Bankruptcy Law and Corporate Investment Decisions*

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Abstract

This paper contributes to the debate over the widespread process of bankruptcy reform taking place in major EU countries providing a set of results that challenge the wisdom that “soft” bankruptcy codes have necessarily positive effects.

We analyze a financing game between a lender and a cash constrained entrepreneur that can start either a short term or a long term project. The legal environment is modeled assuming that under bankruptcy the insolvent entrepreneur is given a chance to lead a process of financial restructuring. The main result of the model is that “soft” bankruptcy procedures are subject to a problem of limited commitment that exacerbates agency costs and cause short-termism in investment decisions.

In two extensions we also analyze the robustness of the short-termism result, and show that it holds both in an environment with monopolistic lending, and if the bankrupt entrepreneur is entitled to conduct a process of technological restructuring.

We conclude that the crucial force driving the short-termism result is the repeated moral hazard problem, and the costs it brings about in environments with “soft” bankruptcy procedures. Consequently, our policy recommendation is in favor of a bankruptcy reform scheme that limits the power of the entrepreneur to guide the venture during the phase of rehabilitation.

**JEL codes:** D82, G33, K22.

**Keywords:** Bankruptcy Law, Financial Contracts, Limited Commitment, Soft budget constraint, Short-termism.
1 Introduction

The law and economics literature has traditionally opposed the American “soft” approach to bankruptcy to the “tough” one typical of European legislators. Recently, this dichotomy has been put at stake by a process of convergence due to the adoption, in major European countries, of bankruptcy codes inspired by U.S. Chapter 11. The European Commission has undertaken important actions to support this process, based on the presumption that an harsh approach to failure would deter risk taking, experimentation, innovation: the belief of the Commission is that bankruptcy favors entrepreneurial initiative if it treats failure in a “soft” fashion.

Several European countries have consequently reformed their bankruptcy codes. In Germany, the reform of 1999 introduced a system of corporate reorganization analogous to Chapter 11 in the balance of creditors’ and debtors’ rights. More precisely, as in Chapter 11, Germany’s Insolvenzverfahren prescribes the automatic stay on creditors’ claim, the super-seniority of lenders that fund the bankrupt firm, and creditors’ right to decide over the approval of the reorganization plan. Instead, unlike Chapter 11, it is a court-appointed administrator that formulates the reorganization plan, and not the bankrupt management. In Italy, before the reform of 2006, the insolvency procedure was rather “tough” with debtors, as bankrupt entrepreneurs were subject to a long phase of rehabilitation before they could start a new enterprise and access to credit. In the current regime, instead, before the opening of the liquidation phase, the entrepreneur has the right to start a process of reorganization (concordato preventivo), and negotiate with creditors over the restructuring of outstanding liabilities, as in Chapter 11. In 2005 the French legislator reformed insolvency law introducing the proc` edure de sauvegarde: the new system prescribes the automatic stay of creditors’ claims, and gives to the incumbent management the rights to retain control over the company and devise a restructuring plan. In other words, Germany, Italy and France have implemented a “soft” regime, and, more interestingly, the new systems have been designed adopting some of the key features of Chapter 11.

Remarkably, this wide policy shift will be put under severe scrutiny by the effects

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1See the website http://ec.europa.eu/enterprise/entrepreneurship/sme2chance/ for a detailed description of the initiatives undertaken since 2002 by the Commission to promote a more lenient cultural and legislative environment towards entrepreneurial failure.

2Section 2 provides a more informative synopsis on Chapter 11 and its features. Moreover, see Stanghellini (2007) for a general overview of bankruptcy law and economics, and Brouwer (2006) for a comparative analysis between the United States and Europe in the discipline of reorganization in bankruptcy. Finally, see Franks and Davydenko (2008) for an empirical study of how differences over creditors’ rights among France, UK and Germany insolvency systems impact over banks’ lending decisions to distressed companies.
of the international financial meltdown triggered, in Fall 2008, by the failure of major US credit institutions. Indeed, Standard & Poor’s reports that the default rate related to European companies in its speculative-grade category is expected to rise to 11.1% in 2009 and 2010, from last fifteen years’ 3.2%. Clearly, this poses an important challenge to the recently adopted bankruptcy schemes, because a successful restructuring of the distressed companies involved in the crisis is crucial to sparkle a fast process of recovery.

We contribute to the debate on the optimal design of bankruptcy providing a set of results that challenge the wisdom that “soft” bankruptcy codes have necessarily positive effects. Indeed, we show that a lenient procedure may bring about a problem of short-termism in investment decisions.

The paper presents a stylized principal agent model with repeated moral hazard in which a cash constrained entrepreneur can choose to undertake either a short term project or a long term project. The short term project is completed in one period and returns a lower net present value than the long term project. However, the long term project requires two periods to be finished, and exposes the entrepreneur to the risk of bankruptcy.

Our aim is to compare the impact on investment decisions of a bankruptcy game that tries to replicate the most salient features of a real “soft” code, with respect to a benchmark case in which liquidation follows automatically in case of insolvency. Bankruptcy is modeled through the implications that it imparts on entrepreneur’s future, and, strictly speaking, it consists in a renegotiation game that resembles Chapter 11 in the balance of lenders’ and entrepreneur’s rights.

The short-termism result is derived in two steps. Firstly, we prove that under “soft” bankruptcy lenders’ behavior is characterized by limited commitment, and we do this following a mechanism borrowed from the literature on the “soft budget constraint” problem. If the bankrupt entrepreneur finds new funds to carry on the project during the phase of financial restructuring, existing lenders may be tempted

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4This literature highlights the costs to a principal from the lack of commitment to remain tough with an agent. For instance, in their seminal paper, Dewatripont and Maskin (1995) show that when the credit market is centralized, a “deep pocket” creditor cannot credibly commit to terminate a project whose future expected surplus is positive. Instead, in decentralized credit markets, creditors are cash constrained and need to sustain costs of monitoring if they do not enforce termination. The negative effect of limited commitment is that the termination threat is looser and the implementation of bad projects becomes more difficult to prevent. See Kornai et al. (2003) for an extensive analysis of this literature, covering both the conceptual genesis, and its main formal applications.
to approve project’s continuation, and renegotiate the prescription of termination contained in the initial contract. On the one hand, this increases ex-post efficiency, because it allows investors to improve recovery rates, on the other hand, it decreases ex-ante efficiency, because the prospect of renegotiation rises the agency costs that investors need to bear to induce the right incentives. Secondly, we show that the problem of limited commitment generates short-termism. Indeed, the higher transfer that lenders need to bear to cope with entrepreneur’s moral hazard reduces the expected net present value of the long run project, inducing the same entrepreneur to prefer projects that return immediate results, but are not subject to the risk of bankruptcy.

