

Rescue Culture

In a comprehensive debt-financing model, I show “rescue”-centric bankruptcy anticipates motives creditors do not have. Although out-of-court settlements dominate and formal procedures are rarely used, insolvent borrowers nevertheless extract concessions from creditors unless supervised reorganisation is 100 percent free. They pay for it, of course, with inefficient continuation and liquidation, expensive debt and credit-rationing. Ironically, rescue culture hits hardest the firms it purports to save yet benefits creditors, whom it claims to check. Firms with long expected lifespans are either the first denied credit or the first to make investment choices that guarantee premature liquidation. Creditors, on the other hand, enjoy a profitable niche lending market in an otherwise perfectly competitive industry.

1 Introduction

In 1986 the U.K. introduced administration: bankruptcy procedures aimed at rehabilitating insolvent debtors.¹ Called reorganisation elsewhere and analogous to U.S. Chapter 11, administration answered political concern that too many financially distressed firms were unnecessarily liquidated—or left to fail—despite a reasonable chance of survival (*Cork Report* 1982). The “rescue culture” it fostered was thought to maximise profits, prevent job loss and uphold creditors’ long-term interests.

In a comprehensive debt financing model, I show rescue culture neither maximises profits nor prevents job loss. Instead, it obstructs firm creation in the first place or supplants otherwise certain survival with upfront investment choices that make premature liquidation not just highly likely in financial distress but virtually guaranteed should the firm remain solvent. The only goal rescue culture does serve is creditors’ long-term interests—by introducing a profitable niche lending market in an otherwise zero-profit industry.

My starting point is that administration is time-consuming, arduous and expensive. United Airlines spent \$250 million on legal and professional services related to its reorganisation; WorldCom topped out at \$620 million (Berk and DeMarzo, 2010). In New York, procedures last three years (Weiss, 1990) and fees eat up 2–4 percent of firm value (LoPucki and Doherty, 2004; Warner, 1977; Weiss, 1990). Customers are reticent to buy goods (Titman, 1984), suppliers hesitate to provide inventory and

¹I thank my supervisor, Christopher Harris, my research advisor, Melvyn Weeks, Hamish Low, Jeremy Edwards, Sönje Reiche, Pramila Krishnan and the Empirical Microeconomic Workshop participants at the University of Cambridge.

¹U.K. law reserves “bankruptcy” for financially distressed individuals and “insolvency” for their corporate counterparts. I use both words per colloquial definitions: bankruptcy is the legal status and insolvency the state of not being able to pay one’s debts.

employees leave (Berk et al., 2010). Hungarian trustees delay liquidation (Franks and Lóránth, 2014); their counterparts in Russia embezzle cash (Lambert-Mogiliansky et al., 2007).

These costs matter: they contribute to expensive debt, delayed liquidation, sub-optimal investment and credit rationing. Limited liability makes creditors disproportionately responsible for reorganisation's impact on future earnings. Insolvent borrowers exploit the imbalance by demanding excessive debt write-downs in obvious violation to absolute priority. This cuts creditor earnings, discourages voluntary liquidation and sometimes renders lending unprofitable.²

Insolvent firms that ought to continue always do—in settlements known as workouts.³ Firms with high expected earnings relative to upfront investment have the most to gain from a workout. So do their creditors. Reorganisation is expensive and probable: not only will equity never willingly liquidate, but if put to a judge she will likely agree. Bankruptcy has real consequences and creditors a real desire to avoid it; they quickly acquiesce to intemperate write-downs.⁴

Potential borrowers lose. Workouts avoid wasteful reliance on an ineffective bankruptcy regime but lender write-downs are still proportional to the cost of that regime. As is often the case, however, it is firms' pre-borrowing selves and solvent peers who really pay the cost.⁵ For some, credit is merely more expensive. For others, it is rationed or obtained only by inducing premature liquidation.⁶ Higher interest rates encourage more workouts so creditors do not lend money no matter how much borrowers are willing to pay. To surmount this, firms over-invest in physical or tradable intangible assets to increase both judicial likelihood of liquidation and a desire to voluntarily do so themselves.

Insolvent firms that ought to liquidate only sometimes do but nevertheless face fewer upfront repercussions in the lending market.⁷ Although they frequently continue when they shouldn't and intermittently even file for bankruptcy, their shorter expected lifespans mean equity usually forgo both to liquidate.⁸ From the creditor's perspective, workouts (and bankruptcy) are riskier; returns are lower. They clearly prefer lending to borrowers who want them less often.

²Earlier models by Bebchuk (2002) and Longhofer (1997) identified deviations to absolute priority as key causes of credit-rationing.

³This conclusion mirrors empirical findings that economically viable firms prefer workouts to Chapter 11 (Chatterjee et al., 1996).

⁴Franks and Torous (1994) find that both creditor recovery rates and absolute priority deviations in favour of equity are much higher in distressed exchanges of publicly traded debt than in Chapter 11.

⁵Jensen and Meckling (1976) discussed adjudication costs in bankruptcy as contributing to declining firm value.

⁶Empirical evidence suggests lenders charge higher interest rates, require shorter maturities and demand more collateral when weak creditor protections allow borrowers to extract steep deviations to absolute priority (Qian and Strahan, 2007).

⁷Bebchuk (2002) similarly finds violations to absolute priority encourage inefficiently risky investment decisions.

⁸Chatterjee et al. (1996) show empirically that Chapter 11 is dominated by bankrupt firms that should be liquidated.

In fact—and despite a perfectly competitive credit market—lending to firms most prone to bankruptcy can actually be profitable. High interest rates encourage bankruptcy, sure, but when they are very high (and reorganisation very costly) it's no better than shutting down; entrepreneurs are indifferent so creditors liquidate...while pocketing all of the firm's initial earnings. If creditors only recuperate their original investment when liquidation is guaranteed, an exorbitant rate achieves this and makes them money in the process.⁹

These conclusions suggest radically altered bankruptcy procedures such as immediate auctions or distributed options may miss the point (see Baird, 1986; Bebchuk, 1988; Bebchuk, 2000; Aghion et al., 1992). All focus on rigidly respecting debt's seniority over equity via a legally structured sale or bargaining process. I show, however, that violations to absolute priority are only harmful once expensive reorganisation forces debt forgiveness beyond that which creditors would otherwise swallow given low initial earnings. Since it is hard to see how auction- or option-based reforms are cheaper than traditional bankruptcy—and their inflexible design may cost more to implement—they are probably not the panacea many hoped them to be.

Far more suitable is the reorganisation law they sought to replace: Chapter 11. I show that any particular bankruptcy regulation that neither implicitly reduces future earnings or explicitly prioritises equity over debt does not constrict lending or distort investment decisions. When it helps quickly resolve reorganisation and doesn't disempower creditors, lending is cheaper and more widespread, investment decisions more efficient.

Most rules in Chapter 11 meet these criteria: allowing management to remain, equity first right to a restructuring plan, super-senior emergency financing and U.S.-style “cramdown”—judicial imposition of a reorganisation plan despite creditor objection. They cost little to implement, do not categorically prioritise equity over debt and their absence (or the alternative) does not strengthen creditors' bargaining position. They do reduce time spent in reorganisation (Elayan and Meyer, 2001), discourage excessive risk-taking and under-investment (Eberhart and Senbet, 1993; Gertner and Scharfstein, 1991) and encourage prompt notification of financial distress (Povel, 1999).¹⁰

⁹Although this paper focuses on corporate insolvency, a similar phenomenon may have been partially responsible for excessive home loans made in the U.S. before 2007. Lenders offered mortgages at exorbitant rates to low income borrowers that virtually guaranteed default—but likely not before the borrower made one or more interest payments. Cumbersome personal bankruptcy procedures, low probability of success and high legal fees induce insolvent borrowers to immediately foreclose; the lender resells the home. When housing prices are rising (or at least not falling), this loan is effectively risk free but generates a rate of return above the risk-free interest rate.

¹⁰Only legal fees incurred in bankruptcy have priority over debt repayment. No other Chapter 11 rule implicitly reduces future earnings or explicitly prioritises equity, suggesting that the structure of Chapter 11 probably isn't the main cause of absolute priority deviations and credit-rationing (Bebchuk, 2002); the massive fees inherent in the U.S. legal system are. Although wages have similar priority, their existence does not depend on bankruptcy. Workers must be paid regardless of solvency, so expected firm value is unaffected by a requirement to pay them first. Appendix B.1 shows that incurring losses (*e.g.*, paying wages in excess of available cash flow) before repaying debt does not affect lending and investment decisions.

Notoriously absent from Chapter 11 are several unambiguously harmful regulations that implicitly cost money. Replacing management with court-appointed administrators—as is done in France—expels specialised skills administrators probably lack. U.K. and German regulations that insist on administrative oversight burden firms with additional salaries that have priority over debt. British advertising requirements publicise financial distress, causing consumers concerned about warranty validity to shop elsewhere (Titman, 1984) and employees worried about their jobs to find new ones (Berk et al., 2010).

Chapter 11 may be the best reorganisation law, but its wider bankruptcy system is always inferior to one without an automatic stay.¹¹ Automatic stays are not only redundant, but weaken creditors' bargaining position. Insolvent borrowers that should continue offer reasonable workout proposals unless creditors are likely the residual claimants in reorganisation. In the latter case, however, lenders' desire to maximise their own recovery impels action that also maximises the insolvent firm's value. Automatic stays therefore anticipate motives that creditors do not have. Eliminating them makes lenders' returns in bankruptcy less risky; insolvent borrowers impose fewer write-downs during workouts.

