Credit, Wages and Bankruptcy Laws*

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May 14, 2003

Abstract

We study bankruptcy in general equilibrium, taking into account the interactions between the credit and the labor markets, as well as wealth heterogeneity. Soft bankruptcy laws often preclude liquidation, to avoid ex-post inefficiencies. This worsens credit rationing, depresses investment and reduces aggregate leverage. Yet, tough laws do not necessarily maximize social welfare or emerge from the legislative process. Relatively rich agents can invest irrespective of the law. They favor soft laws which exclude poorer entrepreneurs from the market and thus reduce labor demand and wages. This raises the pledgeable income of the entrepreneurs who still can raise funds, and thus lowers their liquidation rates and the associated inefficiencies. Hence, a soft law can maximize social welfare.

Keywords: Financial Contracts, Credit Rationing, Bankruptcy Law.
JEL Classification: D82, G33, K22.

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*Our analysis of bankruptcy has benefited from discussions with Catherine Casamatta, Georges Casamatta, Roman Inderst, Steven Kaplan, Jean-Jacques Laffont, David Martimort, Marco Pagano, Howard Rosenthal, Klaus Schmidt, Andrei Shleifer, and Jean Tirole.

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1. Introduction

Should contracts be enforced? The traditional view in economics is that the prospect that they would not may deter agents from committing resources to meet their contractual obligations. This in turn may jeopardize economic activity. Yet, bankruptcy laws often entail violations of clauses stated in financial contracts. As stated by La Porta et al. (1998): "The most basic right of a senior collateralized creditor is the right to repossess—and then liquidate or keep—collateral when a loan is in default (see Hart (1995)). In some countries law makes it difficult for such creditors to repossess collateral, in part because such repossession leads to the liquidation of firms, which is viewed as socially undesirable." The goal of this paper is to offer a theoretical investigation of the causes and consequences of such violations of contractual rights.

Bankruptcy laws indeed vary quite significantly across countries.[1] The US Constitution gave Congress large powers to create bankruptcy laws interfering with the application of contracts (Berglöf and Rosenthal (2000)). The current US law, in particular the Chapter 11 procedure, can help maintain firms in operation. For example, whenever creditors disagree with the reorganization plan, the judge can decide to use the "cram down" procedure to implement the plan in spite of their opposition.[2] The French bankruptcy law goes even further in this direction than the US law (Biais and Malécot (1996)). Its first stated objective is to maintain distressed firms in operation and to avoid laying off workers. To reach this goal, judges enjoy large discretionary powers, to the point that they can unilaterally write-off the creditors' rights. As stated in La Porta et al. (1998): "The French civil law countries offer creditors the weakest protection." Russian courts also have significant discretion in bankruptcy procedures. As noted by Lambert-Mogiliansky, Sonin and Zhuravskaya (2000): "The judge does not need to follow the creditor's request. This clause in the law was motivated by the fact that creditors may opt for inefficient liquidation." These laws contrast with those prevailing in the UK or Germany. Franks and Sussman (1999) show that "the English procedure was developed by lenders and borrowers, exercising their right to contract freely [...] The role of the state in this process was relatively limited, largely confined to enforcing the contract." Correspondingly, the current UK bankruptcy code emphasizes the protection of creditors' rights.[3] Similarly, under the German law, companies that default on their debt repayment obligations are usually liquidated, and the proceeds distributed to debtholders (Kiefer (2000)). As stated in La Porta et al. (1998): "German civil law countries are very responsive to secured creditors."

While debtor-oriented (soft) bankruptcy laws can avoid inefficient liquidations ex-post,

[1] See, e.g., Franks, Nyborg and Torous (1994), White (1994), Atiyas (1995), and La Porta et al. (1998).

[2] Franks and Torous (1989, 1994) study the bankruptcy process in the US, and Fisher and Martel (1995, 1999, 2000) compare it to its Canadian counterpart.