The paper is able to deliver a set of testable predictions. The first is related to the indirect costs generated by “soft” bankruptcy systems in terms of the higher cost of funding caused by the worsening of the agency problem. In this model we deal with indirect costs because we show that agency costs borne by investors increase when the entrepreneur anticipates a lenient bankruptcy procedure. Direct costs, instead, would comprise the expenses necessary to carry out the process of reorganization/liquidation.5

The second concerns the effect that the limited commitment problem characterizing “soft” procedures has on ex ante investment choices: more specifically, if the higher agency costs erode recovery rates up to make long run strategies not implementable, then a bias for short-termism arises. This result is consistent with the evidence provided in several empirical studies on the pressure exerted by stake-holders on American corporate executives for the achievement of short term objectives. A survey by Poterba and Summers (1995) conducted over 1000 U.S. firms show that CEOs perceive to have a time horizon considerably shorter than their competitors in Europe. Also, Poterba and Summers (1995), as well as Blume et al. (1980), provide an estimate of firms’ cut-off rates that substantially exceeds the real market discount rate. Corbett (1987) points at the difference in funded projects’ length to show that Anglo-Saxon corporations are subject to a stronger bias towards short-termism than their German and Japanese counterparts. The theoretical literature has usually explained this evidence confronting the binding role that the risk of takeovers have in the American economy with the long term horizons that the relationship banking system gives to firms in Continental Europe and Japan. We, instead, propose a mechanism based on the way bankruptcy law affects ex ante entrepreneur’s incentives to explain this evidence.

The third prediction regards the effect of competition on financial markets: we show that in a context with a monopoly lender the short-termism result is further

5See Senbet and Seward (1995) for a survey over indirect and direct costs of bankruptcy.
reinforced than in one with competitive financial markets. The forth is that the short-termism result holds even if the bankrupt entrepreneur is allowed to undertake a process of technological restructuring.

Therefore, our policy recommendation is in favor of a bankruptcy reform scheme that, like the new German procedure, limits the power of the entrepreneur to guide the venture during the phase of rehabilitation. Indeed, we show that the repeated moral hazard problem is crucial for the determination of the short-termism result, and such problem is harsher when the entrepreneur stays in charge of the firm in bankruptcy.

The paper proceeds as follows. Section 2 gives a short introduction to Chapter 11, Section 3 compares our findings with those established in related papers, and Section 4 presents the model. In Section 5 we discuss the benchmark case in which the lender can commit to the optimal initial contract with the entrepreneur, while in Section 6 we relax the assumption of full commitment and study the effects of bankruptcy. In Section 7 we solve the model under the assumption of monopolistic lending, and show that the short termism result is reinforced. Instead, Section 8 proves that even allowing the entrepreneur to undertake a process of technological restructuring in case of first period failure the main results are not affected. Section 9 discusses which market forces and law policies may restore efficient investment decisions. Section 10 concludes.

2 Chapter 11

In the United States, Chapter 7 and Chapter 11 of the bankruptcy law provide the federal discipline that regulates corporate insolvency procedures. Chapter 7 governs the phase of liquidation, while Chapter 11 governs the process of financial restructuring, and they are both carried out under the oversight of specialized bankruptcy courts. Entry in Chapter 7 is usually triggered by creditors, as consequence of entrepreneur’s default on existing liabilities. Subsequently, the bankruptcy judge appoints a trustee who shuts the firm down, sells its assets, and distributes the proceeds to creditors following the Absolute Priority Rule (APR hereafter).\textsuperscript{6}

Chapter 11 ultimate target is to protect a bankrupt firm from outsiders’ pressure while it is coping with a process of rehabilitation. Chapter 11 prescribes a system of countervailing rights aimed at protecting both creditors and debtors interests.

\textsuperscript{6}The APR determines the order of creditors’ claims reimbursement in bankruptcy. It states that creditors who have secured their loans have seniority over other creditors, and, therefore, have the right to be paid back first.
On debtors’ side is the provision that allows the entrepreneur to file unilaterally for Chapter 11, at prospect of potential default. Entry in Chapter 11 opens the Debtor-in-Possession (or DIP) phase, during which the entrepreneur has the right to stop payments to existing investors (automatic stay), and devise a restructuring plan to be submitted to creditors by a given period of time. During the Debtor-In-Possession phase, the entrepreneur can also search for new funds, and, in order to facilitate this, Chapter 11 prescribes that the investors willing to finance bankrupt firms are privileged in the reimbursement of their claims at the end of the restructuring process - i.e., they can be repaid before (even senior) existing investors.

Creditors have two important rights in Chapter 11: first, they can propose an alternative plan to entrepreneur’s; second, they vote on the restructuring project to implement in a ballot disciplined by a system of qualified majorities. In fact, rejecting the plan, creditors can reverse the restructuring procedure into a Chapter 7 liquidation process.

Although Chapter 11 is generally classified as a debtor friendly procedure, an empirical study by Bharath et al. (2007) show that, in fact, this does not completely fit with the most recent evidence, which document Chapter 11 increased attitude to defend creditors’ interests, instead of equity’s.

In the model we compare the impact of a variety of renegotiation environments in bankruptcy over ex ante investment choices considering. More specifically, the main bankruptcy game we will consider is based on Chapter 11 and the rights it grants to contracting parties. Particular emphasis is given to two of them: the right that the entrepreneur has to unilaterally file for bankruptcy, search for new funds and devise a restructuring plan, and the right that lenders have to vote on the same plan.

3 Related Literature

Gertner and Scharfstein (1991) have been the first to show how inefficient decisions over bankrupt firms’ continuation distort ex ante corporate investment choices. In this literature, however, two papers are particularly close in spirit to this one, Bebchuk (2002) and Acharya and Subramanian (2007). Bebchuk (2002) focuses on how the APR deviations that characterize Chapter 11 proceedings influence equity-holders choice between two investment projects, one riskier than the other. Bebchuk

7The deadline is set by law at 120 days, but the bankruptcy judge can concede extensions.
8Creditors vote on the plan by classes of seniority. More specifically, an entire class of claims is deemed to accept a plan if the plan is accepted by creditors that hold at least two-thirds in amount and more than one-half in number. A vote of acceptance by a class will bind all creditors in the class.
shows that equity-holders may be tempted to choose the risky project because in failure states they are able to secure a positive rent from Chapter 11 negotiations. However, Bebchuk does not study the contracting game between creditors and equity-holders, and implicitly assumes that the former are unaware of the type of investment projects available to the latter. Instead, in this paper we assume that a lender can observe and verify the investment plan that the entrepreneur undertakes, and designs the optimal contract as to induce her to choose the most profitable one. Consequently, we derive the investment strategy choice as function of the optimal equilibrium contracts, and study how the same choice changes with the type of bankruptcy. Acharya and Subramanian (2007) study how different bankruptcy types impact on firms’ decision over innovation and capital structure. Their main result is that firms that operate in an economy with a “soft” bankruptcy procedure are more prone to carry out innovative strategies. This result is driven by income tax and bankruptcy costs, while, in our model, it is the costs associated to the limited commitment problem that crucially determines the investment strategy chosen at equilibrium.

An important strand of the economic literature on bankruptcy emphasizes the trade-off between the excessive liquidation caused by “tough” procedures and the excessive continuation generated by “soft” procedures. For example, White (1994) investigates the role of bankruptcy as filtering device in a model with adverse selection, and highlights the way bankruptcy can distort liquidation/continuation decisions. Our paper focuses on the agency costs caused by moral hazard and limited commitment. The costs generated by moral hazard induce the parties to write a contract that prescribes termination in case of project’s failure. The problem of limited commitment associated to “soft” procedures, though, weakens this threat, and forces the lender to grant a higher monetary transfer in order to induce the right incentives on entrepreneur’s side.

