. To some extent, this is the case in the U.S., where venue choice in bankruptcy is essentially limited based on the firm’s location and its state of incorporation. Courts might differentiate themselves along the dimension of debtor/creditor friendliness, allowing firms to choose the procedure that is best tailored to their specific characteristics. Empirical evidence on this subject suggests that the Delaware court has differentiated itself from other courts in providing significantly faster cases, which is particularly valuable to secured creditors (Ayotte and Skeel, 2004).

Even if differentiation by courts were allowed, it is unlikely that each firm will find its own optimal procedure available. In setting a bankruptcy code, a social planner must take into account not only the surplus created by the firms that use the law, but also the surplus on firms that choose to avoid it. If the parties can effectively “contract out” of bankruptcy, as is often the case in practice, they may attempt to commit to arrangements that avoid the courts

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<sup>15</sup>For a more elaborate analysis of U.K. bankruptcy laws and its relationship to equity and debt concentration, as well as a description of the London Approach, see Armour, Cheffins, and Skeel (2002).

when the law is not appropriately matched to the firm<sup>16</sup>.

Suppose, for simplicity, that firms are the same along all dimensions except their startup cost  $K \in \{K_L, K_H\}$ ,  $K_L < K_H$ , which is unobservable to judges when a firm lands in bankruptcy court. Given Proposition 3, the optimal debtor-friendliness of the bankruptcy code for the high-cost type, ( $K_H$ ) will be lower than the optimal debtor-friendliness for the low-cost type ( $K_L$ ), i.e.  $\bar{\beta}_{\alpha 1}^*(K_H) > \bar{\beta}_{\alpha 1}^*(K_L)$ . Furthermore, since the creditor earns exactly zero profit on the low cost firm under its optimal bankruptcy code, this implies that the creditor will refuse to finance the high-cost firm under this same code unless bankruptcy can be avoided. The creditor and the high-cost firm might instead agree to a no-court contract that is tougher on the manager in default, but does not involve judicial discretion.

Analyzing this case, it is possible to show that one of two outcomes is optimal from a social planner’s perspective. The social planner may either choose a more *creditor-friendly law* ( $\bar{\beta}_{\alpha 1}^*(K_H)$ ) that has a *broad scope* (both types use the law to resolve distress) or a more *debtor-friendly law* ( $\bar{\beta}_{\alpha 1}^*(K_L)$ ) with a *narrow scope* (only the low-cost firm uses the law, and the high-cost firm resolves distress out of court). From Proposition 5, we know that  $\bar{\beta}_{\alpha 1}^*(K_H)$  is increasing in both types of judicial error. Thus, if the law is designed to be used widely, it must provide enough creditor protection to be used, which is greater when judicial experience is low. Based on this analysis, our model predicts that usage of reorganization law will be especially low in countries with poor legal development combined with low creditor protection in bankruptcy. This is exactly the finding reported in Claessens and Klapper (2002): the usage rate of reorganization law is increasing with the pro-creditor features of bankruptcy, and is increasing in the efficiency of the judiciary. The interaction between these terms is significantly negative, implying that the two variables are substitutes in encouraging bankruptcy usage.

## 5 Conclusions

The goal of this paper is to examine the ways in which optimal bankruptcy laws depend on the legal environment, specifically on the quality of contract enforcement and the experience and ability of judges. Empirical literature in law and finance increasingly recognizes a distinction between the quality of the legal code and the quality of enforcement, both of which have beneficial effects on development. Our model takes this issue a step further in demonstrating

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<sup>16</sup>Examples of this include equity-based contracts, as in venture capital, with state-contingent board rights (Smith and Stromberg, 2004); asset-backed securities which are “bankruptcy remote”; appointment of a floating charge holder in a U.K. based system; and use of secured credit under laws that do not subject secured creditors to an automatic stay.

that these factors are not independent. The creditor protection features of bankruptcy laws are more important when enforcement quality and judicial experience are low. As these factors improve, the law can take a more debtor-friendly approach in allowing “honest but unlucky” managers to remain in control of their firms, preventing inefficient liquidations that would otherwise occur.

In a more general sense, our model explains why a court-based bankruptcy procedure can add value to contracts when private liquidation procedures are also available. Contracting parties anticipate that creditors will have an ex-post liquidation bias, which occurs in our model because future cash flows are difficult to verify. The creditor, if given control, would prefer to sell the assets to a less efficient manager who is not wealth constrained. If a third party, such as a judge, can verify the manager’s quality with some regularity, the court can “complete an incomplete contract” by allowing managers to keep the firm’s assets when they are identified as efficient. Doing so, of course, can be costly. Allowing managers to retain control of assets weakens creditors’ desire to fund new projects. If the bankruptcy law is too debtor-friendly; i.e. creditors are not given sufficient liquidation rights, our model suggests that more firms will write contracts that avoid the law and rely on less flexible private mechanisms. Thus, we expect that debtor-friendly laws will be counterproductive in countries where investor protection is poor, but can be effective in countries with better investor protection and more effective courts.