[3] Franks and Sussman (2000) offer an empirical analysis of the bankruptcy process in the UK.

they have adverse effects ex-ante. Anticipating the violation of creditors' rights, banks are reluctant to grant loans. This amplifies credit rationing. Indeed, La Porta et al. (1997, 1998) and Giannetti (2000) find that access to debt financing is lower in countries with soft bankruptcy codes. Also, the weak enforcement of creditors rights is one of the reasons why Russian companies have virtually no access to external finance (Boycko, Shleifer and Vishny (1993)). This suggests that an optimal bankruptcy law should simply enforce contracts, and avoid interfering with their application. Furthermore, by reducing access to credit, soft bankruptcy laws reduce investment. In turn, this reduces the demand for labor, and thus the opportunities of wage earners. This suggests that workers, interested in job creation and high wages, and entrepreneurs, interested in access to credit, should favor tough bankruptcy laws that respect the freedom of contracting.

Our analysis provide some foundations, as well as some challenges, to these conjectures. We consider a simple general equilibrium model, where the interactions between the credit and the labor markets can be analyzed, and heterogeneity across agents can be taken into account. There is a population of risk-neutral agents, who differ only in terms of their initial wealth. All these agents face the choice between becoming wage earners or entrepreneurs. The latter invest in a business project and hire the former in their firm. Workers incur some disutility to supply labor, and are compensated by wages. Entrepreneurs must exert costly efforts to make the investment project profitable and are compensated by profits (net of wages and reimbursements) and non-transferable private benefits. As a benchmark, we analyze the case where there are no imperfections on the labor and the credit markets. In the socially optimal competitive equilibrium, agents are indifferent between becoming a worker or an entrepreneur. The corresponding first-best aggregate level of investment is independent of the distribution of wealth across agents, and only reflects the disutility of labor and the profitability of investment. When the former is low and the latter is large, it is optimal that a large fraction of the population become entrepreneurs, raise funds and invest in the project.

We next turn to the case of imperfect financial markets. We assume that entrepreneurial effort is unobservable, as in Holmström and Tirole (1997). This raises a moral hazard problem. After the realization of the cash-flow, a firm can be liquidated or maintained in operation, as in Bolton and Scharfstein (1990). We consider the case where ex-post efficiency goes against liquidation, as the private benefits from continuation exceed the proceeds from liquidation. Nevertheless, an ex-ante optimal financial contract can involve the liquidation of the firm when the cash-flow from the project is low, as the threat of liquidation enhances the entrepreneur's incentives to exert effort, and thus reduces agency rents. Furthermore, since liquidation proceeds are allocated to the investors, liquidation increases their willingness to fund the project. Hence, the income that entrepreneurs can pledge to outside financiers is increasing in the liquidation rate in case of failure. It is also decreasing in the wage paid to the workers.

Very wealthy agents need little outside financing and can therefore raise funds without committing to liquidation in case of failure, which corresponds to equity financing. Relatively poorer agents need greater outside financing, and thus must promise greater repayment to outside financiers. To raise their pledgeable income, they must commit to higher liquidation rates in case of failure, and thus issue risky debt.[4] Agents with even lower initial wealth cannot obtain a loan, as their need for outside funds exceeds their pledgeable income. They have thus no other choice than to become workers.

In this context, we first consider the case of a tough law, that simply enforces the contracts written by the entrepreneurs and the financiers. We identify two regimes. The first regime arises when the socially optimal level of investment is relatively limited, e.g., because the disutility of labor is large. Moral hazard may reduce social welfare, by requiring inefficient liquidation, but it does not generate credit rationing, as the marginal entrepreneur is indifferent between investing and being a wage earner. The second regime arises when the socially optimal level of investment is relatively large. In this case, relatively poor agents would be better off as entrepreneurs, but they cannot obtain a loan, because their pledgeable income is below their outside financing needs. Hence, these agents are credit rationed, and must therefore become wage earners. Not only does this reduce investment; by increasing labor supply and reducing labor demand, it also lowers wages.

Next, we analyze the equilibrium arising with a soft law. In our setting, a soft law enables the judge to interfere with the application of contracts, and rule in favor of continuation in cases where the contract called for liquidation. This makes it more difficult for agents to obtain credit and amplifies credit rationing, reducing investment and wages. Our analysis thus delivers the following new testable implications:

(i) The positive impact of collateral for access to credit should be greater in countries with tough bankruptcy laws.

(ii) The amplification of business fluctuations due to credit rationing, identified by Bernanke and Gertler (1989), should be more pronounced in countries with soft bankruptcy laws.