This paper is also related to the literature that studies the decision over corporate strategies’ horizon. In particular, Dewatripont and Maskin (1995) and von Thadden (1995) investigate the relationship between the “soft budget constraint” problem and investments’ horizon, and conclude that hardening the budget constraint may induce short-termism in investment behavior. In these papers it is shown that systematically avoiding the refunding of projects that yield a low outcome in the short term hinders the implementation of both bad projects, and slow but good projects, which are able to generate very high gains only in the long-term. Clearly, this is not efficient if the higher profitability of long term projects offsets the losses caused by bad projects. Our contribution to this strand of literature consists in the formal analysis

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9 This trade-off has also influenced the debate over the design of the optimal bankruptcy reform. See Hart (1995), chapter 7, for a comprehensive discussion on this topic.
of corporate bankruptcy as a commitment device. We obtain the opposite result that hardening the budget constraint induces long-termism, because it allows investors to keep the termination threat credible, and limit the costs associated to the problem of repeated moral hazard. In particular, our model differs from von Thadden (1995) in that we assume that the lender can observe the project chosen by the firm, but cannot observe first period profits. We design a problem of repeated moral hazard that, under “soft”, lenient, procedures, can cause a reduction of the long term project expected value up to create the bias for short-termism.

Several recent theoretical and empirical contributions seem to confirm the theses put forward by those who defend “soft” bankruptcy procedures. For example, Acharya and Subramanian (2007) provides empirical evidence on how “soft” codes foster innovation, Biais and Mariotti (2008) develop a model that shows how these procedures produce positive externalities at a general equilibrium level, and Landier (2006) proves that “soft” bankruptcy stimulates entrepreneurial initiative. More specifically, Landier develops a model where capital markets attitude towards failure is endogenous: entrepreneurship depends on the cost of funding, which, in turn, depends on market’s expectations over failed entrepreneurs’ ability. The author shows that “soft” bankruptcy rules stimulate entrepreneurship because they grant a complete debt relief to the failed entrepreneur, and reduce the cost of capital necessary to start new projects. With respect to Landier’s analysis, we let the cost of funding depend on the severity of the moral hazard problem, which depends on bankruptcy law.

Finally, the main result of the paper follows from the assumption for which parties can renegotiate the initial contract through bankruptcy: this weakens ex ante incentives but alleviates ex post efficiency loss. Therefore, like in Bolton and Scharfstein (1996), our main focus is on the renegotiation game that is carried out between lender and entrepreneur. However, their aim is to determine the optimal number of creditors that is able to minimize the trade-off between entrepreneur’s ex ante incentives to default strategically, and the ex post efficiency costs generated by liquidation. Instead, in this paper we are more concerned about the impact of renegotiation on firm’s investment plans.

4 The Model

The model analyses a financing game in an environment characterized by asymmetric information and entrepreneur’s limited liability. There are two classes of risk-neutral agents in our economy: a cash constrained entrepreneur (or borrower,
she), and competing lenders. In what follows, we assume that each entrepreneur obtains funding from a single lender (or investor, he), and focus on a representative entrepreneur-lender pair. Moreover, market interest rates are normalized to zero.

The entrepreneur decides the time horizon of the investment, and this decision is observed and verified by the lender. More specifically, the entrepreneur can choose between two projects, a short term project ($S$) or a long term project ($L$). This choice influences firm’s expected revenues in the following way. The short term project is modeled as an outside option that returns a net payoff of $\Pi_S$. The long term project extends over up to two periods, it requires an outlay of $I$ to be started, a further infusion of $\hat{I}$ to be completed. In the first period, project $L$ delivers a payoff equal to $\Pi$ in case of success, 0 in case of failure; finally, in the second period the project generates an expected return equal to $\hat{\Pi}$ independently from first period outcome.

The profitability of the long term project is subject to two problems of asymmetric information. Firstly, the entrepreneur must decide in each period whether to exert effort or shirk. In the first period, the moral hazard problem is designed as in Holmström-Tirole (1997). More specifically, we assume that if the entrepreneur puts effort, she would succeed with certainty, and, if she shirks, she would fail with certainty, but also gain private benefits $B$. In the second period, the moral hazard problem is designed in a reduced form: in order to put effort, the entrepreneur requires the payment of a reward at least equal to $\hat{B}$ to put effort. Secondly, we assume that the entrepreneur privately observes project’s first period outcome. This assumption follows Bolton and Scharfstein (1990) and is equivalent to assume that the lender needs to bear an infinite cost to observe the true state. The main implication of this hypothesis is that long term contingent contracts are not feasible in this setting. In other words, we are limiting the scope of our analysis to short term contracts, in which refunding decisions depend on the results reported at the end of the first period by the entrepreneur. Time-line and cash flow of the game are in Figure 1.

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10In fact, what follows also applies to managerial firms in which managers’ interests are perfectly aligned with equity-holders’.

11$\Pi_S$ corresponds to the net surplus yielded by project $S$ to the agent that holds the bargaining power in the contracting phase. Even though it may seem too strong, this assumption allows to greatly simplify the analysis. In fact, what is sufficient for the main result to hold is that project $S$ is not subject to the risk of bankruptcy.

12This assumption allows to deliver a sharper result than with intermediate probabilities of project success (failure). However, we would like to remark that the nature of the results would not change assuming that the probability of success (failure) is positive but less than one (bigger than zero).
The entrepreneur holds all the bargaining power at the contracting stage: she proposes to the lender a take it or leave it offer that specifies the project she wants to carry out, and the contract that would implement it;\textsuperscript{13} if the lender accepts the offer he provides initial funding and the project is started. The class of contractual mechanisms we focus on are composed by two instruments: a per period repayment from the entrepreneur to the lender, and project’s continuation decisions. The repayment required in the first period is denoted by $R$, while expected required repayment in the second period is denoted by $\hat{R}$. Lender’s decisions over project continuation are denoted by $\zeta_j = \{0,1\}$, with $j = \Pi, 0$, and depend on first period payoff: if the entrepreneur reports $\Pi$ (respectively, 0), the project is refunded when $\zeta_\Pi = 1$ ($\zeta_0 = 1$), terminated otherwise ($\zeta_j = 0$, with $j = \Pi, 0$). Entry in bankruptcy takes place when the entrepreneur does not repay as much as it is required in the contract, and the implications for the firm depend on bankruptcy code. In Section 4.1 we will be more specific on how the game develops in bankruptcy states.

Renegotiation takes place in bankruptcy, and following the prescriptions of bankruptcy code. This implies that bankrupt entrepreneurs are allowed to renegotiate the termination clause only under the mechanisms provided by the law.

Finally, before proceeding with the derivation of the optimal contracts, we introduce three assumptions on the parameters of the model.

\textit{Assumption 1.}

\begin{itemize}
  \item[i.] $\Pi > B > 0$;
  \item[ii.] $\Pi > I > 0$;
  \item[iii.] $\Pi - \hat{I} - \hat{B} > 0$.
\end{itemize}

Assumption (1.i) implies that, in the first period, entrepreneur’s choice over profit’s revelation is more binding than the one related to effort provision; Assumption (1.ii) implies that the long term project has positive net present value in the first period; and Assumption (1.iii) implies that the long term project has positive pledgeable income in the second period.\textsuperscript{14}

\textsuperscript{13}Clearly, the way we modeled strategy $S$ implies that the relative contract just specifies how $\Pi_S$ is split.

\textsuperscript{14}By pledgeable income we mean the surplus delivered by the project net of the cost related to investment allotment and private benefits.
4.1 The “Soft” Bankruptcy Game

In insolvency states, the following bankruptcy game takes place.

