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# Absolute Priority Rule Violations in Bankruptcy

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## Introduction

Any transaction involving a continuing relationship over time depends on a mechanism by which parties can commit themselves to some future behavior. This often involves writing contracts. In most cases, we depend on government to enforce these contracts through a court system. Indeed, one of government's most important roles in any economy is defining and enforcing private property rights. Since contracts are simply a means of transferring private property, the use of courts to enforce them has a certain logical appeal.

Loan agreements are one of the most common types of contracts in our economy. Lenders agree to invest in a business and the owners of that business agree to repay the loan, with interest, at some future date. If the borrower fails to repay the loan, his creditors may force him into bankruptcy and seize his assets. By definition, debt contracts require that creditors be paid before the firm's owners receive any value. In other words, creditors are assumed to have "priority" over a firm's equity holders.

This principle is known as the absolute priority rule (APR). Simply stated, this rule requires that the debtor receive no value from his assets until all of his creditors have been repaid in full.[1] While this rule would seem quite simple to implement, it is routinely circumvented in practice. In fact, bankruptcy courts themselves play a major role in abrogating this feature of debt contracts. If private loan contracts are entered into voluntarily, why do courts allow (and even encourage) their terms to be violated on a regular basis? More important, what impact do these violations have on the cost of financial contracting and, hence, economic efficiency?

This article addresses these questions by analyzing the impact of APR violations on financial contracts. We begin in the next section by reviewing the magnitude of these violations and the frequency with which they occur. In section II, we develop a simple model to analyze the efficiency of APR violations. We complicate this model with several market frictions to show how the impact of these violations depends on which friction is present. Section III discusses the model's implications for the proper role of bankruptcy law in enforcing these contracts. Section IV concludes.

**1** The APR also states that senior creditors should be paid before junior creditors. In this paper, we consider only APR violations between the borrower and a (single) lender.

**TABLE 1**

**Empirical Research on APR Violations**

| Article | Data | Dates | Frequency | Magnitude |
|---|---|---|---|---|
| Franks and Torous (1989) | 30 firms with publicly traded debt filing for bankruptcy | 1970–84 | 66.67% | |
| LoPucki and Whitford (1990) | 43 firms with more than $100 million in assets and at least one publicly traded security under Chapter 11 | 1979–88 | 48.84% | |
| Eberhart, Moore, and Roenfeldt (1990) | 30 firms with publicly traded stock under Chapter 11 | 1979–86 | 76.67% | 7.57% |
| Weiss (1990) | 37 NYSE and AMEX firms under Chapter 11 | 1980–86 | 72.97% | |
| Franks and Torous (1994) | 82 firms with publicly traded debt under Chapter 11 or an informal workout | 1983–90 | | 9.51% workouts<br>2.28% Chapter 11 |
| Tashjian, Lease, and McConnell (1996) | 48 firms with a publicly traded security or more than $95 million in assets, reorganizing with a prepackaged bankruptcy | 1980–93 | 72.92% | 1.59% |
| Betker (1995) | 75 firms with publicly traded securities under Chapter 11 | 1982–90 | 72.00% | 2.86% |

SOURCE: Authors' review of the literature.

## I. The Prevalence of APR Violations

A growing body of empirical evidence supports the conclusion that APR violations are commonplace both in Chapter 11 reorganizations and in informal workouts. Using different samples of large corporations with publicly traded securities, numerous researchers have found that equity holders receive value from financially distressed firms in violation of the APR in nearly 75 percent of all reorganizations.[2] This appears to be true whether one looks at private, informal workouts, conventional reorganizations, or "prepackaged bankruptcies" in which the details of the reorganization are negotiated before the bankruptcy petition has been filed.

The frequency with which APR violations occur might be misleading if the magnitude of these deviations as a percentage of the firm's value were relatively small. Indeed, some commentators have suggested that value paid to equity is simply a token to speed up the process and has little economic significance: "Shareholders were tossed a bone, crumbs off the table, to get the deal done..."[3] Existing evidence, however, suggests that this is not generally the case. Estimates of the magnitude of APR violations in favor of equity vary, but in reorganizations in which such violations occur, equity holders appear to receive between 4 and 10 percent of the firm's value.[4] And although the evidence is limited, some have suggested that these deviations are larger for small firms whose owners

**2** See Franks and Torous (1989), LoPucki and Whitford (1990), Weiss (1990), Eberhart, Moore, and Roenfeldt (1990), and Betker (1995).