(iii) With tough laws, agents who are not very wealthy can raise funds by committing to a large liquidation rate, that is, by issuing risky debt. In countries with soft bankruptcy laws, this is not feasible, as large liquidation rates will not be systematically enforced. Consequently, these agents are credit rationed. This in turn reduces the aggregate leverage in the economy. Hence, countries with soft bankruptcy laws should have lower economy-wide aggregate leverage.

[4] Note that in our model financial contracts are optimal. Agents who issue risky debt, and thus face the risk of inefficient liquidation, would not have been able to rely on equity financing.

(iv) By depressing investment, soft laws reduce labor demand, and thus wages. Thus the share of wages in total value added should be greater relative to profits in tough law countries, where contracts are strictly enforced.

(v) Last, a positive labor productivity shock should lead to an increase in investment. This requires that relatively less wealthy agents raise funds to invest in business projects. To obtain funding, these agents must accept a relatively large liquidation rate. Hence, a positive productivity shock should induce an increase in the average leverage in the economy. This is consistent with the empirical results of Koracjczyk and Levy (2001) In addition our model predicts that these effects should be muted in countries with soft bankruptcy laws.

Our analysis underscores the divergence between the preferences of different agents relative to bankruptcy laws. Soft laws reduce wages. Hence, poor agents, who are wage earners irrespective of the law, should be in favor of strict enforcement of contracts. In contrast, rich agents, who can finance their investment project irrespective of the law, are not in favor of the strict enforcement of contracts. Indeed, soft laws exclude relatively poor agents from the credit market. This reduces the competition for labor, lowers wages, and thus raises the profits of the rich. Hence, our analysis predicts that in countries where the economic elite strongly influences the political process, bankruptcy laws should tend to be soft. As an illustration, the very soft 1841 US bankruptcy law was pushed by the Whigs, which represented the economic elite in nineteenth century America. When this law was repealed by the Congress, the New England Whigs, clearly the richest people in the country, still voted in favor of it (Berglöf and Rosenthal (2000)).

Somewhat unexpectedly, our theoretical analysis shows that, in spite of their adverse effect on access to credit, soft laws can maximize the ex-ante utilitarian social welfare. This apparent paradox arises because, with moral hazard, the interaction between the credit market and the labor market endogenously generates externalities. The mechanism at work is the following. When one agent opts for entrepreneurship, this raises wages. In turn, this reduces the income that the other entrepreneurs can promise to outside investors. To maintain their pledgeable income, these entrepreneurs need to commit to greater liquidation rates in case of failure. This reduces social welfare, by raising the frequency of inefficient liquidations. This mechanism is particularly strong whenever, with a tough law, there is no credit rationing. The marginal entrepreneur commits to a relatively large liquidation rate, such that he has access to funds, and at which he is indifferent between becoming a wage earner or an entrepreneur. In this context, a softer law generates greater social welfare than the tough law. Indeed, the soft law worsens credit rationing and excludes the marginal entrepreneur from accessing the credit market. But this does not reduce social welfare significantly, since the utility of this agent as a worker is the same as his utility as an entrepreneur. On the other hand, the corresponding decrease in wages benefits all the other agents who remain entrepreneurs, by reducing their liquidation rates and the corresponding ex-post inefficiency.

Our paper builds on the substantial literature analyzing the design of bankruptcy procedures (see, e.g., Harris and Raviv (1993), White (1989), Bebchuck (1988), Aghion, Hart and Moore (1992), Berkovitch, Israel and Zender (1997), and Berkovitch and Israel (1999)). There are three major difference between our approach and that literature. First, we emphasize the difference between laws and contracts. As stated in La Porta et al. (1998), "the view that securities are inherently characterized by some intrinsic rights is incomplete [...] It ignores the fact that these rights depend on the legal rules of the jurisdictions where securities are issued." Thus we study how the agents take into account the bankruptcy law when writing financial contracts. Second, we consider a general equilibrium setting, where the interaction between the credit market and the labor market generates endogenous externalities in the presence of entrepreneurial moral hazard.[5] This allows us to delineate the impact of the law on social welfare as well on financing choices. Third, we study the political underpinnings of the bankrupcty law, and thus analyze how different laws can exist.