1. The entrepreneur searches for new funds on competitive financial markets.
2. If the entrepreneur finds a new lender, this makes her an offer.
3. In case of offer acceptance, first period lender (or old lender) must decide either to agree on the continuation plan or reject it. We model this through a simple ultimatum game in which the old lender has all the bargaining power and makes a take-it-or-leave-it offer to the agent. This offer specifies the payoff that the lender requires to allow project continuation, which is denoted by $\hat{r}$.
4. If the entrepreneur accepts old lender’s offer, the firm continues its activity and second period time structure is the same as in case of continuation out of bankruptcy. Otherwise, the firm is shut down, and the entrepreneur dismissed.

In bankruptcy, both second period effort decision and project’s cash flow distribution are modeled as out of bankruptcy.

Two points must be stressed. Firstly, the lender that provides new liquidity in the second stage of the renegotiation game must not be necessarily different from the first period one. Indeed, in both cases the model would deliver the same type of results.\textsuperscript{15}

Secondly, the choice to structure the renegotiation phase as an ultimatum game implies that the allocation of the bargaining power determines the equilibrium outcomes. We assume that the old lender has all the bargaining power in bankruptcy. This hypothesis may seem limiting, because it does not allow to capture the interactions that take place among creditors and debtors under the supervision of the bankruptcy judge in a real Chapter 11. However, weakening old lender’s bargaining power would only reinforce our conclusions.\textsuperscript{16} In fact, the model shows that even when the initial lender has the full power to decide whether to enforce the contract or not (asking for a huge value of $\hat{r}$, for instance), he may eventually accept to renegotiate.

\textsuperscript{15}It is worth noticing that the empirical evidence provided by Daihya et al. (2003) on Chapter 11 Debtor-In-Possession funding contracts confirms that bankrupt firms do receive money from both investors with whom they already have a lending relationship and new investors.

\textsuperscript{16}For instance, during Chapter 11 voting phase the bankruptcy judge can “cram down” a restructuring plan, even against old lender’s will, if she/he believes that the plan preserves firm’s value as going concern. Explicitly introducing this in the renegotiation game would further exacerbate the “soft-budget constraint problem” that we highlight, since it would increase entrepreneur’s outside option during negotiations.
Notice that, for ease of exposition, all second period variables are denoted by an hat.

### 4.2 First Best

Analyze first the scenario in which the entrepreneur is not cash constrained and there is no problem of moral hazard. We assume that in these circumstances the long term project generates a net present value higher than the one attached to the short term project, therefore, it determines the value of the firm in the first best scenario.

\[ \Pi - I + \hat{\Pi} - \hat{I} > \Pi_S. \quad (FB) \]

In what follows, it is first presented how the contracting game changes when the moral hazard problems are introduced into the analysis, and then when also the problem of limited commitment is accounted for.

### 5 Contracting with Full Commitment

In this section we derive the equilibrium contract that the lender may want to propose to the entrepreneur under the assumption of full commitment. With respect to the first best benchmark, we introduce the problem of repeated moral hazard. Therefore, in this setting, the constraints related to entrepreneur’s private decisions on effort provision and payoff revelation must be taken into account. Nevertheless, thanks to full commitment, bankruptcy code does not affect the investment strategy choice, because at the interim stage, no matter what the law prescribes, the lender sticks to the contract signed at the outset, and imposes to liquidate the firm.

#### 5.1 Long Term Project \((L)\)

The optimal mechanism that implements strategy \(L\) is found solving by backward induction for the sequential incentive problems in \(t = 2\), and \(t = 1\). The equilibrium concept we employ is the Subgame Perfect Nash Equilibrium (SPE). The optimization program is:

\[
\max_{\{R, \bar{R}\}, \{\hat{\Pi}, \hat{R}\}} \Pi - R + \zeta_R(\hat{\Pi} - \hat{R})
\]
Π − R + ζΠ(ˆΠ − ˆR) ≥ \begin{cases} Π + ζ₀(ˆΠ − ˆR) & (TT) \\ B + ζ₀(ˆΠ − ˆR) & (IC) \\ 0 & (ePC) \end{cases}

R − I + ζΠ(ˆR − ˆI) ≥ 0 \quad (IPC)

Π − R ≥ 0 \quad (LL₁)

ˆΠ − ˆR ≥ 0 \quad (LL₂)

(ζΠ, ζ₀) ∈ \{0, 1\} \quad (FC)

More specifically, the entrepreneur maximizes her utility subject to three incentive constraints: the truth telling constraint (TT), the incentive constraint related to effort provision (IC), and her participation constraint (ePC). Also, the entrepreneur takes into account the lender’s participation constraint (ePC), first and second period limited liability constraints, (LL₁) and (LL₂), and the feasibility conditions, (FC).

**Lemma 1.**
Denote by \( C^{FC} \) the equilibrium contract that implements the long term investment strategy \( L \) under full commitment. \( C^{FC} \) specifies that:

\[ C^{FC} \equiv \{ R = I, ˆR = ˆI \}, \quad \{ ζΠ = 1, ζ₀ = 0 \} \]

Consequently, borrower’s utility under project \( L \) at equilibrium, denoted \( U^{FC} \), is:

\[ U^{FC} = Π − I + ˆΠ − ˆI > 0. \quad (1) \]

And the lender breaks even in expectation.

**Proof.** See Section A.

Notice that \( C^{FC} \) induces the entrepreneur to put effort in both periods and truthfully reveal first period outcome. Also, \( C^{FC} \) can be implemented by a sequence of short-term standard debt contracts that require the repayment of a fixed amount at the end of each period.

Clearly, the choice of the project depends on the comparison of entrepreneur’s utility under \( S \) and \( L \).
Proposition 1.
Under full commitment, the entrepreneur chooses the long term project L:

\[ U_{FC} = \Pi - I + \Pi - \hat{I} > \Pi_S. \]

Therefore, the entrepreneur offers \( C_{FC} \) to the lender, and project L is started if the lender accepts and provides I.

To begin with, notice that the contract specifies that if the entrepreneur does not report \( \Pi \) the firm is not refunded (\( \zeta_0 = 0 \)), and is put in bankruptcy (\( 0 < R \)). In other words, even in a setting with positive second period expected value, it is optimal to terminate the project, and push the entrepreneur to bankruptcy. The decision to terminate the project is related to the fact that if the contract promises to refund the firm after the entrepreneur reveals a nil payoff in the first period, the incentive to divert first period profits increases up to make the project unprofitable to the lender. Moreover, the moral hazard problems do not affect the value of the long term project at equilibrium, because the entrepreneur is able to fully squeeze the surplus in both periods. Finally, the fact that under full commitment renegotiation is not allowed, implies that the profitability of the long term project is not affected by bankruptcy. In other words, even in case of first period insolvency and under a “soft” procedure, the contract signed at the outset of the game is enforced.

6 Contracting with Limited Commitment

In this section we present how the contracting game changes under the assumption of limited commitment. The departure from full commitment implies that lender’s ability to enforce the optimal contract depends on bankruptcy law. When the procedure is “soft”, the bankrupt entrepreneur has the right to search for new lenders, and the old lender has the power to permit or prevent continuation. In this section we show that he allows continuation when recovery rates improve; consequently, a tension arises between ex-post and ex-ante efficiency, which determines the resulting strategy choice.