For future research, one important issue we have not examined in depth is the political forces that affect the choice of bankruptcy laws. While we expect that the laws in place will reflect efficiency concerns to some degree, there are obviously more factors at work, including interest group politics, the effect of competition among competing states, and potentially the country’s legal origin. An interesting question in this regard is whether common law systems, which rely heavily on judicial interpretation and precedent, are more effective at producing convergence toward optimality compared to civil law systems which rely more heavily on legal code.

## 5.1 Proofs of Lemmas and Propositions

**Proposition 2** *The optimal bankruptcy code sets the probabilities of creditor control upon receiving a good and a bad signal as follows:*

a) *When  $K/y < \Delta_b$ ,  $\beta_g = 0$  and  $\beta_b = \frac{K/y}{\Delta_b}$ .*

b) *When  $K/y > \Delta_b$ ,  $\beta_g = \frac{K/y - \Delta_b}{\Delta_g}$  and  $\beta_b = 1$ .*

*where the coefficients  $\Delta_g$  and  $\Delta_b$  are given by  $\Delta_g = \theta\varphi(1 - \alpha_1) + \theta(1 - \varphi)\alpha_2 + (1 - \theta)\varphi\gamma(1 -$*

$\alpha_1) + (1 - \theta)(1 - \varphi)\alpha_2$ , and  $\Delta_b = \theta\varphi\alpha_1 + \theta(1 - \varphi)(1 - \alpha_2) + (1 - \theta)\varphi\gamma\alpha_1 + (1 - \theta)(1 - \varphi)(1 - \alpha_2)$ .

**Proof.** We first demonstrate that solving the manager's problem is equivalent to solving a social planner's problem. First, for any contract that satisfies  $\Pi_C \geq 0$ , total surplus  $\Pi_C + \Pi_F$  is given by

$$\Pi_S = \theta x + y - K - \bar{\beta}_{\alpha_1}(1 - \theta)\varphi(1 - \gamma)y$$

$\theta x + y - K$  is the surplus created when ex-post efficiency obtains. Ex-post efficiency will occur if the manager has cash or if he is inefficient. It will fail to occur only if the existing manager is efficient but wealth-constrained and the creditor is allocated control, which occurs with probability  $\bar{\beta}_{\alpha_1}(1 - \theta)\varphi$  and produces an expected loss of  $(1 - \gamma)y$ . Since credit markets are competitive,  $\Pi_C = 0$  in any equilibrium where the firm receives financing.  $\Pi_C < 0$  is not feasible, and if  $\Pi_C > 0$ , the manager would simply demand higher  $I$  which does not affect any other constraint. Hence  $\Pi_S = \Pi_F$ . Thus, the manager's problem is equivalent to maximizing  $\Pi_S$ , which is equivalent to minimizing  $\bar{\beta}_{\alpha_1}$ , subject to  $\Pi_C = 0$ .

We next find the optimal  $R_x$ . Recall that the incentive compatibility constraints for the efficient and inefficient managers (call these Good IC and Bad IC) are  $R_x \leq \bar{\beta}_{\alpha_1}y$  and  $R_x \leq \bar{\beta}_{\alpha_2}y$  respectively. It is straightforward to verify that the optimal  $R_x \geq \max\{\bar{\beta}_{\alpha_1}y, \bar{\beta}_{\alpha_2}y\}$ , since  $\Pi_C$  is increasing in  $R_x$  for all  $R_x < \max\{\bar{\beta}_{\alpha_1}y, \bar{\beta}_{\alpha_2}y\}$ . Thus for any contract such that  $\Pi_C = 0$  and  $R_x < \max\{\bar{\beta}_{\alpha_1}y, \bar{\beta}_{\alpha_2}y\}$ , a second contract can be found with lower  $\bar{\beta}_{\alpha_1}$  and higher  $R_x$  that also satisfies  $\Pi_C = 0$ . Without loss of generality, we assume  $R_x = \max\{\bar{\beta}_{\alpha_1}y, \bar{\beta}_{\alpha_2}y\}$ . If  $R_x > \bar{\beta}_{\alpha_1}y$  ( $R_x > \bar{\beta}_{\alpha_2}y$ ), which occurs when  $\beta_g < \beta_b$  ( $\beta_g > \beta_b$ ), then the good (bad) type defaults in equilibrium. In either scenario, plugging in the optimal  $R_x$ , the creditor IR reduces to

$$\Pi_C = \beta_g y \cdot \Delta_g + \beta_b y \cdot \Delta_b - I = 0$$

In maximizing  $\Pi_S$  subject to  $\Pi_C = 0$ , it is clear that minimizing  $\beta_g$  is always optimal, since  $\frac{(1 - \alpha_1)}{\alpha_1} > \frac{\Delta_g}{\Delta_b}$ . Thus  $\beta_g \leq \beta_b$ , the manager offers repayment  $R_x = \bar{\beta}_{\alpha_2}y$ , and when the inequality is strict, the good manager defaults in equilibrium.