Our focus on the interaction between financial decisions and politics or legislation in a general equilibrium context is in line with the insightful paper by Bolton and Rosenthal (2002). A key difference is that, in their analysis, voting on moratoria occurs ex-post. In our setup, the bankruptcy law is set ex-ante, before financial contracts are written and economic decisions taken, reflecting the legal context. Furthermore, their focus on how laws complete contracts by making their application contingent on macro-shocks, differs from our focus on how laws take into account externalities imposed on third parties by financial contracts. In contrast to their results, the soft law that can emerge in our setting can be interpreted as a source of contractual incompleteness.

Our emphasis on the general equilibrium interactions between imperfect credit markets and the labor market is in line with Acemoglu (2001). However, his focus and ours are clearly different. Acemoglu (2001) offers a detailed analysis of labor market imperfections and thus analyse how credit market imperfections can raise unemployment. This is outside the scope of the present paper, since we consider perfect labor market. On the other hand, while we offer a detailed analysis of financial contracting, Acemoglu (2001) takes a more reduced form approach, simply assuming that external financing is impossible. Thus our analysis of such determinants of credit rationing as the legal context or the wage level are by construction distinct from his approach.

Our general equilibrium analysis of credit rationing in a context where some agents can

[5] Our emphasis on general equilibrium effects, and the resulting endogenous externality, differs from Biais and Recasens (2000), who assume exogenous social costs of liquidations in a partial equilibrium model.

seek to become entrepreneurs is in the same spirit as Aghion and Bolton (1997). However, while in their analysis, the fraction of agents who become entrepreneurs determines the endogenous cost of capital, in ours it determines the endogenous wage rate. Further, our focus on the potential inefficiencies of liquidations and the violation of creditors' rights induced by soft bankruptcy laws differentiates our analysis from theirs.

The paper is organized as follows. Section 2 presents our model and the first-best benchmark. Section 3 analyzes equilibrium with moral hazard under a tough law. Section 4 considers the case of a soft law. The conclusion, in Section 5, discusses empirical and policy implications of our analysis. Proofs not given in the text are in the Appendix.

2. Model and First-Best Benchmark

2.1. The Environment

The basic model is in line with Holmström and Tirole (1997). There is a continuum of mass one of risk-neutral agents. Each agent has an investment project, requiring initial investment I. While all investment projects are identical, agents differ in terms of their initial wealth $A < I$. We denote by F the cumulative distribution function of wealth among the population of agents, which is assumed to be differentiable on $[0, I]$, with a density f that is bounded away from zero on this interval. To undertake the investment project, and thus become an entrepreneur, an agent with initial wealth A needs to raise outside funds $I - A$. Competitive risk-neutral outside financiers are willing to lend if they break even in expectation. For simplicity, their required rate of return is normalized to zero, and their participation constraint will be saturated in equilibrium. If a project is undertaken, it can yield a payoff R or zero. If an entrepreneur exerts effort by incurring a disutility e, then the probability that the payoff is R is p_H, while if he does not exert effort, the probability of success is lowered to $p_L = p_H - \Delta p$. Each entrepreneur is protected by limited liability.

Our model departs in two ways from Holmström and Tirole (1997). First, besides the investment I, each project also requires one unit of labor, which is purchased at price w on a competitive labor market.[6] The workers are agents that chose, or possibly were forced not to become entrepreneurs. (Self-employment is ruled out.) Supplying l units of labor entails a disutility $C(l)$. We assume that C is strictly increasing, strictly convex, and differentiable, and satisfies the usual Inada conditions $C(0) = 0$, $C'(0) = 0$ and $\lim_{l \to +\infty} C'(l) = +\infty$. Second, after the payoff of the investment is realized, a project can be continued or liquidated. In the latter case, liquidation proceeds L are obtained. If the project is continued, the entrepreneur obtains non-transferable private benefits B. It can be interpreted as the psychological benefit enjoyed by the entrepreneur when his firm is not liquidated. Non-transferable

[6] By convention, wages are paid only conditional on a project being successful, and not upfront. This is without loss of generality given that agents are risk-neutral.