6.1 Long Term Project (L)

The optimization problem is the same as in Section 5.1. Two cases must be distinguished. In case of first period solvency, in the second period, by perfect competition, the required payment, \( \hat{R} \), is equal to \( \hat{I} \). In case of insolvency, instead, the firm is
put in bankruptcy, and the game presented in Section 4.1 takes place. If the entrepreneur finds a new lender, this makes her an offer at which the entrepreneur is residual claimant and the new lender breaks even in expectation. Consequently, conditional on offer acceptance, second period expected pledgeable income is equal to $\hat{\Pi} - \hat{\Pi} - \hat{B} \geq 0$. However, before the project is implemented, the old lender must agree on continuation. In the full commitment analysis the old lender always enforced the optimal contract, because renegotiation was not allowed. Once the assumption of full commitment is relaxed, though, we show that it is not rational to the old lender, at the interim stage, to refuse any finite rent from renegotiation.

The old lender has monopoly power in the ultimatum game with the entrepreneur: he makes her an offer consisting in the value of $\hat{r}$ required to allow continuation. Clearly, the initial lender asks at least the minimum value between the pledgeable income of the project and the value of the outstanding liability. The fact that perfect competition drives $R$ to $I$ implies that the outstanding liability is nil if the entrepreneur reports $\Pi$, while it is equal to $I$ if she reports 0. Consequently, in the bargaining game with the entrepreneur, the old lender offers either $\hat{r} > \min\{\hat{\Pi} - \hat{\Pi} - \hat{B}, I\}$ or $\hat{r} = \min\{\hat{\Pi} - \hat{\Pi} - \hat{B}, I\}$. In the former case, the lender would implicitly enforce the ex ante optimal contract, because the entrepreneur would not be able to repay, and parties’ payoffs would be zero at the end of bargaining. In the latter case, the offer is feasible, and would permit the old lender to improve recovery rates. Moreover, if the entrepreneur accepts the offer, then the old lender lets the firm continue its activity, otherwise, the bargaining game ends, and the firm is liquidated. At the SPE of this game, the old lender asks for $\hat{r} = \min\{\hat{\Pi} - \hat{\Pi} - \hat{B}, I\}$, and the entrepreneur accepts. Using the results derived so far, the truth-telling constraint can be rewritten as:

$$\Pi - I + (\hat{\Pi} - \hat{I}) \geq \Pi + (\hat{\Pi} - \hat{I}) - \hat{r}$$

Finally, introducing the equilibrium value of $\hat{r}$, one gets the result in Proposition 2.

**Proposition 2.**

*Under limited commitment, two scenarios can arise, depending on the value of project $L$ expected pledgeable income in the second period:*

i. *If $\hat{\Pi} - \hat{\Pi} - \hat{B} < I$, the truth telling constraint, and, consequently, the lender’s participation constraint are violated. Therefore, project $S$ is chosen by the entrepreneur. Under project $S$, the lender breaks even, and the entrepreneur takes $\Pi_S$. Finally, project $S$ is implemented if the lender accepts the offer.*

ii. *If $\hat{\Pi} - \hat{\Pi} - \hat{B} \geq I$, the truth telling constraint holds, and the entrepreneur offers $C^{LC}$ to the lender.*
\[ C^{LC} \equiv \{ R = I, \hat{R} = \hat{I}, \hat{r} = I \}. \]

Borrower's utility under \( C^{LC} \), denoted \( U^{LC} \), is:

\[ U^{LC} = \Pi - I + \hat{\Pi} - \hat{I} > 0. \]

And the lender breaks even in expectation. Finally, if the lender accepts the offer project \( L \) is implemented.

**Proof.** The proof follows from the discussion above.

This proposition illustrates the main result of the model, that is that “soft” procedures may cause a bias toward short-termism in firm’s investment behavior. The intuition for this result follows. On the one side, a lenient procedure reduces the instruments available to cope with entrepreneur’s moral hazard, but, on the other side, it allows to improve recovery rates in case of first period insolvency. However, unless the lender is not able to recover in full the initial outlay, the exacerbation of the agency costs caused by the relaxation of the termination threat is not offset by the transfer required by the lender to permit continuation in bankruptcy. In other words, the entrepreneur would always have incentive to divert first period profits and project \( L \) would not be profitable from lenders’ viewpoint. This result supports and qualifies the empirical evidence in Franks and Sussman (2005). Franks and Sussman show that in the UK, where bankruptcy law is relatively “tough”, banks commit to a severe stance towards debt renegotiations, and argue that this is done to avoid strategic default. Similarly, we show that banks are less likely to keep a tough stance against debt renegotiation in bankruptcy when recovery rates allow to recoup in full the outstanding liability.

Clearly, if the long term project \( L \) does not allow the lender to break even, then the short term project \( S \) is chosen at equilibrium.

7 Monopoly Lender and the London Approach

In this section we present how the results of the main model carry on in a framework with monopoly lender. In other words, we now assume that there is no competition on financial markets in the first period, so that the lender is a monopolist to the borrower. Even though this hypothesis is at odd with a major part of the corporate
finance literature, yet this case has a policy relevance, because it is consistent with the financial markets’ competitive environment prevailing in countries like Germany, Italy, and the UK, where banks hold a strong bargaining power vis-à-vis firms.

With particular regard to the UK, this section tries to replicate a renegotiation environment analogous to the one that characterizes the London Approach, a widespread practice adopted by British firms’ management to implement the process of debt reorganization with creditors (typically big banks) out of the court. The London Approach consists in informal negotiations between a distressed entrepreneur and her lenders, and it develops in two distinct phases, which closely resemble a Chapter 11: in the first, a consortium of investors agree on a “standstill” that relieves the entrepreneur from the obligation to pay back her debts; in the second, parties negotiate and implement a plan of financial restructuring.

The model develops as in Section 4, but it is the first period lender that holds all the bargaining power and makes a take it or leave it offer to the entrepreneur. The offer consists in a contract that specifies per period expected repayments, termination decisions and type of investment project. The reversal of the bargaining power also implies that the lender squeezes all the net value of project $S$, $\Pi_S$. Finally, notice that, in bankruptcy, the entrepreneur has access to competitive financial markets when searching for funding in the second period, as in the game in Section 4.1.\textsuperscript{17}

Before proceeding with the analysis, we need to impose a further assumption on the parameters of the model.

Assumption 2.

\[ \hat{B} > I. \]

Assumption 2 allows to have that the payment required at the end of the first period by the contract is bigger than the initial investment cost, $I$, and makes bankruptcy a real concern.

7.1 Long Term Project (L), Full Commitment

Under the hypothesis of full commitment, the lender solves the following problem.

\[
\max_{\{\hat{R}, \hat{\Pi}\}, \{\zeta_{\infty}, \zeta_0\}} R - I + \zeta_\Pi (\hat{R} - \hat{I})
\]

\textsuperscript{17}This setting replicates Dewatripont and Maskin (1995), who study a funding game in which first period lender has full bargaining power at the contracting and renegotiation stage, while creditors intervening at the interim stage are left with zero expected surplus.
\[
\begin{align*}
\Pi - R + \zeta_\Pi (\hat{\Pi} - \hat{R}) & \geq \begin{cases} 
\Pi + \zeta_0 (\hat{\Pi} - \hat{R}) & (TT) \\
B + \zeta_0 (\hat{\Pi} - \hat{R}) & (IC) \\
0 & (ePC)
\end{cases} \\
R - I + \zeta_\Pi (\hat{R} - \hat{I}) & \geq 0 & (IPC) \\
\Pi - R & \geq 0 & (LL_1) \\
\hat{\Pi} - \hat{R} & \geq 0 & (LL_2) \\
(\zeta_\Pi, \zeta_0) & \in \{0, 1\} & (FC)
\end{align*}
\]

Lemma 2.
At the equilibrium contract that implements the long term investment strategy \(L\) under full commitment and monopolistic lending, lender's utility, denoted \(V_{FC,m}\), is equal to:

\[
V_{FC,m} = \hat{\Pi} - \hat{I} - I > 0.
\]

And entrepreneur's utility, \(U_{FC,m}\), is equal to \(\Pi\). Finally, the lender chooses the long term project if and only if

\[
V_{FC,m} = \hat{\Pi} - \hat{I} - I \geq \Pi_S.
\] (2)

Proof. See Section B.