From the expression of  $\Pi_C$  above, it is also straightforward to see that  $I = K$  at an optimum. For any contract such that  $I > K$ , the manager can always find an alternative contract such that  $I = K$  with lower  $\bar{\beta}_{\alpha_1}$  that also satisfies  $\Pi_C = 0$ , which increases  $\Pi_S$ .

Substituting in  $I = K$ , and the bad manager's IC into the creditor IR and rearranging gives

$$\beta_g \cdot \Delta_g + \beta_b \cdot \Delta_b - K/y = 0$$

When  $\frac{K/y}{\Delta_b} \leq 1$ , it is feasible to set  $\beta_g = 0$  and the corresponding value of  $\beta_b$  that satisfies the creditor IR is  $\frac{K/y}{\Delta_b}$ . When  $\frac{K/y}{\Delta_b} > 1$ ,  $\beta_g = 0$  is not feasible for any  $\beta_b \leq 1$ , hence  $\beta_g$  is

minimized by setting  $\beta_b = 1$ , and the corresponding value of  $\beta_g$  that satisfies the creditor IR is  $\frac{K/y - \Delta_b}{\Delta_g}$ . ■

**Lemma 3** *If access to the court is costless, then  $(\Pi_S)^C > (\Pi_S)^{NC}$ , where  $(\Pi_S)^C$  is the total surplus under the optimal reorganization law and  $(\Pi_S)^{NC}$  is the total surplus under the optimal out-of-court liquidation policy; i.e. the optimal bankruptcy code generates strictly greater surplus than the optimal out-of-court solution.*

**Proof.** Since the total surplus created by the contracts in the court and the non-court cases are  $\Pi_S^{Court} = \theta x + y - K - \bar{\beta}_{\alpha_1}(1 - \theta)\varphi(1 - \gamma)y$  and  $\Pi_S^{NoCourt} = \theta x + y - K - \beta_0(1 - \theta)\varphi(1 - \gamma)y$  respectively, we get  $\Pi_S^{Court} - \Pi_S^{NoCourt} = (\beta_0 - \bar{\beta}_{\alpha_1})(1 - \theta)\varphi(1 - \gamma)y$  which is positive if and only if  $\beta_0 - \bar{\beta}_{\alpha_1} > 0$ . Using the results from Propositions 1 and 2, combined with some tedious algebra, it can be shown that  $\bar{\beta}_{\alpha_1} < \beta_0$  for any permissible parameter values. ■

**Proposition 4**  *$\frac{\partial \bar{\beta}_{\alpha_1}}{\partial \alpha_1} > 0$  and  $\frac{\partial \bar{\beta}_{\alpha_1}}{\partial \alpha_2} > 0$ ; as judges reports becomes more accurate (less accurate), the optimal bankruptcy law becomes more debtor-friendly (creditor-friendly).*

**Proof.** There are two relevant cases, (i)  $\frac{K}{y} \leq \Delta_b$ , and (ii)  $\frac{K}{y} > \Delta_b$ . For case (i),

$$\frac{\partial \bar{\beta}_{\alpha_1}}{\partial \alpha_1} = \frac{(1 - \alpha_2)(1 - \varphi)}{\Delta_b^2}(K/y) > 0$$

$$\frac{\partial \bar{\beta}_{\alpha_1}}{\partial \alpha_2} = \frac{\alpha_1(1 - \varphi)}{\Delta_b^2}(K/y) > 0$$

For case (ii), i.e.  $\frac{K}{y} > \Delta_b$ ,

$$\frac{\partial \bar{\beta}_{\alpha_1}}{\partial \alpha_1} = \frac{\alpha_2(1 - \varphi)}{\Delta_g^2}\{\Delta_g + \Delta_b - K/y\} > 0$$

and

$$\frac{\partial \bar{\beta}_{\alpha_1}}{\partial \alpha_2} = \frac{(1 - \alpha_1)(1 - \varphi)}{\Delta_g^2}\{\Delta_g + \Delta_b - K/y\} > 0$$

which are positive if and only if  $\Delta_g + \Delta_b - K/y > 0$ . Examining the creditor IR in Proposition 2 reveals that this will be true for all feasible projects, i.e. projects that satisfy  $\Pi_C \geq 0$  for some  $0 \leq \beta_g, \beta_b \leq 1$ . ■