benefits from continuation would also arise in a dynamic extension of our model. In that context, they would reflect the expectation of the rents to be obtained by the entrepreneurs in the future. B can be understood as a reduced form representation of these future rents. We assume that $B \leq e/\Delta p$. This ensures that the maximum income that can be pledged to investors in case of success is less than R, which must be the case as B is non-transferable. We also assume that ex-post liquidation is inefficient in the sense that $B > L$. This ex-post inefficiency will play a key role in our model, to generate a trade-off between the ex-ante and ex-post consequences of tough bankruptcy laws. Finally, we assume that a project has a positive net present value only if the entrepreneur exerts effort:

$$p_L R + B - I < 0,$$

and if the project is not liquidated except perhaps in the bad state:

$$p_H(R + B) + (1 - p_H)L - e - I > 0 > p_H(R + L) + (1 - p_H)B - e - I.$$

2.2. Efficient Allocations without Moral Hazard

As a benchmark, we characterize efficient allocations of workers and entrepreneurs when entrepreneurial effort is contractible, so that there is no moral hazard problem. For each project that is undertaken, it is efficient to exert high effort and not to liquidate. The first-best surplus from a project is then:

$$S^{FB} = p_H R + B - e - I.$$

In the absence of moral hazard constraints, only the total mass of workers, not their identity, matters for efficiency. To see this formally, let μ be the measure corresponding to the cumulative distribution function F. An efficient allocation is described by a measurable set of workers W and a measurable labor supply function l that solve:

$$\max_{W,l} \left\{ (1 - \mu(W))\, S^{FB} - \int_W C(l(a))\, \mathrm{d}\mu(a) \right\}$$

subject to:

$$\int_W l(a)\, \mathrm{d}\mu(a) = 1 - \mu(W).$$

Because C is strictly convex, efficiency requires that all workers supply the same amount of labor. Specifically, we have the following proposition.

Proposition 1 *An efficient allocation is reached when there is a mass μ^{FB} of workers, and each worker supplies $l^{FB} = (1 - \mu^{FB})/\mu^{FB}$ units of labor, where:*

$$\mu^{FB}\big(S^{FB} + C(l^{FB})\big) = C'(l^{FB}). \tag{1}$$

A key implication of Proposition 1 is that the efficient proportion of workers, and thus the level of aggregate investment, does not depend on the distribution of wealth among agents. As shown in the next section, this property of first-best allocations does not hold in the second-best environment.

2.3. *Competitive Equilibrium without Moral Hazard*

Absent any frictions, any efficient allocation can be decentralized in a competitive equilibrium. Specifically, given wage w, a typical worker solves:

$$\max_{l} \{p_H wl - C(l)\}.$$

Let $l^*(w)$ be the solution to this problem. Equilibrium requires that wages equal the marginal disutility of labor:

$$C'(l^*(w)) = p_H w. \tag{2}$$

The second equilibrium condition relates to occupational choices. It requests that the utility from becoming a worker equal that from becoming an entrepreneur:

$$p_H wl^*(w) - C(l^*(w)) = S^{FB} - p_H w. \tag{3}$$

Finally, the labor market clearing condition implies that, at competitive equilibrium wage w^{CE}, individual labor supply is given by:

$$l^*(w^{CE}) = \frac{1-\mu^{CE}}{\mu^{CE}}, \tag{4}$$

where μ^{CE} is the total mass of workers in equilibrium. Using (2)-(4), we obtain that:

$$\mu^{CE}\big(S^{FB} + C(l^*(w^{CE}))\big) = C'(l^*(w^{CE})),$$

which is the clear counterpart of (1). It follows that $\mu^{CE} = \mu^{FB}$, as expected. The fact that the equilibrium proportion of workers is independent from the distribution of wealth reflects that gains from trade in (3) are independent of initial endowments. This will no longer be the case in the second-best, as shown in the next section.