**3** Quoted in Weiss (1990), p. 294.

**4** See Eberhart, Moore, and Roenfeldt (1990), Franks and Torous (1994), Tashjian, Lease, and McConnell (1996), and Betker (1995). Franks and Torous note that the larger deviations found by Eberhart, Moore, and Roenfeldt may be a consequence of the latter's older sample of distressed firms: "With the growth in the market for distressed debt securities and the greater involvement of institutional investors such as 'vulture funds,' debtholders may have increased their bargaining power at the expense of equity holders" (Franks and Torous [1994], p. 364).

also manage the company.[5] Table 1 summarizes recent empirical research on APR violations.

One major caveat should be kept in mind when considering these findings: All the studies of bankruptcy resolution cited here have focused on firms with publicly traded stock and/or debt.[6] However, such firms comprise only a small subset of those filing for Chapter 11 bankruptcy or initiating out-of-court debt workouts. As a result, the number of firms included in these studies averages less than 50. In contrast, there were over 176,000 Chapter 11 cases filed nationwide in the first 10 years after the new Bankruptcy Code was implemented in 1979 (Flynn [1989]). Even after eliminating single-asset real estate partnerships and "house" filings to focus on what might reasonably be considered true "business" reorganizations, these studies have depressingly small and biased samples of "average" reorganizations.[7] Indeed, bankruptcy judge Lisa Fenning notes that only five out of more than 600 Chapter 11 cases on her docket involve publicly traded companies.[8] Clearly, we must be cautious and avoid overinterpreting these empirical studies.

## II. APR Violations and Efficiency

**M**any have argued that APR violations occur because they are privately optimal for bankruptcy participants. If strict adherence to the APR creates perverse investment incentives once the firm is in bankruptcy, it may be privately optimal (ex post) for everyone involved to abrogate such rules and renegotiate their contracts.[9] Under this view, APR violations—both inside Chapter 11 and in out-of-court workouts—are a desirable consequence of renegotiation between the firm and its creditors; APR violations are essentially payoffs by lenders to encourage the firm's shareholders to make good investment decisions once the firm is in financial distress. Unfortunately, this view fails to take into account how such behavior affects ex ante efficiency through the terms of the original financial contract, which is ultimately the only way to evaluate the efficiency of APR violations fully.

To focus on this problem, we develop a simple model of financial contracting. Consider an entrepreneur who wants to open a firm and invest in a project, but needs to borrow $I$ dollars from an outside investor to do so. In return for this loan, the entrepreneur agrees to repay his lender $R$ dollars from his firm's future profit. For ease of exposition, we will often refer to $R$ as "the interest rate."[10] Of course, the firm's profit is not guaranteed. Let $x$ denote the firm's realized profit, which can take values on the interval $[\underline{x}, \bar{x}]$. Let $f(x)$ be the probability that any given $x$ is realized (that is, its probability density function) and, as is standard, let $F(x)$ be the associated distribution function. To model APR violations, let $\delta$ represent the fraction of the firm's profit retained by the entrepreneur in bankruptcy.

The entrepreneur will default whenever doing so gives him a higher return (that is, whenever $x - R < \delta x$). Define $\hat{x} = R/(1-\delta)$ as the critical level of profit below which default occurs. The entrepreneur's expected return from his business, $E$, is then:

$$(1) \qquad E = \int_{\underline{x}}^{\hat{x}} \delta x f(x)\,dx + \int_{\hat{x}}^{\bar{x}} (x - R) f(x)\,dx.$$

When bankruptcy occurs, the entrepreneur receives only fraction $\delta$ of the firm's profit $x$; by weighting this by $f(x)$ and integrating over all levels of profit for which default occurs, we obtain the first term in $E$. On the other hand, when the firm's profit exceeds $\hat{x}$, the entrepreneur uses it to repay his loan and keeps the rest. Weighting this by $f(x)$ and integrating over all $x > \hat{x}$ gives us the second term in $E$.