If the market for equity finance were as competitive as traditional lending is theorised to be, credit-constrained borrowers could turn to family and friends, initial public offerings or angel investors. But not everyone is blessed with wealthy kin, issuing public stock is just not done by tiny enterprises and illiquid venture capital markets favour entrepreneurs with whom investors share social networks and other superficial similarities (Hochberg et al., 2007; Bottazzi et al., 2011; Verheul and Thurik, 2001).¹² Thus, eliminating automatic stays—by permitting floating charge liens—is the most straightforward antidote to bankruptcy's unpleasant side effects.¹³ Despite claims by the *Cork Report* (1982), lenders are not prone to asset grabbing and firms are not left to fail (Franks and Sussman, 2005). Distressed British companies secured by floating charges were less likely liquidated than their counterparts in countries more committed to their survival (Davydenko and Franks, 2008). Bankruptcies involving floating charges keep firms as going concerns far more frequently than reorganisation—and cost significantly less to implement (Djankov et al., 2008).

Yet floating charges are no longer part of British bankruptcy law. The Insolvency Act 1986 weakened them; the Enterprise Act 2002 removed them. Rescue culture won. Paradoxically at the expense of its purported aim: “to recognise that the effects of insolvency are not limited to the private interests of the insolvent, his family, creditors

¹¹An automatic stay is a court order that prevents confiscating collateral or collecting debt payments. It is the defining characteristic of reorganisation, since without it nothing legally prevents creditors from *de facto* liquidating an insolvent firm by seizing the assets it needs to operate.

¹²It's not hard to guess who has the toughest time getting cash—of *Business Insider's* “50 Early Stage Investors in Silicon Valley You Need to Know”, only two are female and only one black.

¹³Floating charges are debt secured by an entire business. In the event of default, the creditor with a floating-charge lien is granted control rights of the firm with little judicial interference. An alternative simply removes the specific regulation referring to automatic stays. This may, however, enable borrowers to secure multiple loans with a single asset and exacerbate lender co-ordination problems (Jackson, 1986; Baird, 1986).

or directors, shareholders and employees, but that other interests of society or other groups in society are vitally affected...and to ensure that these public interests are recognised and secured" (*Cork Report* 1982, §198(i)).

2 Model

An entrepreneur has an idea for a business project. The project lasts two periods and requires a machine.¹⁴ Operating profits each period are X_1 and X_2 , where X_1 and X_2 are non-negative and independently distributed according to the joint cumulative distribution function Π .¹⁵

The machine costs K_0 . Up to time 1, it may be resold for its initial value. After time 1, it depreciates; its value at time 2 is K_2 , where $0 < K_2 < K_0$. K_0 and K_2 are non-random and known at time 0.

The entrepreneur has no money to buy the machine. He pitches a creditor the take-it-or-leave-it offer to borrow K_0 at time 0 and owe D at time 1.¹⁶ The entrepreneur and creditor are risk neutral, have symmetric information and the risk-free interest rate is zero; credit markets are perfectly competitive.

If the lender accepts his offer, the entrepreneur buys the machine. The project begins and X_1 is realised.

2.1 Solvency

Presume first $D \leq X_1$; the project is solvent. The entrepreneur decides whether to operate another period or liquidate. Should he continue, the project generates a second period's cash flow, X_2 , after which it comes to the natural end of its life. It is shut down and the machine sold for K_2 . Gross project value is

$$V_2^C = X_1 + X_2 + K_2.$$

Should he liquidate, all service and employment contracts are voided, business operations cease and the machine is sold for its full market value. Gross project value is instead

$$V_1^L = X_1 + K_0.$$

In both scenarios, the creditor is repaid in full; his returns are D . The entrepreneur keeps what's left: $E_2^C = V_2^C - D$ if the project is continued and $E_1^L = V_1^L - D$ if it's liquidated.

¹⁴The analysis is applicable to any tangible or intangible depreciable productive asset.

¹⁵For an extensive form representation of the bankruptcy game, see Appendix C.

¹⁶Borrowing more than K_0 is a risk-free transfer of wealth from time 1 to time 0. Since the entrepreneur is risk-neutral and the risk-free interest rate is zero, the transfer itself confers no benefit. The fact that loans mature after one period while project returns last for two is fundamental to the model. If loans could last the entire duration of the project, bankruptcy is irrelevant.

2.2 *Insolvency*

Suppose now $X_1 < D$; the project is insolvent: “unable to pay its debts as they fall due” (*U.K. Insolvency Act 2016*, §123(2)).¹⁷ No legal restrictions prevent the entrepreneur and creditor from settling matters on their own: renegotiating the terms of their loan contract or jointly agreeing to liquidate. Formal bankruptcy is their fallback when they fail to do so.

2.2.1 Bankruptcy. If the entrepreneur and lender cannot see eye-to-eye on whether to restructure their debt or liquidate the project, each petitions the court to force the other to accept his desired result—reorganisation or compulsory liquidation. A judge adjudicates.

Reorganisation—administration in the U.K.—is a supervised version of continuation.¹⁸ The entrepreneur formulates a restructuring plan; a court-appointed administrator approves and oversees its implementation.

As discussed in the introduction, reorganisation is expensive. Legal and accounting fees, lost customers, suppliers and employees, added bureaucracy and even theft from fraudulent administrators add up. The upshot is delayed production, asset depreciation and lower profits. $Y \in (0, 1)$ captures this. It measures the fraction of project value reorganisation wastes. What’s left is only

$$V_2^R = X_1 + (1 - Y)(X_2 + K_2).$$

Compulsory liquidation is the second option. In theory, compulsory liquidation is more transparent, straightforward and faster than reorganisation. Service and employment contracts are immediately voided and business operations cease. Secured creditors repossess their liens; a court-appointed administrator auctions off remaining assets and distributes the proceeds to unsecured creditors.¹⁹ Any excess is settled on

¹⁷Technically it is “cash flow insolvent”. Another test is “balance sheet insolvency” whereby the firm’s liabilities exceed its assets. Usually, balance sheet insolvent firms are also cash flow insolvent; rarely, however, a firm is *currently* able to pay its debts but clearly won’t be able to in the future. In this scenario, creditors (or shareholders) can petition the court to declare the company insolvent. Since every balance sheet insolvent firm must eventually be cash flow insolvent, the entrepreneur has no opportunity to misuse company funds and the time value of money is zero, I disregard balance sheet insolvent firms (without loss of generality).

¹⁸In Germany and France, control cedes to a court-appointed administrator; in the U.S., it remains with existing managers. In most countries payments cease on outstanding loans and an automatic stay—lasting anywhere from three months in Germany to over a year in France—is applied to secured claims. The firm can usually obtain new financing, often at terms more favourable than existing debt. After a certain period—at least four months in the U.S. and more than 18 in France—a plan is proposed to restructure debt and reorganise the firm. In the U.S., this period can be extended indefinitely by the bankruptcy court. Creditors vote on it and the court approves it; in some jurisdictions equity holders also have a say. In the U.S. a judge can impose a plan already rejected by creditors. In France, creditors have no vote; only the court decides whether the plan is implemented.

¹⁹Generally, these proceeds are distributed according to legally defined absolute priority rules. For example, in the U.S., administrative and legal fees incurred during proceedings are paid first; next, statutory claims, including unpaid taxes and wages; finally, unsecured debt. Evidence from the U.S. suggests this ordering is very rarely violated when firms are liquidated in Chapter 7 (Bris et al., 2006).

equity.

Winding up a business is less ambiguous than rescuing it—giving corruption, bureaucracy and legal fees less scope to eat away a firm’s eventual liquidation value. And since that value is independent of unrealised future earnings, bankruptcy’s impact on business reputation is especially irrelevant. Compulsory liquidation, therefore, probably wastes a smaller fraction of a firm’s time 1 liquidation value than reorganisation wastes of its time 2 continuation value.²⁰

To incorporate this idea without adding unnecessary complexity, I assume compulsory liquidation incurs no added cost and is instantaneous.²¹ Gross returns are therefore identical to those in voluntary liquidation.

Whether reorganised or liquidated, the creditor is no longer guaranteed the full face value of his loan. Given $X_1 < D$, neither V_1^L nor V_2^R is necessarily large enough to cover D . When it isn’t, the creditor takes home the entirety of the project’s gross value; otherwise, he earns D . His gross returns in liquidation and reorganisation are, respectively

$$C_1^L = \min\{D, V_1^L\} \quad \text{or} \quad C_2^R = \min\{D, V_2^R\}.$$

As before, the entrepreneur keeps whatever remains: $E_1^L = V_1^L - C_1^L$ if the project is liquidated and $E_2^R = V_2^R - C_2^R$ if it’s reorganised.

Adjudication. Bankruptcy occurs only if the entrepreneur and his creditor cannot agree whether to continue operating or liquidate the firm. Both parties expect strictly higher returns under separate outcomes. As illustrated in Lemma 1 and its proof (Appendix A), the concavity of creditor returns and convexity of entrepreneurs’ bind the latter to reorganisation, the former to liquidation.

Lemma 1. *In bankruptcy, the entrepreneur prefers to reorganise the project; the creditor to liquidate it.*

Guided by legislation, a judge settles the conflict. Insolvency law calls for reorganisation when it is “reasonably likely” (*Harris Simmons* 1989) to maintain “the

²⁰It is empirically difficult to disentangle the cost of reorganisation from the cost of liquidation. Evidence from the U.S. suggests that legal and accounting fees are roughly equivalent (Ferris and Lawless, 1997; Ferris and Lawless, 2000), but recovery rates in Chapter 7 are lower than those in Chapter 11 (Weiss, 1990; Bris et al., 2006). (Because these studies cannot compare Chapter 7 and Chapter 11 recovery rates for the same firm, however, the data are not especially informative on the actual cost of each regime. Additionally, recovery rates in Chapter 7 partially incorporate losses incurred in Chapter 11 given most firms that are eventually liquidated previously attempted a reorganisation.) In contrast, empirical work conducted in Italy and the U.S. after each country introduced or significantly expanded reorganisation procedures suggest creditors anticipate lower returns when reorganisation is more likely (Rodano et al., 2012; Scott and Smith, 1986). Indeed, emerging markets with weak institutions and severe restrictions on reorganisation appear far more capable of recovering creditors’ claims than their peers with more generous procedures (Djankov et al., 2008).