**Proposition 5** *For all  $\rho < \gamma$ ,  $\frac{\partial \bar{\beta}_{\alpha_1}}{\partial \rho} < 0$ ; the optimal “debtor-friendliness” of the bankruptcy law depends positively on the degree of enforcement ( $\rho$ ). For  $\rho \geq \gamma$ , the allocation of control rights is irrelevant: any  $\{\beta_b, \beta_g\}$  such that  $\Pi_C \geq 0$  achieves the first-best.*

**Proof.** Consider first the case where  $\rho < \gamma$ . Using an argument similar to the one in Proposition 2, it can be shown that the manager’s maximization problem is equivalent to

maximizing total surplus subject to the creditor IR. Again, for any contract such that  $\Pi_C \geq 0$ , total surplus is given by

$$\Pi_S = \theta x + y - K - \bar{\beta}_{\alpha_1}(1 - \theta)\varphi(1 - \gamma)y$$

and the manager's problem reduces to minimizing  $\bar{\beta}_{\alpha_1}$  subject to  $\Pi_C = 0$ . Also using similar arguments to Proposition 2, the optimal repayment  $R_x$  is set so that the Bad IC is binding; this now is given by  $R_x = \rho(x + y) + (1 - \rho)\bar{\beta}_{\alpha_2}y$ . The optimal bankruptcy code minimizes  $\beta_g$  subject to  $\Pi_C = 0$ . Substituting into the creditor's profit function yields

$$\begin{aligned} \Pi_C = & \theta\{\varphi[\rho x + (1 - \bar{\beta}_{\alpha_1})\rho y + \bar{\beta}_{\alpha_1}y] + (1 - \varphi)[\rho(x + y) + (1 - \rho)\bar{\beta}_{\alpha_2}y]\} \\ & + (1 - \theta)\{\varphi[(1 - \bar{\beta}_{\alpha_1})\rho y + \bar{\beta}_{\alpha_1}\gamma y] + (1 - \varphi)[(1 - \bar{\beta}_{\alpha_2})\rho y + \bar{\beta}_{\alpha_2}y]\} - I \end{aligned}$$

Differentiating this expression and some algebraic manipulation can show that, for a given  $\{\beta_g, \beta_b\}$  pair,  $\frac{\partial \Pi_C}{\partial \rho} > 0$  and  $\frac{\partial \Pi_C}{\partial \beta_g}, \frac{\partial \Pi_C}{\partial \beta_b} > 0$  for all  $\rho < \gamma$ .

Looking at this expression, it is clear that  $I = K$  at an optimum. If  $I > K$  for some feasible  $\{\beta_g, \beta_b\}$ , we can always find some  $\{\beta'_g, \beta'_b\}$  also satisfying  $\Pi_C \geq 0$  such that  $\beta'_g \leq \beta_g$  and  $\beta'_b \leq \beta_b$  (with one of the inequalities holding strictly), which reduces  $\bar{\beta}_{\alpha_1}$  and hence increases  $\Pi_S$ .

Suppose we are at an optimum for a given set of parameters and holding  $\{\beta_g, \beta_b\}$  fixed, consider a small positive change in  $\rho$  (with a corresponding change in  $R_x$ ). All else equal, this implies that  $\Pi_C > 0$ . Then we can find a lower  $\bar{\beta}_{\alpha_1}$  that satisfies the creditor IR. Similarly, a small negative change in  $\rho$  (with a corresponding change in  $R_x$ ) implies that  $\Pi_C < 0$ . Since  $I = K$ , and  $\beta_g$  is minimized at any optimum,  $\bar{\beta}_{\alpha_1}$  must increase to satisfy the creditor IR.

For the case in which  $\rho \geq \gamma$ , ex-post efficiency is maintained regardless of control rights. If the manager is efficient but wealth constrained and the creditor is given control, he will prefer to sell the firm back to the manager in exchange for debt, since  $\rho y \geq \gamma y$ . Thus, total surplus is given by

$$\Pi_S = \theta x + y - K$$

but the above expression is independent of the bankruptcy code  $\{\beta_g, \beta_b\}$  and the ability of judges  $\{\alpha_1, \alpha_2\}$ . Hence, any bankruptcy code  $\{\beta_g, \beta_b\}$  for which there exists an  $\{I, R_x\}$  that satisfies  $\Pi_C = 0$  and  $I \geq K$  is equivalent. ■

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