In a competitive lending market, the equilibrium interest rate, $R^*$, is set to ensure that the lender is just willing to make the loan:[11]

$$(2) \qquad L = \int_{\underline{x}}^{\hat{x}^*} (1 - \delta) x f(x)\,dx + \int_{\hat{x}^*}^{\bar{x}} R^* f(x)\,dx - I = 0.$$

As above, the first term in this expression represents the lender's expected return when

**5** See LoPucki (1983) and LoPucki and Whitford (1990).

**6** LoPucki (1983) is an exception.

**7** House filings are Chapter 11 filings by individuals whose home mortgages exceed the Chapter 13 debt limit. The 1994 changes to the Bankruptcy Code should make such filings less common.

**8** Fenning (1993).

**9** See Bulow and Shoven (1978), White (1980, 1983), Gertner and Scharfstein (1991), and Berkovitch and Israel (1991) for models that promote this idea.

**10** Technically, $R$ is the "face value" of the debt and is equal to $(1 + r)I$, where $r$ is the nominal interest rate on the loan.

**11** Implicit in this specification is the assumption that the competitive return on riskless assets is 1, so that the lender's cost of funds is only $I$.

default occurs, and is the firm's profit in these states minus the APR violation. The second term in $L$ follows from the fact that the lender is simply paid $R^*$ in all nondefault states.

In this simple model, APR violations have no impact on the firm's cost of financing. While it is true that once the firm is in bankruptcy the entrepreneur is "better off" with large APR violations, these gains are entirely offset by increases in the interest rate the firm is forced to pay. To see this, we substitute the equilibrium solution for $R$ into (1) to get

$$(3) \qquad E = \int_{\underline{x}}^{\bar{x}} xf(x)dx - I.$$

The fact that $\delta$ does not appear in this expression shows us that the firm's profit is unaffected by the size of the APR violation.[12]

In this simple model, the magnitude of APR violations has no impact on the cost of the initial financial contract. Of course, this analysis ignores many of the problems that plague real-world financial contracting. Throughout the rest of this section, we extend this model with several standard complications and show how the effect of APR violations depends on which problem is present.

## Costly Bankruptcy

One of the most basic problems in financial contracting is the fact that bankruptcy is costly. Let $c$ denote the cost paid by the lender whenever he forces the entrepreneur into bankruptcy (for simplicity, assume $c < \underline{x}$).[13] As before, the equilibrium interest rate, $R^*$, must be set to ensure that the lender earns a competitive return:

$$(4) \qquad L = \int_{\underline{x}}^{\hat{x}^*} [(1-\delta)x - c]f(x)dx + \int_{\hat{x}^*}^{\bar{x}} R^* f(x)dx - I = 0.$$

In the appendix, we verify that, as before, increases in the magnitude of the APR violation make default more likely (that is, $d\hat{x}^*/d\delta > 0$).

Substituting (4) into the entrepreneur's expected profit (1), we get

$$(5) \qquad E = \int_{\underline{x}}^{\bar{x}} xf(x)dx - I - cF(\hat{x}^*).$$

This expression demonstrates how APR violations affect the terms of the loan agreement. Since $\hat{x}^*$ increases with $\delta$, larger APR violations make bankruptcy occur more frequently. As a result, the added expected bankruptcy costs, $cF(\hat{x}^*)$, lower the entrepreneur's ex ante expected return.

In this environment, APR violations may create an additional problem. Although the lender's expected return is generally increasing in the interest rate, eventually the added expected bankruptcy costs associated with higher interest rates outweigh their benefits; that is, $L$ will eventually be decreasing in $R$. Williamson (1986) shows that this effect can lead to credit rationing, since changes in the interest rate may be insufficient to clear the loan market.

Increases in the magnitude of APR violations have the same impact: By reducing the lender's payoff in default states and increasing the probability that bankruptcy will occur, a point comes at which the lender can no longer be compensated for additional violations of the APR through increases in the interest rate. In other words, APR violations exacerbate credit-rationing problems.

Thus, when bankruptcy is costly, there are strong reasons to avoid APR violations. First, these violations raise the interest rate the entrepreneur must pay, increasing the chance that default—and its corresponding costs—will occur. Furthermore, violations make credit rationing more likely, thereby limiting the entrepreneur's investment opportunities. Why, then, do they occur with such frequency? We next turn to one possible reason.