²¹In general, however, a nominal court fee may be due—£200 in the U.K.—and both sides undoubtedly incur legal and administrative fees they otherwise wouldn’t be subject to if the liquidation were voluntary. For example, in the U.K., the party petitioning the court for compulsory liquidation must advertise in the press a number of days before the process takes place.

survival of the company, and the whole or any part of its undertaking, as a going concern” (*U.K. Insolvency Act 2016*, §2(3)(a)). Specifically, viable projects—projects with continuation value greater than their assets’ piecemeal resale value²²—are reorganised, *i.e.*,

$$V_1^L < \bar{V}_1^C, \quad (1.1)$$

where \bar{V}_1^C is the time 1 expected value of V_2^C . When the reverse is true, the project is non-viable: unlikely to survive as a going concern without “unnecessarily harm[ing] creditors as a whole” (*Harris Simmons 1989*). Non-viable projects are liquidated at time 1.

The judge does not know whether a project before her is viable. Although the creditor and entrepreneur do, per Lemma 1 the latter has an incentive to present evidence that the project should be reorganised while the former will argue just as forcefully for liquidation. The judge, meanwhile, gathers publicly available material on the project’s assets and earnings and independent market research on similar projects in the same industry. All together, this information colours her opinion of the firms’ true value and forms the basis of her ruling. That ruling is correct with probability p , where $p \in (1/2, 1)$ depends on the quality and veracity of the documentation provided by the entrepreneur and creditor as well as the intelligence the judge gathers herself.²³ Creditors’ expected returns just before her official ruling are

$$\bar{C}_1^B = q \bar{C}_1^R + (1 - q) C_1^L,$$

where $q = p$ if the project is a viable one, $1 - p$ if it isn’t and \bar{C}_1^R is the time 1 expected value of C_2^R .

Even with perfect information the judge’s decision is biased in favour of reorganisation. \bar{V}_1^C drives her ruling (Equation (1.1)), but the time 1 expected value of V_2^R , \bar{V}_1^R , really determines whether a bankrupt project is viable or not. Only when \bar{V}_1^R exceeds V_1^L does the project’s true value—including reorganisation costs—surpass the principal amount of the loan. Since $\bar{V}_1^R < \bar{V}_1^C$, too few bankrupt firms are liquidated and too many are reorganised.²⁴

²²British administration orders are granted on even weaker terms. The court must only be satisfied that the project has a “real prospect of” or “good, arguable case for” profitability—*i.e.*, less than the balance of probabilities (*Harris Simmons 1989*).

²³ p is an inverse function of the variance of information available on the distribution of time 2 earnings. When financial records provided by the firm are accurate—*e.g.*, because disclosure laws are strong—and significant outside information exists on similar firms—*e.g.*, because the financial analysis sector is well developed—the variance of information is low; p is close to 1. When the opposite is true, the variance of information is high; the judge’s decision is random ($p = 1/2$).

²⁴Theoretically, the judge could base her decision either wholly or partially on Equation (1.1). However, insolvency laws rarely (or only vaguely) reference such costs, giving judges little scope or even desire to adjust their rulings (*e.g.*, judges may prefer to rule in line with legal precedent to prevent being overturned on appeal; see Gennaioli and Shleifer, 2008). Additionally, given reorganisation’s costs are difficult to quantify and tend to occur long after a judge has ruled in a particular case, she

2.2.2 Settlement. Bankruptcy isn't the only option. Creditors and entrepreneurs can always deal with insolvency on their own. One scenario involves a mutual decision to wind-up business operations. In another, both parties agree to a workout.

Monetary or in-kind transfers between borrower and lender are common components of workout agreements; in liquidation, however, they are usually forbidden. Paying a director to voluntarily wind up his insolvent firm qualifies as a “preference payment”—*i.e.*, a payment that “has the effect of putting [its recipient] into a position which, in the event of the company going into insolvent liquidation, will be better than the position he would have been in if that thing had not been done” (*U.K. Insolvency Act 2016*, §239 (4)(b)).²⁵ Preference payments are not allowed in either the U.S. or the U.K.²⁶

Voluntarily liquidating an insolvent firm differs very little from compulsory liquidation. The process is overseen by a third-party who acts in the creditors' interests. One of his tasks is to inspect the firm's financial records and recover preference payments—which I assume he does efficiently and accurately.²⁷ Without preference payments, neither side has the power to “bribe” the other to wind up operations; combined with the earlier assumption that liquidation does not erode project value, the process and proceeds are identical to those in compulsory liquidation.

In a workout, the bankrupt debtor negotiates a revised debt contract with his creditors outside the judicial system. Workouts, when allowed, follow a similar script. In the U.S., managers propose a plan to restructure the debt; creditors then vote on it. If unanimously accepted, the plan is implemented without requiring court intervention.²⁸ Time spent in bankruptcy is reduced or eliminated, making them cheaper and less stressful than formal reorganisation (McConnell and Servaes, 1991). I assume they are costless.

has few opportunities to educate herself on their extent and incorporate them into future rulings. Indeed, she may not even wish to make an accurate decision to begin with. Forum-shopping and judges' desire to attract high-profile bankruptcy cases may lead to a preference for reorganisation over liquidation (Gennaioli and Rossi, 2010).

²⁵Preference payments include most transfers to company directors (and connected persons) one (U.S.) or two (U.K.) years prior to insolvency.

²⁶For a discussion on voidable preferences in the U.K., see Hill (2014). In the U.S., paying directors to liquidate may also fall under *U.S. Title 18* (2016, §152(6))—otherwise known as the “bankruptcy bribery” statute. It states that “a person who knowingly and fraudulently gives, offers, receives or attempts to obtain any money or property, remuneration, compensation, reward, advantage or promise thereof for acting or forbearing to act in the case under title 11; [...] shall be fined under this title, imprisoned not more than 5 years, or both”. (See also *U.S. Title 11* (2016, §727(a)(4)(C)).)

²⁷In the U.K., all liquidations, regardless of solvency, are overseen by a liquidator with this responsibility. In the U.S., a liquidator is appointed only if the firm undergoes Chapter 7 liquidation or state-governed “Assignment for the Benefit of Creditors” (ABC) procedures. Yet, even if the borrower and creditor negotiate a settlement and liquidate assets outside official procedures, creditors may nevertheless recover preferences in bankruptcy court after concluding the sale. (For a discussion of this issue specific to ABC procedures—a generally weaker mechanism for recovering preferences—see Thorne (2007).)

²⁸Although altering the financial terms of a debt contract outside bankruptcy requires the unanimous consent of creditors (*U.S. Trust Indenture Act 2014*), if accepted by at least a supra-majority, the firm can file for a pre-pack bankruptcy. Pre-pack bankruptcies fast-track approval of (or approve by default) workout agreements supported by a certain majority of creditors in each class.

The debt renegotiation game is very simple; I assume the entrepreneur makes a take-it-or-leave-it offer to replace the original debt D due at time 1 with a new one \tilde{D} due at time 2. If accepted, projects operate another period; gross earnings are identical to V_2^C .²⁹ Under these circumstances, the entrepreneur offers the smallest \tilde{D} the creditor will accept: one which equates the latter's expected earnings in a workout, \bar{C}_1^W , with those of his outside option—bankruptcy (Lemma 2).

Lemma 2. *In a workout, the entrepreneur offers the creditor the smallest \tilde{D} such that $\bar{C}_1^B = \bar{C}_1^W$. Such a \tilde{D} exists if and only if $\bar{C}_1^B \leq \bar{V}_1^C$.*

Assuming his proposal is accepted, the entrepreneur's expected earnings from a workout are

$$\bar{E}_1^W = \bar{V}_1^C - \bar{C}_1^B.$$

Let \bar{E}_1^C be the time 1 expected value of E_2^C . Since \bar{C}_1^B is only ever at most D , $\bar{E}_1^C \leq \bar{E}_1^W$ for values of X_1 within a sufficiently small neighbourhood of D . The upshot? Entrepreneurs are better off in a workout than they would be if continuing while solvent—armed with the threat of bankruptcy, they demand revised terms of credit at lenders' expense.³⁰

2.2.3 Outcome. High bankruptcy costs weaken creditors' ability to solicit fairer workouts. From Lemma 2, however, workouts are no worse than bankruptcy and liquidation may be better. If the former exists, both parties (weakly) prefer to settle; otherwise, insolvent firms sometimes go bankrupt (Proposition 1).

Proposition 1. *Insolvent projects choose between voluntary liquidation and: (i) a workout if $\bar{V}_1^B \leq \bar{V}_1^C$; (ii) bankruptcy, otherwise.*

Without reorganisation, viable firms optimally continue—and per Proposition 1(i), this is precisely what they do. Liquidation cannot beat an accepted workout and creditors never reject proposals by viable firms.

Non-viable firms optimally liquidate—but their owners sometimes insist on workouts that their lenders don't refuse. Workouts enable entrepreneurs to extract deviations from absolute priority. How much depends on creditor earnings in bankruptcy.

²⁹This assumption effectively grants the entrepreneur all bargaining power in bankruptcy. It is made for tractability—without further constraints, multiple equilibria are possible. As shown in Appendix B.3, however, as long as entrepreneurs extract some surplus during debt renegotiations, all conclusions in this paper hold. Additionally, granting the entrepreneur full power is most consistent with the original motivation of rescue culture. It is also very likely to hold for viable firms—*i.e.*, those that had originally planned to operate two periods and more susceptible to the stigma of failure and side effects of sudden unemployment (see, *e.g.*, Linn et al., 1985; Fay et al., 2002).