7.2 Long Term Project (\(L\)), Limited Commitment

Under the hypothesis of limited commitment, we study how the possibility to renegotiate the contract in an environment characterized by the bankruptcy game presented above affects the choice of the project.

Proposition 3.
Under limited commitment and monopolistic lending the market strategy choice depends on the value of project \(L\) expected pledgeable income in the second period:

i. If \(\hat{\Pi} - \hat{I} - \hat{B} < I\), lender’s participation constraint does not hold at equilibrium. Consequently, project \(S\) is chosen by the entrepreneur. Under project \(S\) the lender takes \(\Pi_S\).
ii. If \( \hat{\Pi} - \hat{I} - \hat{B} \geq I \), the lender breaks even at equilibrium, and project \( L \) is chosen if and only if the following condition holds:

\[
V^{LC,m} = \hat{\Pi} - \hat{B} - \hat{I} - I \geq \Pi_S.
\]  

(3)

Proof. See Section C.

The pledgeable income of the project in the second period plays a crucial role in the choice of the investment time horizon under limited commitment, also in a framework with relationship banking. Indeed, if project \( L \) second period value does not allow the lender to break even, then project \( S \) is chosen. Otherwise, project \( L \) is preferred, provided condition (3) is satisfied. In particular, comparing the left hand sides of conditions (2) and (3), it is easy to realize that the increase of the agency costs caused by limited commitment makes entrepreneur’s utility rise \( (U^{LC,m} - U^{FC,m} = \hat{B}) \), but also makes decrease the net present value of \( L \), and this reduces the scope for the long term project to be selected at equilibrium.

Overall, we can conclude that the result on short-termism derived under competitive financial markets is even reinforced under monopolistic lending. Indeed, while under competitive financial markets project \( L \), if incentive compatible, is always chosen by the firm, here its implementability depends on condition (3).

The rationale for this result follows. In Section 4 the entrepreneur holds all bargaining power, therefore she is able to squeeze the all value of the long term project when it is implementable. Instead, here the lender has to take into account entrepreneur’s agency rent, and this increases in the soft bankruptcy case with respect to the tough one. In other words, the long-term project may not be undertaken, even when it is implementable, when implementation becomes too costly.

8 Technological Restructuring

In Proposition 2 above we show that the second period net value of the long term project determines the choice of the investment time horizon under limited commitment. More specifically, if recovery rates are not enough to recoup lender’s outstanding liability, the long term project is not profitable to the lender, and, hence, the short term project is chosen by the firm. In the derivation of that result, we forego the impact of a technological restructuring process on firm’s value in the second period. However, the fact that the entrepreneur stays on charge of the venture during
the Chapter 11 debtor in possession phase allows the same entrepreneur to undertake a process of reorganization that may enhance the efficiency of the enterprise, and increase its value.

In this section we introduce this additional feature of Chapter 11 modifying the payoff distribution of the long term project, and the structure of the bankruptcy game of Section 4.1. Firstly, we assume that in the second period the expected payoff returned by the long term project is perfectly correlated to the outcome of the first period, and equal to $\hat{\Pi}^h$ in case of success, $\hat{\Pi}^l$ in case of failure (with $\hat{\Pi}^h > \hat{\Pi}^l > \hat{I}$).

Secondly, we allow the entrepreneur to undertake a hidden action consisting in a restructuring process that can increase the payoff of the project up to $\hat{\Pi}^h$. The entrepreneur knows that the restructuring process succeeds with certainty, and needs to bear a cost $\hat{c}$ to undertake it. The old lender, other than bargain over the distribution of the surplus in bankruptcy, can also choose whether to sink a fixed cost $\hat{\kappa}$ to retrieve from the entrepreneur the information regarding the outcome of the hidden action. Moreover, old lender expects that restructuring succeeds with probability $\hat{p} \in (0, 1)$. The new timing follows:

1. The entrepreneur searches for new funds on competitive financial markets.
2. If the entrepreneur finds a new lender, this makes her an offer.
3. In case of offer acceptance, two sub stages take place:
   i. The entrepreneur decides to undertake the restructuring process, and privately observes its outcome;
   ii. First period lender decides whether to observe the outcome of the process.
4. The old lender must decide either to agree on the continuation plan or reject it. We model this through a simple ultimatum game in which the lender has all the bargaining power and makes a take-it-or-leave-it offer to the agent. This offer specifies the payoff that the he requires to allow project continuation, which is indexed by $\hat{r}$.
5. If the entrepreneur accepts old lender’s offer, the firm continues its activity and second period time structure is the same as in case of continuation out of bankruptcy. Otherwise, the firm is shut down, and the entrepreneur dismissed.

Also in this case, second period effort decision in bankruptcy is modeled as out of bankruptcy, while the new payoff distribution is in Figure 2. Finally, Assumption 3 below implies that the restructuring process delivers a positive pledgeable income only if successful.

[FIGURE 2 ABOUT HERE]
Assumption 3.

\[ \hat{\Pi}^h - \hat{B} - \hat{I} > \hat{c} + \hat{\kappa} > \hat{\Pi}^l - \hat{B} - \hat{I}. \]

The goal of this section is to compare the results of the bankruptcy game with technological restructuring, with the benchmark case in which the payoff distribution is the same as in Figure 2, but technological restructuring is not allowed. More specifically, we want to understand if, thanks to restructuring, the chances for the long term strategy to be selected at equilibrium increase.

**Proposition 4.**

*Compared to the benchmark with no restructuring, the implementation of technological restructuring reduces the scope for the choice of the long term project by the entrepreneur.*

**Proof.** See Section D.

Proposition 4 shows that even if recovery rates in bankruptcy would increase thanks to the implementation of a restructuring process, the cost that must be sunk by the lender to monitor the outcome may erode the expected pledgeable income up to make the first period revelation problem more severe than in the benchmark case with no restructuring.

## 9 Discussion

The outcomes of the extensions presented above highlight that the driving force of the short-termism result lies in the exacerbation of the repeated moral hazard problem caused by limited commitment when procedures are “soft”. Indeed, the main result of the model is robust to the relaxation of the assumption of perfectly competitive financial markets, and the one regarding the possibility to carry out a technological restructuring project after first period failure.

However, “soft” procedures are widely observed in reality, and in order to provide a rationale to this type of codes in the model, this section discusses what can tilt the short-termism result and restore first best investment choices. More specifically, for a reversal of the short-termism result it is necessary that either the limited commitment problem or the repeated moral hazard problem is fixed.