## Asymmetric Liquidation Value

The model presented above assumes that the firm had no capital assets once the project was completed or, alternatively, that the firm had no "going-concern" value. But much of the justification for a reorganization procedure derives from the belief that many firms in financial distress are in fact economically viable and should be reorganized rather than liquidated.[14]

To focus on this idea, we return to our original model (in which bankruptcy is costless) and simplify it by assuming that only two levels of

**12** On the other hand, APR violations can lead to credit-rationing problems, even in this simple model, since they make default occur more frequently. We discuss this problem in the subsection that follows.

**13** This, then, is the costly state verification environment developed by Townsend (1979) and Gale and Hellwig (1985).

**14** Harris and Raviv (1993) develop a model based on this issue and come to similar conclusions.

profit are possible. In good states of the world, which occur with probability $\pi$, the entrepreneur's business earns $x_H$. In contrast, when business is bad, the firm earns only $x_L$; this occurs with probability $(1 - \pi)$. Furthermore, assume that when business is good the entrepreneur can repay his debt, but in bad states he cannot; that is, $x_H > R > x_L$.

In addition to its profit, $x$, the firm has capital assets worth $A$ once its project is completed; these can be thought of as the value of the firm's expected future profit. If this value is the same regardless of who owns the firm, our results remain unchanged: APR violations have no impact on the terms of the financial contract. On the other hand, if the firm's assets are worth more in the hands of the entrepreneur, there will be an incentive to modify the financial contract to allow him to retain control of the firm even after filing for bankruptcy.

Let $\alpha$ represent the fraction of the firm's assets (and hence future profit) retained by the entrepreneur during bankruptcy. In this case, the entrepreneur's expected profit[15] is

$$(6) \quad E = (1 - \pi)(\delta x_L + \alpha A) + \pi(x_H - R + A).$$

Let $\gamma$ be the fraction of the firm's ongoing value that is lost by transferring these assets to the lender. Once again, the equilibrium interest rate must be set to guarantee the lender a competitive return:

$$(7) \quad L = (1 - \pi)[(1 - \delta)x_L + (1 - \alpha)\gamma A] + \pi R^* - I = 0.$$

Substituting this into the entrepreneur's expected profit gives us

$$(8) \quad E = (1 - \pi)(x_L + A) + \pi(x_H + A) + (1 - \pi)(1 - \gamma)(\alpha - 1)A - I.$$

As before, it is irrelevant whether the entrepreneur is allowed to keep some of the profit (the size of $\delta$) when the firm defaults; the interest rate adjusts so as to keep the entrepreneur's expected return unchanged. Likewise, when $\gamma = 1$ and the firm's capital assets have the same value regardless of who controls them, the size of $\alpha$ does not matter; that is, APR violations involving the firm's capital assets are irrelevant. In this case, we are back to our original model.

Notice, however, that the same is not true when $\gamma$ is less than one. Differentiating (8) with respect to $\alpha$ gives us

$$(9) \quad \frac{dE}{d\alpha} = (1 - \pi)(1 - \gamma)A > 0;$$

since these assets are worth less to the lender than they are to the entrepreneur, APR violations of this sort are beneficial.

Why are both $\alpha$ and $\gamma$ necessary to analyze the impact of APR violations in this environment? The intuition is clear: APR violations are beneficial only when they are applied to $A$, since this is the only part of the firm's value that is worth more in the hands of the entrepreneur. If allowing the lender to keep some of $x_L$ has any detrimental impact (such as costly bankruptcy), the desirability of distinguishing between these two types of APR violations is obvious.

One might wonder whether there is a practical distinction between $x_L$ and $A$. For large, publicly traded firms, this distinction may be irrelevant. After all, the going-concern value of Johnson & Johnson is likely to be unaffected by the identity of its stockholders (that is, their $\gamma$ is equal to one). On the other hand, firms that are owned and managed by an entrepreneur who brings specialized skills to his company are likely to have small $\gamma$'s. In this case, it might be reasonable to allow the entrepreneur to keep control of his firm after bankruptcy, but all of the firm's liquid assets should be transferred to its creditors.