³⁰This discrepancy creates motive for strategic default (see Hart and Moore, 1998; Bolton and Scharfstein, 1990). As shown in Appendix B.2, however, strategic default is only harmful when coupled with expensive reorganisation. Otherwise, it has no effect on the lending market and probably no effect on interim investment decisions.

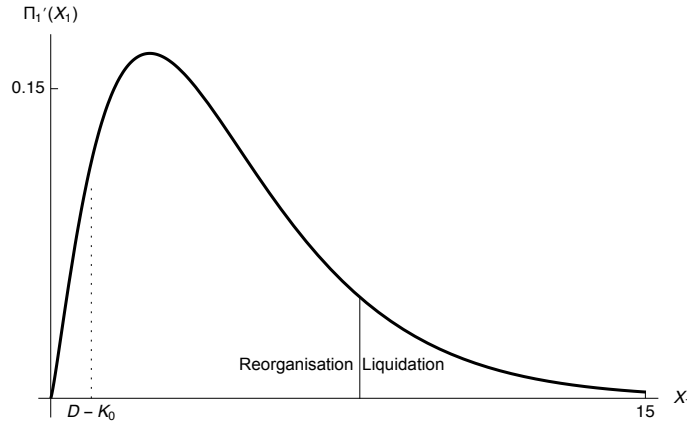


FIGURE 1.1: To liquidate or not to liquidate?

Notes. Marginal distribution of X_1 and X_2 (Π_1): gamma distribution with $\alpha = 2.25$ and $\beta = 2$. Model parameters: $K_0 = 13.99$, $K_2 = 9.46$, $q = 0.42$ and $Y = 0.36$. D and liquidation threshold determined per Lemma 3 and Proposition 1, respectively.

When those earnings are low, creditors tolerate larger write-offs. Thus, entrepreneurs demand a premium to liquidate: the project's piecemeal value must offset the “haircut” debt holders concede in a workout (see Figure 1.1).

But workouts aren't always available. Sometimes creditor gains from a possible liquidation outweigh the potential cost of an expensive reorganisation—making bankruptcy a worthwhile gamble. And sometimes, time 1 earnings are so low that entrepreneurs fight liquidation no matter how inefficient continuation may be. The firm goes bankrupt.

2.3 Contracts and credit

Whatever the interim outcome, entrepreneurs' returns are aggregate earnings, \bar{V}_0 , less the amount paid to creditors, \bar{C}_0 , making their unconditional expected value

$$\bar{E}_0 = \bar{V}_0 - \bar{C}_0. \quad (1.2)$$

The optimal contract maximises \bar{E}_0 , subject to the constraint that creditors' anticipate at least the principal amount of their loan, *i.e.*, $K_0 \leq \bar{C}_0$. Given \bar{V}_0 and \bar{C}_0 are positive, it is obvious from Equation (1.2) that \bar{E}_0 is increasing in the former and decreasing in the latter; it is less obvious, however, how each reacts to D .

Start with viable firms. Viable projects operate both periods whether solvent or not—expected aggregate earnings are constant, making $\partial \bar{V}_0 / \partial D = 0$. Solvent firms satisfy $D \leq X_1$ so in *any* outcome creditors receive D , meaning $\bar{C}_1^B = D$. Consequently, $\bar{C}_0 = \bar{C}_0^B$, where \bar{C}_0^B is the unconditional expected value of creditor returns in bankruptcy. Since \bar{C}_0^B is increasing in D , \bar{E}_0 must be decreasing in it.³¹

³¹Both \bar{C}_1^L and \bar{C}_1^R are non-decreasing in D , making $\partial \bar{C}_1^B / \partial D$ non-negative.

Entrepreneurs optimally set D as low as possible: $\bar{C}_0 = K_0$.

For non-viable firms it is no longer true that \bar{V}_0 is unaffected by D or that \bar{C}_0 is always increasing in it. As shown in the proof of Lemma 3, the change in \bar{C}_0 with respect to D is

$$\frac{\partial \bar{C}_0}{\partial D} = \int_{\mathcal{L}} \frac{\partial C_1^L}{\partial D} d\hat{\Pi} + \int_{\mathcal{R}} \frac{\partial \bar{C}_1^R}{\partial D} d\hat{\Pi} + \frac{\partial \bar{V}_0}{\partial D}, \quad (1.3)$$

where \mathcal{L} and \mathcal{R} are the set of outcomes in which creditors accept payoffs consistent with liquidation and reorganisation, respectively, and $\hat{\Pi}$ their joint cumulative distribution function.

$\partial \bar{V}_0 / \partial D$ is negative but $\partial \bar{C}_1^R / \partial D$ and $\partial C_1^L / \partial D$ are positive so $\partial \bar{C}_0 / \partial D$ may be positive or negative. A larger D increases creditors' claims to eventual earnings. This direct effect is the sum of the first two terms in Equation (1.3). A higher D , however, also makes workouts and bankruptcy more attractive, depressing \bar{V}_0 and thereby indirectly reducing \bar{C}_0 : the third term of Equation (1.3).

Combine Equation (1.3) with the partial derivative of Equation (1.2) with respect to D , and $\partial \bar{E}_0 / \partial D$ is simply the negative direct effect D has on creditors' returns. Although D affects entrepreneurs' decisions at time 1, and that decision affects expected project value at time 0, its cost is borne only by lenders so entrepreneurs ignore it and opt for the smallest D they can; again, $\bar{C}_0 = K_0$ (Lemma 3).

Lemma 3. *The entrepreneur prefers the smallest D such that $\bar{C}_0 = K_0$.*

The main feature of the optimal contract is that every entrepreneur wants the cheapest loan he can get his hands on. He may have no choice—for viable projects $\partial \bar{C}_0 / \partial D$ is positive meaning at most one D exists such that $\bar{C}_0 = K_0$.³² Possibilities are broader for non-viable projects. $\partial \bar{C}_0 / \partial D$ is neither definitively positive or negative; it isn't necessarily even monotone. Consequently, the D at which $\bar{C}_0 = K_0$ may be on the upward or downward slope of \bar{C}_0 or even occur at several places (Figure 1.2).

2.3.1 Credit rationing. Unfortunately, borrowing isn't guaranteed. A higher D affects risk twofold: (i) it increases entrepreneurs' chances of default; and (ii) reduces their desire to liquidate. Both effects result in more workouts and bankruptcy. Making either more probable reduces \bar{C}_0 . It is entirely possible \bar{C}_0 does not cover the creditor's initial outlay no matter what D the entrepreneur is willing to pay. Credit is rationed.

Proposition 2. (i) If $\bar{V}_1^B \leq \bar{V}_1^C$, some firms are credit rationed; the creditor is willing to lend if and only if $K_0 \leq \sup_D \bar{C}_0$. (ii) If $\bar{V}_1^C < \bar{V}_1^B$, creditors are willing to lend at any $K_0 \leq D$ on the extended real number line such that $E_2^R = 0$ for all X_1, X_2 .

³²There is one technical (and rather pedantic) exception: when $\bar{C}_0 = K_0$ on a non-trivial closed interval.

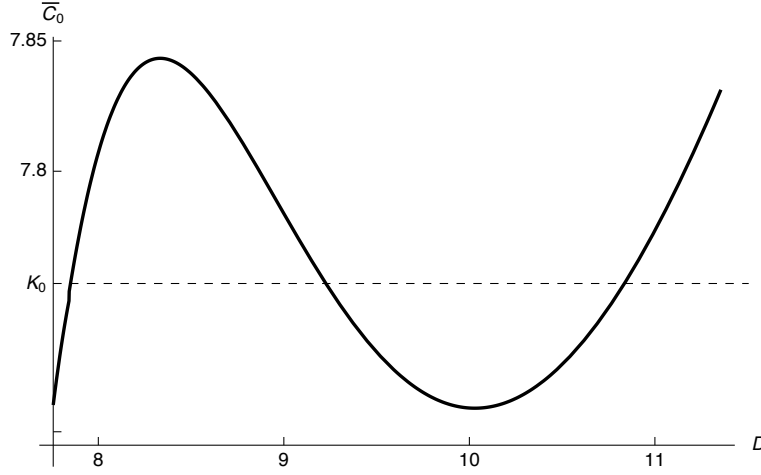


FIGURE 1.2: Multiple debt contracts.

Notes. Truncated (at zero) mixture distribution: 70 percent gamma distribution with $\alpha = 2$ and $\beta = 1$ and 30 percent generalised gamma distribution with $\alpha = 2$, $\beta = 1$, $\gamma = 2$ and shift parameter $\mu = 6$. Model parameters: $K_0 = 7.76$, $K_2 = 2.48$, $q = 0.49$ and $Y = 0.99$.

Credit rationing per Proposition 2(i) happens to both viable and non-viable firms. For the former, criteria are straightforward. Because \bar{C}_0 is increasing in D , its supremum is its limit as D tends to infinity; viable firms are credit-rationed whenever

$$\lim_{D \rightarrow \infty} \bar{C}_0 = \int \lim_{D \rightarrow \infty} \bar{C}_1^B d\hat{\Pi} = \bar{V}_0^B < K_0. \quad (1.4)$$

Viable projects are funded only when their time 0 expected returns in bankruptcy are enough to cover the loan's principal. When it can't, the firm is credit-rationed.