As for efficient allocations, the identity of workers and entrepreneurs is irrelevant in equilibrium. However, it will be helpful for future reference to consider the case where agents who become workers are those with wealth below some cutoff $\hat{A}$, to be determined in equilibrium. Labor market clearing implies that individual labor supply is $(1-F(\hat{A}))/F(\hat{A})$. The utility of a worker, as a function of $\hat{A}$, is then given by:

$$U_W(\hat{A}) = C'\left(\frac{1-F(\hat{A})}{F(\hat{A})}\right)\frac{1-F(\hat{A})}{F(\hat{A})} - C\left(\frac{1-F(\hat{A})}{F(\hat{A})}\right),$$

while the utility of an entrepreneur, as a function of $\hat{A}$, is given by:

$$U_E^{FB}(\hat{A}) = S^{FB} - C'\left(\frac{1 - F(\hat{A})}{F(\hat{A})}\right).$$

The convexity of the cost function C implies that U_W is decreasing and U_E^{FB} is increasing. This reflects that, the more workers there are, the lower is the wage rate. The equilibrium value of $\hat{A}$, A^{FB}, is determined by the indifference condition $U_W(A^{FB}) = U_E^{FB}(A^{FB})$, and we have $\mu^{FB} = F(A^{FB})$.

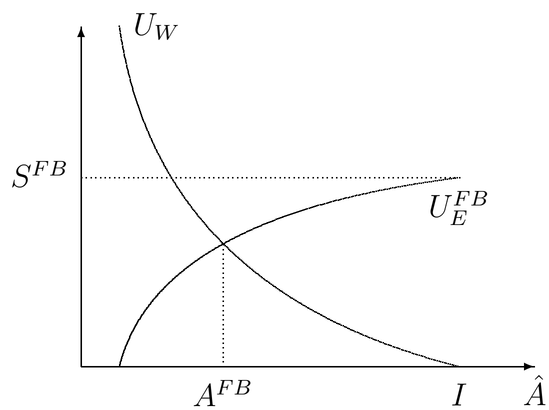

Figure 1

The competitive equilibrium in the first-best case is illustrated on Figure 1. Again, while the equilibrium threshold of wealth below which agents become workers depends on the distribution of wealth, the total mass of workers does not.

3. Equilibrium with Moral Hazard and a Tough Bankruptcy Law

When entrepreneurial effort is not observable, agents cope with the resulting moral hazard problem by designing optimal financial contracts. These contracts must ensure that investors are ready to lend and entrepreneurs to exert effort. They rely on two instruments. First, a minimal amount of initial wealth may be required in order to grant investment, as in Holmström and Tirole (1997). Second, inefficient ex-post liquidation in case of failure may be used as an incentive to exert effort, as in Bolton and Scharfstein (1990). In this section we consider a tough bankruptcy law, which simply enforces the contracts. In the next sections we will consider soft laws, interfering with the application of contracts.

3.1. The Credit Market

Consider an entrepreneur with initial wealth A. A financial contract stipulates a transfer ρ to the entrepreneur whenever the project succeeds, and a liquidation probability λ whenever the project fails.[7] Equivalently, λ could be thought of as the deterministic proportion of the firms' assets to be liquidated, leaving private benefits $(1-\lambda)B$ to the entrepreneur.[8] Given a wage rate w, the incentive compatibility constraint of the entrepreneur is:

$$p_H(\rho + B - w) + (1 - p_H)(1 - \lambda)B - e \geq p_L(\rho + B - w) + (1 - p_L)(1 - \lambda)B.$$

The left-hand side of this inequality is the expected utility the entrepreneur derives from the project if he exerts effort, and the right-hand side is his expected utility without effort. The incentive compatibility condition requires that the payoff to the entrepreneur in case of success, ρ, be at least as large as:

$$\frac{e}{\Delta p} + w - \lambda B.$$

Given a liquidation rate λ, the highest income in case of success that can be pledged to the investors without jeopardizing the entrepreneur's incentives is thus:

$$R + \lambda B - w - \frac{e}{\Delta p}.$$

Taking into account ex-post liquidation, the expected pledgeable income is then:

$$p_H\left(R - \frac{e}{\Delta p}\right) + \lambda(p_H B + (1 - p_H)L) - p_H w.$$

As usual, the expected pledgeable income is decreasing in $e/\Delta p$, which measures the severity of the moral hazard problem. More interestingly, the expected pledgeable income is increasing in λ. This reflects two effects. First, an increase in the liquidation rate raises the investors' revenue in case of failure. Second, it strengthens the incentives of the entrepreneur to exert effort in order to avoid liquidation.