## Risk Shifting

Perhaps the most common problem in financial contracting is the borrower's incentive to undertake actions that affect the riskiness of his business.[16] Suppose that, by exerting effort, the entrepreneur can affect the likelihood that the firm will be successful. If the entrepreneur works hard, the firm will earn $x_H$ with probability $\pi_1$; without effort, it will earn $x_H$ with probability $\pi_2 < \pi_1$. In addition, assume that the amount of effort required (or alternatively, the cost of this effort) is not discovered until after the loan is made; let $e$ represent the effort ultimately required. Finally, suppose that the lender cannot observe whether effort is exerted.

After learning the effort required, the entrepreneur's expected return from the "good" project is $(1 - \pi_1)\delta x_L + \pi_1(x_H - R) - e$, while his expected return from the "bad" project is $(1 - \pi_2)\delta x_L + \pi_2(x_H - R)$. Ultimately, whether

**15** This expression is analogous to equation (1); note that we have assumed only two possible states of the world.

**16** Bebchuk (1991) develops a different model of risk shifting and comes to similar conclusions. See also Innes (1990).

the entrepreneur chooses to undertake the good project (that is, exert effort) will depend on how much effort is required. He will select the good project as long as his realized $e$ is less than $e^*$, where

$$(10) \quad e^* = (\pi_1 - \pi_2)(x_H - R - \delta x_L).$$

In what follows, it will be useful to know how often the entrepreneur will select the good project, which requires us to know the distribution of $e$. Assume for simplicity that $e$ is distributed uniformly on the interval [0,1]. In this case, the probability that the entrepreneur will choose the good project (that is, that $e < e^*$) is simply $e^*$.

The lender, knowing that the entrepreneur will choose the good project with probability $e^*$ and the bad project with probability $1 - e^*$, will demand an interest rate that guarantees him zero expected profit:

$$(11) \quad L = [e^*(1 - \pi_1) + (1 - e^*)(1 - \pi_2)](1 - \delta)x_L + [e^*\pi_1 + (1 - e^*)\pi_2]R^* - I = 0.$$

Before he takes the loan, the entrepreneur's expected return is simply his expected profit from each of the projects, weighted by the probability that he will choose each, minus his expected effort conditional on the good project being chosen:

$$(12) \quad E = (1 - e^*)[\pi_2(x_H - R) + (1 - \pi_2)\delta x_L] + e^*[\pi_1(x_H - R) + (1 - \pi_1)\delta x_L] - \frac{e^{*2}}{2}.$$

Substituting R* into this expression gives us:

$$(13) \quad E = e^*(\pi_1 - \pi_2)(x_H - x_L) + \pi_2 x_H + (1 - \pi_2)x_L - \frac{e^{*2}}{2} - I.$$

As in our original problem, $\delta$ has no direct effect on the entrepreneur's ex ante expected return; the interest rate simply adjusts to ensure that the lender makes a competitive return. On the other hand, such APR violations do have an indirect effect through their impact on the probability that the entrepreneur will exert effort and choose the good project. Differentiating (13) with respect to $\delta$ yields

$$(14) \quad \frac{dE}{d\delta} = \frac{de^*}{d\delta}[(\pi_1 - \pi_2)(x_H - x_L) - e^*]$$

$$= \frac{de^*}{d\delta}(\pi_1 - \pi_2)[R - (1 - \delta)x_L].$$

Now, $R > (1 - \delta)x_L$ by assumption. In the appendix, we demonstrate that $de^*/d\delta \leq 0$, that is, that the presence of large APR violations makes the entrepreneur less likely to choose the good project.[17] Combining these results shows that the entrepreneur's expected profit is decreasing in $\delta$. Hence, when risk shifting is a problem, APR violations are ex ante inefficient.

The intuition behind this is straightforward. As before, the direct benefit to the entrepreneur of receiving compensation when the firm fails is exactly offset by the higher interest rate he must pay.[18] On the other hand, APR violations reduce the entrepreneur's incentive to undertake the good project. Why is this the case? Since effort is costly for the entrepreneur, he would like to avoid it whenever possible. Nevertheless, he is willing to exert some effort, since doing so makes it more likely that the firm will be successful, reaping him a higher return. The presence of these violations, however, reduces the pain of bankruptcy and hence the relative benefits of this effort. After all, why should the entrepreneur work hard if he can be assured of a sizable payoff even when his business bombs? As a result, the entrepreneur exerts less effort than he would if there were no APR violations.