Credit rationing is actually less of a problem for non-viable projects. For a start, more are liquidated in bankruptcy. As shown in the proof of Proposition 2,

$$\bar{C}_0 = \bar{C}_0^B + \int_{\mathcal{L}^*} (D - \bar{C}_1^B) d\hat{\Pi}, \quad (1.5)$$

where \mathcal{L}^* is the set of outcomes in which the firm is voluntarily liquidated. When D tends to infinity, every firm either engages in a workout or goes bankrupt, making Equation (1.4) also the limit of Equation (1.5). Because $q = 1 - p$, however, non-viable projects more easily attain $K_0 \leq \bar{V}_0^B$ than do viable ones for project parameters within a sufficiently small neighbourhood of $\bar{V}_1^C = V_1^L$. And although those that satisfy Proposition 2(i) do not go bankrupt, their higher probability of being liquidated if they did increases the value of creditors' outside option during a workout. Entrepreneurs have less scope to extract concessions *ex interim*. They are rewarded with better lending opportunities *ex ante*.

Lending to non-viable firms is safer for another reason: they often forgo workouts to voluntarily liquidate. When loaning money to viable projects, creditors expect \bar{C}_0^B ;

when lending to non-viable projects they earn \bar{C}_0^B plus a “bonus”—the integral in Equation (1.5)—pushing the supremum of Equation (1.5) beyond Equation (1.4).³³ Even if judges reorganised non-viable and viable projects at the same rate, the latter would still have a tighter credit market. From the creditor’s perspective, liquidation is safer so lending is safer when entrepreneurs want it more often.

Arguably, one group of non-viable firm has no problem ever getting credit—those that sometimes file for bankruptcy (Proposition 2(ii)). Any firm guaranteed to liquidate at time 1 is guaranteed a loan. With workouts on the table, however, this promise is not credible *ex ante* because lenders capitulate *ex interim*. For those that go bankrupt, however, creditors resist. Couple that resistance with an excessively high D and entrepreneur returns in bankruptcy are exactly what they would be in liquidation: nothing. Assuming firms choose the efficient option when their earnings from doing so are no worse than the alternatives, liquidation at time 1 is guaranteed.³⁴

Entrepreneurs take out high interest rate loans per Proposition 2(ii) only as a last resort.³⁵ Creditors, on the other hand, love them (Corollary 1). They are risk-free, yet generate a long-run rate of return above the risk-free rate. Not bad for a zero-profit industry.

Corollary 1. *Loans made per Proposition 2(ii) satisfy $\bar{E}_0 = 0$ and $K_0 < \bar{C}_0$.*

Creditor profits are a byproduct of guaranteed liquidation. Lending is predicated on avoiding bankruptcy and exorbitant rates do this—but only by conferring the creditor absolute rights to X_1 . Since creditor profits are a side effect rather than the source of lending, no amount of competition will drive them back to zero.

2.3.2 Endogenous collateral. Machines are generally available in several models, produced by more than one company and sold at various prices. Daily newspapers with circulation between 150,000–200,000 spend anywhere from \$4–25 million on a press: cost depends on manufacturer reputation, post-purchase service quality, colour capacity and several additional features that reduce wastage, increase automation and speed up printing. Farm equipment is available in an even more dramatic range. John Deere’s 2015 catalogue advertises 20+ tractors, priced \$35,000–160,000. Models are differentiated by horsepower, warranty and special add-ons such as air conditioning, instrument panels, automatic transmission, bluetooth and surround sound speakers.

³³ $C_2^B \leq D$ for all X_1, X_2 making the integral in Equation (1.5) non-negative.

³⁴ The real world relevance of Proposition 2(ii) depends crucially on whether firms actually do liquidate under such conditions. Evidence in the home mortgage market suggests they do. Lenders are more frequently and rapidly transferred ownership of houses from delinquent borrowers with little to no equity in their homes (Ambrose and Capone, 1998; Pennington-Cross, 2010). Borrowers’ quick surrender may be especially likely when bankruptcy incurs a personal cost, such as lost time. See also Footnote 29 for a discussion on the likelihood of voluntary liquidation and the entrepreneur’s original intent to liquidate.

³⁵ Note that $\bar{V}_1^C < \bar{V}_1^B$ is not sufficient to guarantee loans are made as in Proposition 2(ii)—only that such loans exist. Cheaper loans, if obtainable, are preferred (Corollary 1).

Differentiated products cater to diverse clientele. Larger newspapers need faster presses because they print more copies; farming in extreme heat makes air conditioned tractor cabs (almost) a necessity. It is possible, however, that a spectrum of products sold at various prices also relieves credit rationing caused by bankruptcy.

Assume the machine comes in a variety of models each of which is equally productive when employed by a specific project—utility tractors pick up just as many bales of hay whether equipped with subwoofers or not, and faster presses have little bottom-line impact when used by smaller newspapers. The price of a particular model is $\underline{K}_0 \leq K_0$, where \underline{K}_0 corresponds to the cheapest, or “base”, model.

Every model retains its full value until time 1. After that, technological change causes the factors which differentiate models of the same machine to depreciate faster than the machine itself.³⁶ Their value at time 2 is zero; every machine is worth \underline{K}_2 where \underline{K}_2 is the time 2 resale value of the base model.

Proposition 3. *When the product market for machines is sufficiently differentiated, no one is credit rationed.*

From Proposition 3, every project is funded. A sufficiently differentiated product market ensures a model exists that costs just enough to satisfy $\bar{V}_1^C < \bar{V}_1^B$. Per Proposition 2(ii), the entrepreneur who purchases this model guarantees his project is liquidated at time 1. Loaning him money is riskless, so he always gets credit.

Whether the entrepreneur actually buys an expensive model is a different question. Viable firms able to get credit for \underline{K}_0 choose the base model. Every other firm in every other circumstance, however, buys an expensive machine, *i.e.*, one that costs

$$\bar{K}_0 = \max \{ \underline{K}_0, (1 - Y)(X_2^H + \underline{K}_2) \},$$

where X_2^H is the upper limit of X_2 (Corollary 2).³⁷

Corollary 2. *Viable firms choose $K_0 = \underline{K}_0$ at $K_0 \leq D$ if creditors are willing to lend; all other firms choose \bar{K}_0 at $\bar{K}_0 = D$.*

Any credit rationed project viable at \underline{K}_0 won't get credit at any other K_0 that leaves Equation (1.1) intact: Equation (1.4) is decreasing in K_0 making loans harder to get as the machine's price rises. Since \underline{K}_0 was already the cheapest model, an entrepreneur's only option is to verifiably grant creditors more bargaining power during insolvency—by buying a machine expensive enough to reverse Equation (1.1), converting a previously viable project into a newly non-viable one.

³⁶For example, tractors aren't remarkably different from those produced in 1940 but today's audio systems are a big change from earlier gramophones. Similarly, according to Kelley Blue Book, a standard equipped 2015 Toyota Camry SLE 4-door sedan currently costs 25.7 percent of the price of a standard equipped 2015 Mercedes-Benz S-Class S550 4-door sedan. That same Camry purchased in 2005, however, currently costs 89.9 percent of a comparable 2005 Mercedes-Benz S-Class. (Assumes all cars are in excellent condition.)

³⁷“Sufficient differentiation” in Proposition 3 required only that some K_0 exists such that $\bar{V}_1^C < \bar{V}_1^B$. Corollary 2 applies only if “sufficient differentiation” includes a model which costs \bar{K}_0 .

By “over-investing”—*i.e.*, purchasing a machine with greater capabilities (and a higher price tag) than what he actually needs—the entrepreneur fundamentally alters the relationship between his project’s value in continuation and its assets’ piecemeal resale value. Although his project now gets credit, he manages this only by shortening its lifespan.

Every entrepreneur of a non-viable firm—whether non-viable at K_0 or because credit is only available if rendered non-viable—wants to subvert entirely his *ex interim* incentive to demand a workout. From Proposition 1, non-viable projects are sometimes operated a second period when time 1 earnings are low. But freedom at time 1 means a higher D at time 0. *Ex ante*, its entrepreneur still prefers D as small as possible (Lemma 3); by extension he must want liquidation as probable as possible. Purchasing the expensive machine at \bar{K}_0 guarantees it.

\bar{K}_0 assures liquidation much like an exorbitant D would per Proposition 2(ii) but with one crucial difference: the entrepreneur retains control rights to X_1 . By setting $D = \bar{K}_0$ the creditor recovers the loan principal in every state; the entrepreneur keeps all cash flows.

Over-investment by firms not viable at K_0 contributes to a more socially desirable outcome. Entrepreneurs exploit the value of the machine at time 0 and its worth at time 2 to induce better behaviour at time 1: increasing K_0 reduces their desire to demand workouts or bankruptcy; by buying the model that costs \bar{K}_0 they eliminate it entirely.

2.4 Policy implications

Proposition 1, Proposition 2 and Proposition 3 imply two fundamental problems caused by bankruptcy: (i) credit rationing and/or decisions that induce premature liquidation *ex ante*; and (ii) inefficient continuation *ex interim*. Problem 1 affects viable firms; Problem 2 affects non-viable firms.

Rescue culture supposedly limits liquidating viable firms. When procedures are expensive, however, the opposite occurs. Minimising Problem 1 means cutting their cost.³⁸ When $Y = 0$, all viable firms get credit. $K_0 < \bar{V}_0^B$; per Proposition 2(i) and Equation (1.4) a D exists that satisfies Lemma 3. Since viable firms continue even when insolvent (Proposition 1(i)), investment decisions are anyway efficient. Meanwhile, Proposition 2(ii) applies to all non-viable firms; none are excluded from the lending market. With sufficiently differentiated product markets for productive assets, *ex interim* decisions are efficient as well.³⁹

³⁸As I show in a companion paper, judicial errors may also reduce credit-rationing of and self-induced premature liquidation by viable firms (Hengel, 2015).