We shall maintain in what follows that the minimum ex-wages pledgeable income is positive, so that agents with large initial wealth can raise funds without committing to liquidation:

$$p_H\left(R - \frac{e}{\Delta p}\right) > 0.$$

[7] It is easy to check that it is never optimal to liquidate the project following a success, as doing so would result in a tighter incentive constraint for the entrepreneur.

[8] In practice, when borrowing firms enter financial distress, their files are managed by a specialized department of the lending bank, that has its own staff and procedures. Franks and Sussman (2000) offer an empirical analysis of the workings of such recovery units in several British banks. Committing to a given liquidation probability can be achieved by an appropriate specification of the objectives and procedures of the recovery unit.

We also assume that the maximum ex-wages pledgeable income is less than the level of investment expenditures, so that some initial wealth is required for investing:

$$p_H\left(R - \frac{e}{\Delta p}\right) + p_H B + (1 - p_H)L < I.$$

In order for investors to break even, the expected pledgeable income must exceeds the investors' commitment:

$$p_H\left(R - \frac{e}{\Delta p}\right) + \lambda(p_H B + (1 - p_H)L) - p_H w \geq I - A. \tag{5}$$

It follows that, given the wage rate w, an agent can obtain a loan with liquidation rate λ if and only if his initial wealth A is above the threshold level $A(\lambda, w)$, where:[9]

$$A(\lambda, w) = I - p_H\left(R - \frac{e}{\Delta p}\right) - \lambda(p_H B + (1 - p_H)L) + p_H w.$$

Let $\lambda(A, w)$ be the optimal liquidation rate for an entrepreneur with wealth A, given wage w. Since liquidation is ex-post inefficient, it is optimal to keep the liquidation rate as low as possible. We therefore obtain two distinct financing regimes, outlined in the following proposition.

Proposition 2 *Given a wage rate w, only agents with wealth $A \geq A(1, w)$ can obtain external financing. Out of the agents who obtain funding, those with wealth $A \geq A(0, w)$ are never liquidated in case of failure, while those with wealth $A(1, w) \leq A < A(0, w)$ are liquidated at a positive rate in case of failure.*

If $A < A(1, w)$, there is no value of the liquidation rate such that the participation constraint of the investors is satisfied. Agents with wealth below $A(1, w)$ have thus no other choice than to become workers. For agents with wealth $A \geq A(1, w)$, a larger initial wealth reduces the amount of external finance and thus the debt overhang. When $A \geq A(0, w)$, the optimal financial contract precludes liquidation in case of failure. Thus, while outside financiers obtain a share of the cash-flow in case of success, they cannot force liquidation in case of failure. This corresponds to external financing by minority shareholders. By contrast, the optimal contract when $A(1, w) \leq A < A(0, w)$ can be thought of as a debt contract. The optimal liquidation rate in that case is obtained whenever (5) is binding,

$$\lambda(A, w) = \frac{I - A - p_H(R - e/\Delta p) + p_H w}{p_H B + (1 - p_H)L}. \tag{6}$$

[9]Our result that a minimum level of wealth is needed to obtain credit is directly in line with Holmström and Tirole (1997). It is also in line with the result by Bernanke and Gertler (1989) that the greater the level of net worth of the potential borrower, the lower the agency cost implied by the optimal contract.

The larger the initial wealth of an entrepreneur, the smaller the optimal liquidation rate. As wealthy entrepreneurs need relatively little external finance, they need to pledge only limited revenues. As a consequence, they do not need to concede a large liquidation rate. Eventually, entrepreneurs with wealth $A \geq A(0, w)$ are never liquidated in case of failure, and therefore $\lambda(A, w) = 0$ for these agents.