## III. Policy Implications

The results of the last section suggest that an optimal bankruptcy institution would allow debtors and creditors to decide ex ante whether APR violations will occur. In other words, the parties to the loan agreement should be allowed to write a contract that specifies under what conditions APR violations will and will not occur.

Although the desirability of such a system might seem obvious, current bankruptcy law does not enforce agreements like these. Once a firm enters bankruptcy, it must follow the rules and procedures set out in the Bankruptcy Code, and no one is allowed to forfeit his future right to file for bankruptcy when he signs a loan agreement. This might not be a problem if it weren't for the fact that current bankruptcy law strongly encourages APR violations, regardless of whether they are efficient.

**17** For small $\delta$, $de^*/d\delta$ may be zero; in this range, the payments that the entrepreneur receives in bankruptcy are not large enough to discourage him from choosing the good project, regardless of the level of effort required.

**18** Once again, however, a credit-rationing problem is possible.

Several features of the code make this true. First, the debtor retains control of the firm throughout the process, except in extraordinary circumstances. Second, the debtor is allowed to obtain "debtor-in-possession financing" to continue operation of the business; this financing is automatically given priority over all of the firm's unsecured claims. Third, the debtor is granted 120 days to propose a plan of reorganization; during this time, no other parties may propose alternative plans.[19] Finally, if the debtor's reorganization plan is not approved by its creditors, it may attempt to enforce a "cram-down," getting the judge to impose the plan against the creditors' wishes.[20] Each of these factors gives the debtor leverage in the reorganization, increasing the likelihood (and magnitude) of APR violations.

Although one might appeal to asymmetric liquidation values as a justification for APR violations, a formal bankruptcy procedure that *mandates* them seems unwarranted, especially in light of other problems that make APR violations inefficient. After all, nothing prevents the firm and its creditors from writing a loan agreement that would keep the firm's capital assets in the entrepreneur's hands, even in default.

This points out an additional complication that must be present to justify a special bankruptcy law: incomplete contracting. If the future value of the firm's capital assets is uncertain, and the entrepreneur and the lender cannot agree on a way to measure its value, some outside arbiter may be useful. While bankruptcy courts can certainly fill this role, the implicit assumption that the contract participants cannot designate such an arbiter in their agreement seems extreme. On the other hand, bankruptcy law may be able to provide a useful baseline to reduce the costs of contracting on improbable events.

Potential conflicts among different creditors might provide another justification for bankruptcy laws.[21] In their rush to retrieve some value from a financially distressed firm, the theory goes, lenders may inadvertently reduce the total value of the firm's assets that are available for distribution. This might happen if the firm's assets are worth more undivided, but individual creditors have liens on specific assets. Worse yet, this rush might cause financially viable firms to be liquidated. Setting aside the question of why the firm and its creditors cannot foresee these problems and write their contracts so as to prevent them, this rationale for bankruptcy law does not necessarily mandate that it violate contractual priorities that are determined ex ante.

Nonetheless, many firms may feel that the fact-finding and mediation services provided by a formal bankruptcy institution provide a cost-effective way of writing financial contracts. Similarly, conflicts among creditors may be sufficiently severe to justify the use of such an institution. As a result, one would be overzealous in recommending total repeal of the Bankruptcy Code.

It is clear, however, that any bankruptcy procedure should merely provide an optional starting point for private contracts. If everyone involved finds it convenient to use this institution, they may. But if they find the procedure unnecessarily restrictive, they should have the opportunity, when they write their financial contract, to opt out of it entirely. That is, the parties to the loan agreement should be allowed to decide up front, when they write their agreement, whether a formal bankruptcy procedure will be used in the event of financial distress.

On the one hand, small entrepreneurial firms with highly uncertain markets and products may find Chapter 11 protection beneficial. As discussed above, Chapter 11 gives equity substantial bargaining power in the renegotiation process. Since these firms are more likely to benefit from the ability to recontract when new information is available, and their managers are more likely to possess special skills that affect the firm's going-concern value, this added bargaining power and the resulting violations in the APR are more likely to be beneficial. Firms in this situation would typically include the right to seek Chapter 11 protection in their debt contracts.

In contrast, firms that have greater opportunities to adjust their activities to the detriment of their creditors would generally choose to opt out of this protection. Formally forfeiting their right to Chapter 11 protection would clearly signal their creditors of their intention to avoid high-risk projects. Likewise, large, publicly

**19** This exclusivity period is often extended indefinitely (Franks and Torous [1989] and LoPucki and Whitford [1990]).