³⁹When the market for machines is insufficiently differentiated, some non-viable firms are always at risk of filing for bankruptcy when initial earnings are very low—and a fraction of those may be inefficiently continued due to judicial error. Nevertheless, sub-optimal interim decisions are infrequent. Firms opt for bankruptcy in only a narrow set of mathematical circumstances predicated mostly by dismal initial earnings. When low earnings are improbable, D will be low squeezing the range of X_1 that make bankruptcy attractive. When they are likely, firms may get credit at some D such that $\bar{C}_0 = K_0$. In this case, however, bankruptcy is not much worse than liquidation, so either the difference

The model assumes bankruptcy does not explicitly curtail creditors' right to D . Thus, regulations which neither reduce future earnings nor explicitly cut claims do not impact *ex ante* lending decisions. As discussed in the introduction, most rules from Chapter 11 meet these criteria—even super-senior interim financing. As shown in Appendix B.1, emergency finance prevents existing creditors from blocking new loans. Nevertheless, interim loans do not alter underlying firm value; contracts adjust upfront to account for their possibility. Lending conditions and investment decisions remain efficient.

Yet elevating the value of creditors' outside option simultaneously addresses Problems 1 and 2. Several common law countries—most notably the U.K. before 2003—include a form of bankruptcy that does just that: receivership. Receivership applies to a special class of creditor—one that holds a lien on more than just the firm's physical assets.

“Floating charge” liens apply to an entire business.⁴⁰ In receivership, a creditor secured by one has full control of the distressed firm. He may operate it himself, sell it to a third party or liquidate its assets piecemeal. Setting $q = 0$ simulates receivership: creditor and entrepreneur disagreement implies the creditor supports liquidation (Lemma 1); without reorganisation, courts uphold his wish.

Contracts based on receivership replace a payment with an outcome precisely when that payment is particularly risky. Safer outside options are more valuable, forcing entrepreneurs to shoulder greater financial responsibility in insolvency. Since $\bar{C}_1^B = C_1^L$, the creditor always recovers the principal amount of his loan. Lending is riskless. The entrepreneur asks to borrow K_0 and repay exactly that one period later. The creditor accepts. Every project is funded. *Ex ante* and *ex interim* investment decisions are efficient (Proposition 4).

Proposition 4. *In receivership, $D = \underline{K}_0$. There is no credit-rationing. Non-viable firms liquidate at time 1. Viable firms continue until time 2.*

But receivership is not common and its ability to alleviate credit-rationing frequently undermined by regulation. Reformed U.K. procedures took effect in 2003. The new law limits floating charges to eight exceptional cases.⁴¹

Rescue culture was the obvious rationale. Nevertheless, 60 percent of small-to-medium-sized firms in British receivership ultimately continued operating as going concerns—and most lenders that eventually liquidated genuinely tried a rescue

between returns in liquidation and those in continuation are small or judicial likelihood of liquidation is high. If, on the other hand, no such D is available, the firm only gets credit at an exorbitant rate (Proposition 2(ii)), thus guaranteeing an efficient outcome at time 1.

⁴⁰Floating charges may also be more narrowly defined or co-exist with traditional secured loans.

⁴¹They are: 1. capital markets; 2. public-private partnerships; 3. utilities; 4. urban regeneration projects; 5. project finance; 6. financial markets; 7. social landlords; and 8. special administration regimes (notably, transport and water). Each is further limited by several specific provisions in Enterprise Act 2002, *e.g.*, debt exceeding £50 million and contractual “step-in” rights (giving one party rights to “step in” the shoes of another in cases of serious breach of contract).

first (Davydenko and Franks, 2008; Franks and Sussman, 2005).⁴² Chapter 11, on the other hand, rehabilitates only a third of them; the rest are eventually liquidated (Baird et al., 2007; Kahl, 2001).

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⁴²Findings in Davydenko and Franks (2008) and Franks and Sussman (2005) actually apply to U.K. administrative receivership procedures. The Insolvency Act 1986 altered earlier receivership—most notably by outlining statutory responsibilities of the appointed administrator—and renamed it.

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Appendix

A Proofs

Each proof is restricted to only those results not otherwise shown in the text of the previous section. No separate proof is needed for pProposition 3.

Proof of Lemma 1. (Proof by Contradiction.) Suppose $C_1^L < \bar{C}_1^R$, where \bar{C}_1^R is the time 1 expected value of C_2^R . By Jensen's inequality,

$$C_1^L < \min\{\bar{V}_1^R, D\}, \quad (\text{A.6})$$

where \bar{V}_1^R is the time 1 expected value of V_2^R . Equation (A.6) is only satisfied when $V_1^L < \bar{V}_1^R$; coupled again with Jensen's inequality,

$$E_1^L \leq \max\{\bar{V}_1^R - D, 0\} \leq \bar{E}_1^R,$$

where \bar{E}_1^R is the time 1 expected value of E_2^R . By assumption, parties enter bankruptcy only when they cannot agree, thus $E_1^L \leq \bar{E}_1^R$ implies $\bar{C}_1^R < C_1^L$, a contradiction. \square

Proof of Lemma 2. The entrepreneur's time 2 returns from a workout are

$$E_2^W = V_2^C - C_2^W,$$

where

$$C_2^W = \min\{\tilde{D}, V_2^C\}.$$

Since C_2^W is non-negative and non-decreasing in \tilde{D} , $\partial E_2^W / \partial \tilde{D} \leq 0$. The entrepreneur prefers to set \tilde{D} as small as possible.

Let $\bar{V}_1^C < \bar{C}_1^B$. Because the limit of C_2^W as \tilde{D} approaches infinity is V_2^C , $\bar{C}_1^W < \bar{C}_1^B$ for all \tilde{D} . Whatever \tilde{D} the entrepreneur offers, the creditor refuses; the latter is always better off in bankruptcy.

Let $\bar{C}_1^B \leq \bar{V}_1^C$. By the same logic, there exists some \tilde{D} such that $\bar{C}_1^W = \bar{C}_1^B$. This is the smallest \tilde{D} the creditor will accept. Thus, all is proved. \square

Proof of Proposition 1. First let $\bar{V}_1^B \leq \bar{V}_1^C$. Thanks to limited liability, $\bar{C}_1^B \leq \bar{V}_1^B$, thus $\bar{C}_1^B \leq \bar{V}_1^C$. Because C_2^W is increasing in \tilde{D} , a workout exists per Lemma 2 which combined with $\bar{V}_1^B \leq \bar{V}_1^C$ implies $\bar{E}_1^B \leq \bar{E}_1^W$. The entrepreneur (weakly) prefers a workout to bankruptcy. He then prefers voluntary liquidation to a workout if and only if $\bar{E}_1^W \leq E_1^L$.

Now let $\bar{V}_1^C < \bar{V}_1^B$. Assume a workout proposal exists, *i.e.*, $\bar{C}_1^B \leq \bar{V}_1^C$. Nevertheless, $\bar{V}_1^C < \bar{V}_1^B$ implies $\bar{E}_1^W < \bar{E}_1^B$: the entrepreneur prefers bankruptcy to a workout.

Preference for bankruptcy implies actual preference for one of its two outcomes: liquidation or reorganisation. If the entrepreneur prefers reorganisation to liquidation, he prefers reorganisation to bankruptcy and reorganisation to a workout. But $\bar{V}_1^R \leq \bar{V}_1^C$ implies a workout would generate better returns *ex post* yet from Lemma 2 incur identical costs *ex interim*, meaning $\bar{E}_1^B \leq \bar{E}_1^W$, which is false. The entrepreneur cannot prefer reorganisation to liquidation; he must therefore prefer liquidation to reorganisation. By extension, $\bar{E}_1^B \leq E_1^L$ so he (weakly) prefers to voluntarily liquidate the project.

If no workout proposal exists, the entrepreneur chooses to voluntarily liquidate if and only if $\bar{E}_1^R \leq E_1^L$. \square

Proof of Lemma 3. It remains to show that Equation (1.3) represents the change in \bar{C}_0 with respect to D and $\partial\bar{V}_0/\partial D$ is negative for non-viable firms. First, note that the inequality in Proposition 1 does not depend on X_1 . It is therefore known at time 0 whether financially distressed firms choose between voluntary liquidation and a workout or voluntary liquidation and bankruptcy at time 1.

Per Proposition 1 and its proof, firms liquidate when $X_1^* \leq X_1$, where X_1^* solves $\bar{E}_1^{W*} = E_1^{L*}$ if $\bar{V}_1^B \leq \bar{V}_1^C$ and $\bar{E}_1^{R*} = E_1^{L*}$, otherwise. Equivalently,

$$C_1^{L*} - \bar{C}_1^{R*} = \begin{cases} \frac{1}{q} (V_1^L - \bar{V}_1^C) & \text{if } \bar{V}_1^B \leq \bar{V}_1^C \\ V_1^L - \bar{V}_1^R & \text{otherwise} \end{cases}. \quad (\text{A.7})$$

Differentiating both sides of Equation (A.7) with respect to D ,

$$\left(1 - \frac{\partial X_1^*}{\partial D}\right) \Pi_1 \left(\frac{D - X_1^*}{1 - Y} - K_2\right) = 0, \quad (\text{A.8})$$

where Π_1 is the marginal distribution of X_1 . Equation (A.8) is satisfied only if $\partial X_1^*/\partial D = 1$.

Let X_1^H be the upper support of Π_1 . Aggregate expected returns at time 0 are

$$\bar{V}_0 = \int_{X_1^*}^{X_1^H} V_1^L d\Pi_1 + \int_0^{X_1^*} \bar{V}_1^o d\Pi_1,$$

where $o \in \{C, B\}$ per Proposition 1. Differentiating with respect to D ,

$$\frac{\partial \bar{V}_0}{\partial D} = -(\bar{V}_1^L - \bar{V}_1^o) \Pi_1'(X_1^*).$$

$\partial\bar{V}_0/\partial D$ is the expected fall in value from inefficiently choosing bankruptcy or a workout over liquidation. Given the latter scenario maximises returns, $\partial\bar{V}_0/\partial D$ is negative.