To begin with, we expect that the “soft budget constraint” problem can be alleviated when debt is strongly collateralized. Indeed, as witnessed by the evidence in Franks and Sussman (2005), part of the commitment problem is solved when in-
vestors have senior claims: in this case, recovery rates for senior lenders may be higher than for the all project, so that they may have little incentive to continue, independently from the procedure.

Concerning the repeated moral hazard issue, instead, a policy conclusion delivered by our paper is that it is the joint rights, on entrepreneur’s side, to file unilaterally for bankruptcy and decide on firm’s restructuring and search for new funds, that exacerbate agency costs. Therefore, the paper provides support to those bankruptcy reforms that have implemented a system which limits the power of the bankrupt entrepreneur to stay in charge during the reorganization phase. This conclusion is also corroborated by the evidence in Bharath et al. (2007), where the authors show that management turnover in Chapter 11 is increased by 65% since 1990, and is observed in 37.7% of reorganization cases in 2000. Such surge testifies a growing influence of creditors in Chapter 11, at the expenses of the bankrupt management: our model rationalizes these results showing that tightening the termination threat reduces the cost of funding.

10 Conclusions

In this paper we explore a research question that concerns the relationship between bankruptcy law and firms’ investment strategies. We employ a streamlined model with repeated moral hazard in which an entrepreneur can choose between a long term and a short term project, and “soft” bankruptcy is modeled as a renegotiation game that gives the entrepreneur the right to start a process of financial restructuring. The result delivered shows that a “soft” procedure is subject to a problem of “soft budget constraint”, which may make a lender prefer short-term strategies. The main novelty of this work consists in the use of bankruptcy as commitment device, and in the design of a renegotiation game that resembles the main features of a real Chapter 11.

The model provides two main testable predictions. The first regards the costs associated to the financing game between the lender and the entrepreneur in a legal environment characterized by “soft” bankruptcy procedures. The second regards the time horizon that should characterize firms’ investment behavior in economies with “soft” bankruptcy law. We have shown that, ceteris paribus, contracts signed in a legal environment with a soft bankruptcy code require more expensive incentive schemes. More specifically, if the higher agency costs offset the increase of recovery rates, then the lender will privilege short run projects to avoid the risk of bankruptcy. Overall, there are two channels of causation: the first goes from the type of bankruptcy to the funding costs borne by the lender; the second relates these
higher costs to the time horizon of investment decisions.

In two extensions to the main model we analyze the robustness of the short-termism result, and show that it holds in an environment with monopolistic lending, and even if the bankrupt entrepreneur is entitled to conduct a process of technological restructuring. Therefore, we conclude that the crucial force driving the result is the repeated moral hazard problem, and the costs it brings about in environments with “soft” bankruptcy procedures.

Although not directly related, our model can also be employed to understand the possible consequences of the rescue plan decided by main western countries to counteract the financial crisis that has affected the international banking system in fall 2008. In an effort to inject trust in the market, governments have guaranteed to intervene and protect major banks against the risk of failure. In this paper we highlight that the likely effect of such a lenient policy is to increase the pressure exerted by investors for short-run corporate results, unless it is not accompanied by the turnover of the incumbent management found liable.

Finally, we would like to stress that it is not our intent to conclude that the analysis carried out in this paper allows to draw a general assessment of bankruptcy procedures’ optimal design. This would require to build a set-up able to account also for the many beneficial effects that “soft” bankruptcy codes are able to generate. However, the model sheds light on a type of costs caused by reorganization in bankruptcy that, so far, have been neglected by the law and economics literature.
A Proof of Lemma 1

In this section we derive the optimal contract that implements the long run investment project $L$ under the assumption of full commitment.

$$\max_{\{R,\hat{R}\}\{\zeta_\Pi,\zeta_0\}} \Pi - R + \zeta_\Pi(\hat{\Pi} - \hat{R})$$

$$\Pi - R + \zeta_\Pi(\hat{\Pi} - \hat{R}) \geq \begin{cases} 
\Pi + \zeta_\Pi(\hat{\Pi} - \hat{R}) & (TT) \\
B + \zeta_\Pi(\hat{\Pi} - \hat{R}) & (IC) \\
0 & (FC)
\end{cases}$$

$$R - I + \zeta_\Pi(\hat{R} - \hat{I}) \geq 0 \quad (lPC)$$

$$\Pi - R \geq 0 \quad (LL_1)$$

$$\hat{\Pi} - \hat{R} \geq 0 \quad (LL_2)$$

$$\zeta_\Pi, \zeta_0 \in \{0, 1\} \quad (FC)$$

Conditional on project continuation out of bankruptcy, in the second period perfect competition drives the repayment required by the lender to $\hat{I}$, so that $\hat{R} = \hat{I}$. This implies that the entrepreneur is the residual claimant, and gets the all net present value generated by the project, which is equal to $\hat{\Pi} - \hat{I}$.

The optimal contract is completed by first period required repayment and lender's refunding decisions. First of all, notice that, due to Assumption 1.i, the only relevant incentive constraint is ($TT$). Then, financial markets' perfect competition and the fact that the lender does not gain any rent in the second period ($\hat{R} = \hat{I}$), imply that the required repayment in the first period, $R$, is equal to $I$. Finally, the problem can be simplified setting $\zeta_0 = 0$ and $\zeta_\Pi = 1$, the entrepreneur is not rewarded if she reveals 0, while she is refunded if she reveals $\Pi$: both simplifications improve entrepreneur’s incentives, the latter also increases entrepreneur’s expected utility. Therefore, at the equilibrium, constraint ($TT$) is never binding, while the lender earns zero profits.

Denote by $C^{FC}$ the optimal contract that implements strategy $L$. $C^{FC}$ is given by:

$$C^{FC} \equiv \{R = I, \hat{R} = \hat{I}\}, \quad \{\zeta_\Pi = 1, \zeta_0 = 0\},$$

At which entrepreneur’s utility is equal to:

$$U^{FC} = \Pi - I + \hat{\Pi} - \hat{I} > 0.$$  \hspace{1cm} (4)

In order to implement $L$, the entrepreneur offers $C^{FC}$ to the lender, and the project is started if the latter accepts the deal and provides $I$. 

25
**B Proof of Lemma 2**

In this section we derive the optimal contract that implements the long run investment project $L$ under the assumption of full commitment and monopolistic lending.

$$\max \{R, \hat{R}\} \{\zeta, \zeta_0\}$$

$$R - I + \zeta\Pi(\hat{R} - \hat{I})$$

$$\Pi - R + \zeta\Pi(\hat{\Pi} - \hat{R}) \geq \begin{cases} \Pi + \zeta_0(\hat{\Pi} - \hat{R}) & (TT) \\ B + \zeta_0(\hat{\Pi} - \hat{R}) & (IC) \\ 0 & (cPC) \end{cases}$$

$$R - I + \zeta\Pi(\hat{R} - \hat{I}) \geq 0 \quad (lPC)$$

$$\Pi - R \geq 0 \quad (LL_1)$$

$$\hat{\Pi} - \hat{R} \geq 0 \quad (LL_2)$$

$$(\zeta\Pi, \zeta_0) \in \{0, 1\} \quad (FC)$$

In the second period, if the entrepreneur was solvent, the lender rewards her with $\hat{B}$, as to induce effort, and extract $\hat{R} - \hat{I} = \hat{\Pi} - \hat{I} - \hat{B}$. Instead, if insolvent, the entrepreneur is put in bankruptcy.