**20** Cram-downs are rather uncommon, and are allowed only in cases in which all dissenting creditors receive at least what they are due under the APR when the firm is liquidated. A cram-down may nonetheless impose an APR violation if the firm would be worth more if it continued than if it were liquidated, or if the face value of the securities offered to dissenting creditors is substantially above their true market value. Furthermore, the threat of a cram-down, which is costly to fight, may cause some creditors to accept lower payouts than they might otherwise.

**21** See Jackson (1986) for a complete discussion of this argument.

traded firms whose going-concern value is unaffected by their ownership would benefit from such an option.

## IV. Conclusion

This paper has demonstrated how the efficiency of APR violations depends on the nature of the contracting problem present. When the firm's future profit will be higher if it is controlled by the entrepreneur, it makes sense for him to retain the firm's capital assets—if not its past profits—after bankruptcy. On the other hand, APR violations of any sort have the detrimental effect of raising interest rates, thereby increasing expected bankruptcy costs and worsening credit-rationing problems. Furthermore, APR violations can reduce the entrepreneur's incentive to work hard in order to ensure his firm's profitability.

The diversity of these implications suggests that an optimal bankruptcy law would allow firms and their creditors to decide ex ante whether (and what type of) APR violations will occur in the event of financial distress. While such decisions could reasonably be left to private contracts, a formal bankruptcy law may be desirable for other reasons. If this law de facto encourages APR violations, it is clear that it should also include an "opt-out" provision that allows private agents to determine whether its structure will be beneficial to them. This is not allowed under current U.S. bankruptcy law.

In such a world, we might expect owner-operators of small firms to include APR violations in their contracts, since these firms are the most likely to lose value from transferring their capital assets. In contrast, the value of large, publicly traded companies is less likely to be affected by their ownership, and we would therefore expect such companies to avoid APR violations of any type, as would firms of any size whose profit streams are easily affected by managerial effort.

## Appendix

In this appendix, we prove some of the more technical results required in the text. The first is the fact that, in the model with costly bankruptcy, $\hat{x}^*$ is increasing in $\delta$. Totally differentiating (4) shows that

$$(15)\quad \frac{d\hat{x}^*}{d\delta} = \frac{\hat{x}^*[1 - F(\hat{x}^*)] + \int_{\hat{x}}^{\hat{x}^*} xf(x)dx}{(1-\delta)[1 - F(\hat{x}^*)] - cf(\hat{x}^*)}.$$

The numerator of this expression is clearly positive, as is the denominator whenever

$$(16)\quad \frac{c}{1-\delta} < \frac{1 - F(\hat{x}^*)}{f(\hat{x}^*)}.$$

Longhofer (1995) shows that whenever this condition does not hold, no lending occurs in equilibrium. That is, when $c$ or $\delta$ is too large, credit rationing results.

The second fact we must prove is that $de^*/d\delta \leq 0$ in the model with risk shifting. Solving (11) for $R^*$, substituting into (10), and simplifying shows that $e^*$ is defined by

$$(17)\quad e^{*2}\mu_2 + e^*\mu_1 + \mu_0 = 0,$$

where $\mu_0 = I - \pi_2 x_H - (1 - \pi_2)x_L + \delta x_L$,
$\mu_1 = \pi_2 - (\pi_1 - \pi_2)^2(x_H - x_L)$, and
$\mu_2 = (\pi_1 - \pi_2)$.

Although two roots will solve this equation, differentiation of (13) with respect to $e^*$ shows that the larger root will always be the one chosen in equilibrium. Using the quadratic formula to solve for $e^*$, it is straightforward to verify that

$$(18)\quad \frac{de^*}{d\delta} = -x_L(\mu_1^2 - 4\mu_2\mu_0)^{-1/2},$$

which must be nonpositive whenever a real solution for $e^*$ exists.

It is worth asking what happens when the optimal $e^*$, as given by the quadratic formula, is greater than one. This would imply that the entrepreneur will always choose the good project, regardless of the level of effort ultimately required. In this case, small APR violations will have no impact on the firm's ex ante profit. Larger violations, however, will still reduce the chance that the entrepreneur will choose the good project.

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