Analogously, expected creditor returns at time 0 are

$$\bar{C}_0 = \int_{X_1^*}^{X_1^H} C_1^L d\Pi_1 + \int_0^{X_1^*} \bar{C}_1^B d\Pi_1. \quad (\text{A.9})$$

Differentiating with respect to D and substituting $\partial X_1^*/\partial D = 1$ from Equation (A.8) and Equation (A.7),

$$\begin{aligned} \frac{\partial \bar{C}_0}{\partial D} &= \int_{X_1^*}^{X_1^H} \frac{\partial C_1^L}{\partial D} d\Pi_1 + \int_0^{X_1^*} \frac{\partial \bar{C}_1^B}{\partial D} d\Pi_1 - q \left(C_1^{L*} - \bar{C}_1^{R*} \right) \Pi_1'(X_1^*) \frac{\partial X_1^*}{\partial D} \\ &= \left(1 - q \Pi_1(X_1^*) \right) \mathbb{E}_0 \left[\frac{\partial C_1^L}{\partial D} \mid \mathcal{L} \right] + q \Pi_1(X_1^*) \mathbb{E}_0 \left[\frac{\partial \bar{C}_1^R}{\partial D} \mid \mathcal{R} \right] + \frac{\partial \bar{V}_0}{\partial D}, \end{aligned} \quad (\text{A.10})$$

where \mathcal{L} and \mathcal{R} are the set of outcomes in which creditors accept payoffs consistent with liquidation and reorganisation, respectively. $q \Pi_1(X_1^*)$ is the probability the project is reorganised, making Equation (A.10) equivalent to Equation (1.3), as desired. \square

Proof of Proposition 2. For (i), it remains to show that Equation (1.5) is \bar{C}_0 . From Equation (A.9) and the definition of \bar{C}_1^B ,

$$\begin{aligned} \bar{C}_0 &= \int_0^{X_1^H} \bar{C}_1^B d\Pi_1 + \int_{X_1^*}^{X_1^H} (\bar{C}_1^L - \bar{C}_1^B) d\Pi_1 \\ &= \bar{C}_0^B + \int_{\mathcal{L}^*} (\bar{C}_1^L - \bar{C}_1^B) d\Pi_1, \end{aligned} \quad (\text{A.11})$$

where \mathcal{L}^* is the set of X_1 such that $X_1^* \leq X_1$. For all $X_1 \in \mathcal{L}^*$, the firm voluntarily liquidates. Per Proposition 2, voluntary liquidation requires \bar{V}_1^L is at least \bar{C}_1^L , *i.e.*, $\bar{C}_1^L = D$; Equation (A.11) is equivalent to Equation (1.5).

For (ii), let $\bar{V}_1^C < \bar{V}_1^B$ and consider a debt contract $K_0 < D$ such that $E_2^R = 0$ for all X_1, X_2 . Per Proposition 2, the insolvent entrepreneur prefers bankruptcy only when \bar{E}_1^B is strictly more than E_1^L ; the entrepreneur liquidates, otherwise. This inequality is equivalent to $E_1^L < \bar{E}_1^R$, which is false: limited liability ensures E_1^L is non-negative and $\bar{E}_1^R = 0$ since E_2^R is 0 by assumption. Thus, the entrepreneur always liquidates when insolvent. Since solvency implies full repayment and involvency guarantees liquidation, the creditor recovers at least K_0 in every state. He is willing to lend at D . Thus, all is proved. \square

Proof of Corollary 1. Let $\bar{V}_1^C < \bar{V}_1^B$ and define X_1^H and X_2^H as the upper support of X_1 and X_2 , respectively.

Assume $(1 - Y)(X_2^H + K_2) \leq K_0$. Set $D = K_0$ and consider $X_1 < K_0$. The firm is insolvent. The entrepreneur's expected returns in reorganisation are

$$\bar{E}_1^R \leq \max\{X_1 + (1 - Y)(X_2^H + K_2) - K_0, 0\} = 0 \leq X_1 = E_1^L.$$

Since $\bar{E}_1^R \leq E_1^L$, the entrepreneur liquidates if insolvent and repays K_0 when not. The creditor is paid K_0 in all states. Thus, $\bar{C}_0 = K_0$. The entrepreneur obtains a loan per Lemma 3 and not per Proposition 2(ii).

Assume $K_0 < (1 - Y)(X_2^H + K_2)$. Let $D = X_1^H + (1 - Y)(X_2^H + K_2)$. Then $X_1 < D$, $E_1^L = 0$ and $E_2^R = 0$ for all X_1 and X_2 . The firm defaults regardless of initial earnings; the entrepreneur agrees to voluntarily liquidate and D is so high that the creditor keeps the entirety of those proceeds. Thus, $\bar{E}_0 = 0$ and $\bar{C}_0 = \bar{X}_1 + K_0$, where \bar{X}_1 is the time 0 expected value of X_1 . \square

Proof of Corollary 2. In the proof of Corollary 1 it is shown that if $\bar{K}_0 \leq K_0$ then $D = K_0$. It remains to show that viable firms choose $K_0 = \underline{K}_0$ at $K_0 \leq D$ if creditors are willing to lend.

Consider a viable firm and the set of all K_0 such that $\underline{K}_0 \leq K_0$, Equation (1.4) is satisfied and the creditor is willing to lend per Lemma 3. The firm always continues; \bar{V}_0 is constant. Per Equation (1.2), \bar{E}_0 is decreasing in K_0 . The entrepreneur chooses the base model and thus all is proved. \square

Proof of Proposition 4. Proposition 4 follows by setting $D = \underline{K}_0$ and examining outcomes in each state. The creditor always recovers D and the entrepreneur's decisions are always efficient. \square

B Robustness

B.1 Super-senior financing. Let lower support for X_1 be $X_1^L < 0$; X_2 remains non-negative.⁴³ Consider the entrepreneur of a viable firm who obtained a loan at face value D_1 and earned $X_1 < 0$ in time 1. To continue operating, he must finance first period losses. I assume loans taken out in this manner are legally conferred seniority to all existing debt but obligations in the original debt contract award existing creditors right of first refusal.

Allowing super-senior financing prevents creditors from blocking new loans—should existing debt holders refuse, the borrower can turn to the wider lending market. Thus, creditors evaluate the new loans independent of their previous stake. They extend one if there exists some D_2 such that

$$\mathbb{E}_1 [\min\{D_2, X_2 + K_2\}] = -X_1. \quad (\text{B.12})$$

Equation (B.12) is increasing in D_2 . D_2 exists if and only if $-X_1 \leq \bar{X}_2 + K_2$, where \bar{X}_2 is the expected value of X_2 . If D_2 does not exist for the original creditor, it does not exist for any creditor. Without necessary financing, the firm is liquidated.⁴⁴

⁴³Since neither creditor nor entrepreneur are responsible for time 2 losses, the assumption $0 \leq X_2$ is made for explanatory ease. If X_2 were negative, an equivalent non-negative random variable and corresponding probability mass function exist that assign 0 for all X_2 such that $X_2 + K_2 < 0$ and $X_2 + K_2$, otherwise.

⁴⁴Non-negative returns at time 1 introduces a nuance to “viability”. In fact, the firm was *not* viable—only expected to be. After realisation of time 1 earnings, it is better to liquidate, since project earnings are not high enough to cover the costs required to keep it in operation.

When evaluating the original loan at time 0, the entrepreneur expects D_1 when $D_1 \leq X_1$. If X_1 falls below that but above 0, the project is insolvent. In the absence of bankruptcy costs, workout negotiations favour the creditor since reorganisation is equivalent to continuation and liquidation guarantees recovery of his initial investment; without loss of generality I assume both parties agree to continue operating the firm but do not otherwise modify the original loan contract. Creditor returns are

$$\mathbb{E}_1 [\min\{D_1, X_1 + X_2 + K_2\}].$$

If X_1 is less than 0 but more than $-(\bar{X}_2 + K_2)$, the creditor loans $-X_1$ per Equation (B.12). His expected returns at time 1 are

$$\mathbb{E}_1 [\min\{D_1 + D_2, X_2 + K_2\}] + X_1.$$

When X_1 falls below $-(\bar{X}_2 + K_2)$ the project is liquidated.⁴⁵ Since the firm is deemed “viable”, $K_0 < -(\bar{X}_2 + K_2)$. The creditor earns nothing.

In every scenario, creditor returns increase in D_1 . Their supremum occurs at the limit as D_1 tends to infinity, *i.e.*,

$$\bar{X}_1 + \bar{X}_2 + K_2, \tag{B.13}$$

where \bar{X}_1 is the expected value of X_1 . Since the firm is viable, Equation (B.13) is more than K_0 . Applying similar arguments used to prove Proposition 2, a D_1 exists that satisfies $\bar{C}_0 = K_0$. The lending conditions for viable firms are not fundamentally altered when bankruptcy law allows super-senior financing.

B.2 Strategic default. In this section, I illustrate that strategic default does not affect lending when reorganisation is costless. In a minority of cases, judicial error may lead to premature liquidation.

Let $Y = 0$. Absconding with more than X_1 requires surreptitious liquidation that is a serious breach of contract and probably constitutes fraud. I assume its punishment is enough to deter it entirely. Additionally, $X_1 < D$ triggers insolvency and if the creditor desires, court supervision implied by bankruptcy. Thus, strategic default is possible only up to $D \leq X_1$.⁴⁶

Consider non-viable firms. Since $Y = 0$, $\bar{V}_1^C < \bar{V}_1^B$; per Proposition 1, insolvency implies liquidation or bankruptcy. For all $D \leq X_1$, however, $\bar{E}_1^B < E_1^L$. The firm does not strategically default.