By Assumption (1.i), the only relevant incentive constraint is $(TT)$, moreover, this constraint is binding at the equilibrium, otherwise the lender could always profitably increase $R$ without violating $(TT)$. As in Section A, then, one can set $\zeta_0 = 0$ and $\zeta\Pi = 1$, and, consequently, have that $R = \hat{B} > I$. The optimal contract, denoted $C^{FC,m}$, follows:

$$C^{FC,m} \equiv \{R = \hat{B}, \hat{R} = \hat{\Pi} - \hat{B}\} \quad \{\zeta\Pi = 1, \zeta_0 = 0\}.$$   

Lender’s utility, given by project $L$ pledgeable income, and denoted by $V^{FC,m}$, is equal to:

$$V^{FC,m} = \hat{\Pi} - \hat{I} - I > 0.$$  

And entrepreneur’s utility, $U^{FC,m}$, amounts to $\Pi$. The lender offers $C^{FC,m}$ to the entrepreneur, if $V^{FC,m} > \Pi_S$, and the project is started if the entrepreneur accepts. Notice that, because of the problem of repeated moral hazard, the value generated by project $L$ to the lender is lower than in the first best. This is easily verifiable comparing and $V^{FC,m}$ with the left hand side of (FB) above.
C Proof of Proposition 3

If the entrepreneur was solvent at the end of the first period, the reward that the old lender promises to the entrepreneur in the second period is equal to \( \hat{B} \). In this way he induces effort, and generates \( \hat{\Pi} - \hat{I} - \hat{B} \). In case of bankruptcy, instead, the renegotiation game presented in Section 4.1 takes place. If the entrepreneur finds a new lender, the assumption of competitive financial markets in the renegotiation phase drives new lenders’ expected surplus to zero, while makes the entrepreneur the residual claimant. Therefore, second period expected pledgeable income in bankruptcy is the same as out of bankruptcy, and equal to \( \hat{\Pi} - \hat{B} - \hat{I} \geq 0 \).

If the entrepreneur accepts the offer made by the new lender, the old one must agree on continuation before the project is implemented. The old principal has monopoly power in the ultimatum game with the agent. He makes an offer to the firm consisting in the value of \( \hat{r} \) required to allow continuation. In the SPE of this game, the old lender asks for \( \hat{r} = \hat{\Pi} - \hat{B} - \hat{I} \), which is what he would have been able to extract from the project in case of refunding, and the entrepreneur accepts. Consequently, at the contracting stage the entrepreneur solves the following problem.

\[
\begin{align*}
\max_{R} & \quad R - I + \hat{\Pi} - \hat{I} - \hat{B} \\
\Pi - R + \hat{B} & = \Pi + \hat{B} \quad (TT) \\
R - I + \hat{\Pi} - \hat{I} - \hat{B} & \geq 0 \quad (lPC) \\
\Pi - R & \geq 0 \quad (LL_1)
\end{align*}
\]

In which \((TT)\) binds because otherwise the lender could always increase \(R\) without violating it. Moreover, in this formulation of the problem, \((TT)\) holds if and only if the lender sets \(R\) to zero. In other words, the relaxation of the disciplining role imparted by the refunding decisions, and the consequent increase of the reward necessary to induce the right incentives, implies that the lender should ask the entrepreneur a nil repayment to make her behave. Consequently, the entrepreneur is put in bankruptcy even when the project succeeds in the first period. However, at \( R = 0 \), lender’s participation constraint is satisfied if only if \( \hat{\Pi} - \hat{B} - \hat{I} \geq I \): when this is the case, the expected utility of the lender is equal to

\[
V^{LC,m} = \hat{\Pi} - \hat{I} - \hat{B} - I \geq 0.
\]

While the entrepreneur gets
\[ U^{LC,m} = \Pi + \hat{B}. \]

Otherwise, the lender participation constraint does not hold, and project \( L \) cannot be implemented.

**D Proof of Proposition 4**

First of all, in the benchmark with no restructuring, at the bargaining stage of the bankruptcy game the old lender offers \( \hat{\tau} = \min\{\hat{\Pi}^l - \hat{I} - \hat{B}, I\} \), and, in the more interesting case in which \( \hat{\Pi}^l - \hat{I} - \hat{B} < I \), the truth telling constraint is given by

\[ \Pi - I + (\hat{\Pi}^h - \hat{I}) \geq \Pi + (\hat{\Pi}^l - \hat{I}) - \hat{\tau}, \]

Simplifying, it reduces to

\[ \hat{\Pi}^h - \hat{I} - \hat{B} \geq I, \quad (5) \]

Which holds provided \( \hat{\Pi}^h \) is high enough.

When restructuring is introduced, instead, it is undertaken by the entrepreneur if and only if \( \hat{\Pi}^h - \hat{\Pi}^l \geq \hat{c} \), that is, if her utility increases. Instead, the old lender decides to monitor when the following conditions hold:

\[ \hat{p}(\hat{\Pi}^h - \hat{\Pi}^l) \geq \begin{cases} \hat{c} & (i) \\ \hat{\kappa} & (ii) \end{cases} \]

If (i) is satisfied, the old lender expects the entrepreneur to undertake restructuring, and, if (ii) is satisfied, the project is expected to increase recovery rates.\(^{18}\) In case (i) and (ii) are verified, then the pledgeable income attached to the project following first period failure is equal to \( \hat{\Pi}^h - \hat{I} - \hat{B} - (\hat{c} + \hat{\kappa}) \), and the old lender, at the bargaining stage, asks for \( \hat{\tau} = \min\{\hat{\Pi}^h - \hat{I} - \hat{B} - (\hat{c} + \hat{\kappa}), I\} \). Again, in the case in which \( \hat{\Pi}^h - \hat{I} - \hat{B} - (\hat{c} + \hat{\kappa}) < I \), the truth telling constraint is

\[ \Pi - I + (\hat{\Pi}^h - \hat{I}) \geq \Pi + (\hat{\Pi}^h - \hat{I} - \hat{\tau}). \]

\(^{18}\)In particular, condition (ii) is derived comparing the expected pledgeable income in case the old lender decides to monitor restructuring, and given by \( \hat{p}\hat{\Pi}^h + (1 - \hat{p})\hat{\Pi}^l - \hat{I} - \hat{B} - (\hat{c} + \hat{\kappa}) \), with the pledgeable income attached to the case in which condition (i) holds, but the lender does not sink \( \hat{\kappa} \), equal to \( \hat{\Pi}^l - \hat{I} - \hat{B} - \hat{c} \). Indeed, in the latter case the entrepreneur will always pretend that the project was undertaken, but failed.
Where the second term at the right hand side of the inequality is entrepreneur’s utility, net of the restructuring cost. This constraint reduces to

\[ \hat{\Pi}^h - \hat{I} - \hat{B} - \hat{\kappa} \geq I, \]  

(6)

And it is straightforward, comparing (5) with (6), to conclude that the former is less tight than the latter even in the case in which technological restructuring increases recovery rates, that is when \( \hat{\Pi}^h - \hat{I} - \hat{B} - \hat{\kappa} - \hat{c} \geq \hat{\Pi}^l - \hat{I} - \hat{B} \). This result holds because the entrepreneur does not internalize the cost sunk by the lender to observe project’s outcome.
References


Figure 1: Timeline and Cash Flow
Figure 2: Cash Flow with Technological Restructuring