Consider now viable firms. As discussed in Section 2.2, for some X_1 entrepreneurs are better off in a workout than they would be continuing while solvent—creating

⁴⁵Note that even if the firm were to go bankrupt it would be immediately liquidated. The new loan is required to continue operating (for example, to pay wages), thus even if the judge mandated reorganisation no funding would emerge to make that possible.

⁴⁶In an alternative scenario, the entrepreneur could steal all of X_1 . Using analogous arguments, non-viable firms always obtain credit, whereas viable firms did anyway per Proposition 1(ii).

motive for strategic default. Nevertheless, creditors expect at least K_0 even in reorganisation when X_1 is naught. Since reorganisation is by definition court-supervised and the judiciary assumed ethical, worst-case-scenario creditors turn to it for future oversight.⁴⁷ Regardless, viable firms always get credit. If bankruptcy guarantees reorganisation when creditors favour it or if entrepreneurs cannot steal time 2 earnings, firms efficiently continue. Otherwise, judicial error may cause prematurely liquidating a minority of them.

B.3 Bargaining power. The following section sketches model conclusions when the entrepreneur and creditor share bargaining power during debt renegotiations. Assume first bargaining power is allocated entirely to the entrepreneur. Creditors accept any debt contract that is no worse than their expected returns in formal bankruptcy; entrepreneurs therefore offer a revised debt contract \tilde{D} that solves

$$\bar{C}_1^W = \bar{C}_1^B. \quad (\text{B.14})$$

Similarly, when creditors have all the bargaining power, entrepreneurs accept any workout proposal that gives them at least as much as their expected earnings in formal bankruptcy. Now, \tilde{D} is the solution to

$$\bar{E}_1^W = \bar{E}_1^B. \quad (\text{B.15})$$

When entrepreneurs and creditors share bargaining power, each extracts a proportion of the surplus from Equation (B.14) and Equation (B.15), respectively. To illustrate the concept, I introduce a new variable, z , where z is a number between zero and 1. In this framework, the new debt contract, \tilde{D} , solves

$$z(\bar{E}_1^W - \bar{E}_1^B) = (1 - z)(\bar{C}_1^W - \bar{C}_1^B). \quad (\text{B.16})$$

$z = 0$ grants the entrepreneur all bargaining power; $z = 1$ grants it to the creditor; $z \in (0, 1)$ permits sharing workout surplus. To simplify exposition, Equation (B.17) expresses Equation (B.16) in terms of creditor returns, only.

$$\bar{C}_1^W = C_1^B + z(\bar{V}_1^C - \bar{V}_1^B). \quad (\text{B.17})$$

If a settlement is reached, the creditor prefers liquidation to a workout if and only if $\bar{C}_1^W \leq C_1^L$; plugging in Equation (B.17), the condition is

$$\bar{C}_1^B + z(\bar{V}_1^C - \bar{V}_1^B) \leq C_1^L. \quad (\text{B.18})$$

The entrepreneur prefers liquidation to a workout if and only if $\bar{E}_1^W \leq E_1^L$, or equivalently

$$C_1^L \leq C_1^B + z(\bar{V}_1^C - \bar{V}_1^B) - (\bar{V}_1^C - V_1^L). \quad (\text{B.19})$$

⁴⁷ $Y = 0$ implies no corruption, *i.e.*, an ethical judiciary.

$\bar{V}_1^C \leq V_1^L$ is a necessary condition for both Equation (B.18) and Equation (B.19) to hold simultaneously; thus, for no $z \in [0, 1]$ are viable firms ever inefficiently liquidated in a settlement. Since \bar{C}_1^W is increasing in z , creditor losses from default decline—as do credit rationing and the cost of debt.

For non-viable firms, a necessary and sufficient condition for \tilde{D} to exist is for returns in continuation to exceed creditors' expected returns in bankruptcy plus their bargaining surplus awarded during renegotiations:

$$\bar{C}_1^B + z(\bar{V}_1^C - \bar{V}_1^B) \leq \bar{V}_1^C. \quad (\text{B.20})$$

Because \bar{C}_1^B is increasing in D , $\bar{C}_1^B \leq \bar{V}_1^B$. Thus a sufficient (but not *necessary*) condition for Equation (B.20) to be satisfied is

$$\bar{V}_1^B \leq \bar{V}_1^C, \quad (\text{B.21})$$

i.e., the same condition from Proposition 1.

Consider the set of firms that violate Equation (B.21). As z increases, the left-hand side of Equation (B.20) declines. Workouts more likely exist. Because time 0 claims by creditors that they will have no choice but to file for bankruptcy are less credible, entrepreneurs are less willing to accept a loan contract with an exorbitant D per Proposition 2(ii). The profitable nice lending market market (Corollary 1) shrinks. When creditors have all the bargaining power ($z = 0$), Equation (B.20) collapses to $\bar{C}_1^B \leq \bar{V}_1^B$ —which is always satisfied. Proposition 2(i) applies to all firms; no firm goes bankrupt and there are no supranormal profits in lending.

C Extensive form

Figure C.1 is an extensive form representation of the bankruptcy game. This representation is not unique—the actions and proofs (Appendix A) are also consistent with a game in which the entrepreneur files for bankruptcy and/or the creditor proposes to liquidate or enter a workout.⁴⁸ Complete details on assumptions and legal rationale behind actions in bankruptcy are outlined in Section 2; a brief description is provided in the notes.

⁴⁸It is still assumed the entrepreneur has all the bargaining power when negotiating a workout, thus if the creditor makes the workout offer, it would satisfy Lemma 2. For a full discussion on how the entrepreneur's bargaining power changes the game, see Appendix B.3.

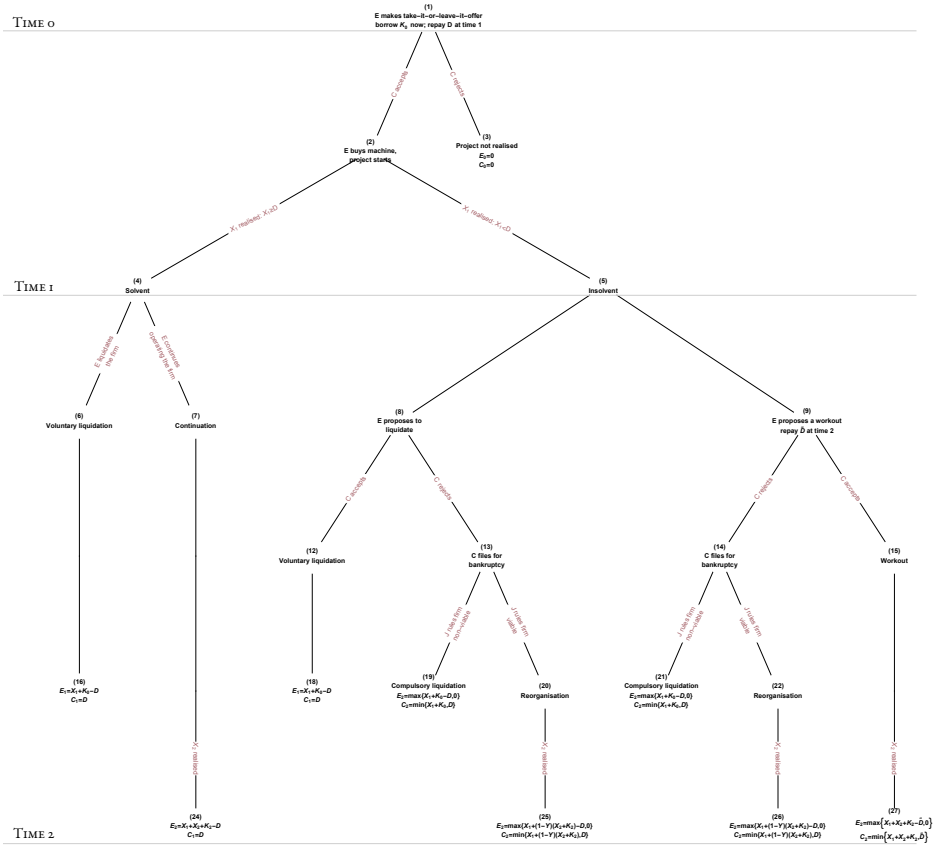


FIGURE C.1: The bankruptcy game, entrepreneur moves first in renegotiations

The game. The entrepreneur (E) moves first by making a take-it-or-leave-it offer to borrow K_0 at time 0 and repay some amount D at time 1 (node 1). The creditor (C) then accepts the proposal, E buys the machine and the project starts (node 2) or C rejects the proposal and the project is not realised (node 3). At time 1, Nature moves by selecting the realisation of X_1 , which determines whether the project is solvent (node 4) or insolvent (node 5). If the project is solvent, E may choose to liquidate (node 6) or continue operating the firm (node 7). If the project is insolvent, E may propose to C to liquidate (node 8) or enter a workout (node 9). If E proposed to liquidate and C accepts, the project is voluntarily liquidated (node 18); if C rejects, the project enters bankruptcy (node 13). If E proposes a workout and C accepts, the project enters a workout (node 15); if C rejects, the project enters bankruptcy (node 14). In bankruptcy, the judge (J) may rule the firm is non-viable, in which case the firm enters compulsory liquidation (nodes 19 and 21), or rule it is viable and the firm enters reorganisation (nodes 20 and 22). If the firm is at nodes 7, 15, 20 or 22, Nature moves again at time 2 by selecting the realisation of X_2 . At time 2 the project is shut down, the machine sold for K_2 , the creditor paid the minimum of the project value and D (nodes 24, 25 and 26) or \bar{D} (node 27) and the entrepreneur retains whatever is left.