3.2. Competitive Equilibrium

Given wage w, the utility of an agent with wealth $A \geq A(1, w)$ who decides to become an entrepreneur is given by:

$$S^{FB} - p_H w - \lambda(A, w)(1 - p_H)(B - L).$$

Since $B > L$ and $\lambda(A, w)$ is a decreasing function of A, the utility of an entrepreneur is an increasing function of his initial wealth, in contrast with the first-best. This reflects that, since wealthy entrepreneurs can avoid frequent liquidations, they avoid the corresponding welfare losses. In contrast, the utility from becoming a worker,

$$p_H w l^*(w) - C(l^*(w)),$$

is independent of wealth. Moreover, only agents with wealth above $A(1, w)$ can be financed. Thus, in a competitive equilibrium, those who choose, or are forced to become workers must be the poorest agents. Let $\hat{A}$ be the cutoff level of wealth below which an agent becomes a worker. Labor market clearing then implies that individual labor supply is $(1 - F(\hat{A}))/F(\hat{A})$. The wage rate w corresponding to $\hat{A}$ is given by the first-order condition (2). For this to be compatible with equilibrium in the credit market, it must be that:

$$\hat{A} \geq A\left(1, \frac{1}{p_H} C'\left(\frac{1 - F(\hat{A})}{F(\hat{A})}\right)\right), \tag{7}$$

otherwise the marginal agent with wealth $\hat{A}$ could not obtain a loan. It is not difficult to check that there exists some cutoff $\underline{A} \in (0, I)$ such that (7) holds if and only if $\hat{A} \geq \underline{A}$.[10] This represents the minimal amount of wealth required from the marginal agent to become an entrepreneur, taking into account the endogeneity of wages. An intuitive interpretation of $\underline{A}$ is that this is the level of wealth for the marginal entrepreneur at which the maximal pledgeable income is equal to the required funding:

$$p_H\left(R - \frac{e}{\Delta p}\right) + p_H B + (1 - p_H)L - C'\left(\frac{1 - F(\underline{A})}{F(\underline{A})}\right) = I - \underline{A}.$$

[10] Using the definition of $A(\lambda, w)$ together with the convexity of C, it is easy to verify that the right-hand side of (7) is decreasing in $\hat{A}$. The existence of $\underline{A}$ then follows directly from the positivity of the maximum ex-wages expected pledgeable income, together with the Inada conditions on C.

To complete the description of the equilibrium, we need only to determine the equilibrium value of $\hat{A}$. For this, we need to compare a worker's utility with the utility that the marginal agent with wealth $\hat{A}$ would obtain if he became an entrepreneur. To compute the latter, define, for any $\hat{A} \geq \underline{A}$,

$$\Lambda(\hat{A}) = \lambda\left(\hat{A}, \frac{1}{p_H} C'\left(\frac{1 - F(\hat{A})}{F(\hat{A})}\right)\right). \tag{8}$$

This is the optimal liquidation rate for a marginal entrepreneur with wealth $\hat{A}$, given the labor market clearing wage rate. Note that, by construction, $\Lambda(\underline{A}) = 1$. Conditional on becoming an entrepreneur, the utility of the marginal agent with wealth $\hat{A}$ is therefore given by:

$$U_E^{SB}(\hat{A}) = U_E^{FB}(\hat{A}) - \Lambda(\hat{A})(1 - p_H)(B - L).$$

It is easy to check from (6) and (8) that Λ is decreasing in $\hat{A}$, and thus that U_E^{SB} is increasing in $\hat{A}$. We then have the following proposition, whose proof is immediate.

Proposition 3 *There exists a unique competitive equilibrium, with the following characteristics:*

(i) If $U_E^{SB}(\underline{A}) > U_W(\underline{A})$, there is credit rationing in equilibrium, and agents with initial wealth below $\underline{A}$ must become workers, while those with greater initial wealth prefer to become entrepreneurs;

(ii) If $U_E^{SB}(\underline{A}) \leq U_W(\underline{A})$, there is no rationing in equilibrium. The agents who become workers are those with initial wealth below A^T, where $A^T \geq \underline{A}$ is the unique value of $\hat{A}$ such that $U_E^{SB}(\hat{A}) = U_W(\hat{A})$.

If $U_E^{SB}(\underline{A}) > U_W(\underline{A})$, then the competitive equilibrium with moral hazard exhibits quantity rationing in the sense that the marginal entrepreneur with wealth $\underline{A}$ obtains a strictly higher utility than the typical worker. Agents with wealth slightly below $\underline{A}$ would rather become entrepreneurs, but there is no way of satisfying simultaneously incentive compatibility and investors' participation for those agents, even if the liquidation rate in case of failure is set at its maximal value of one. A competitive equilibrium with rationing is shown on Figure 2.

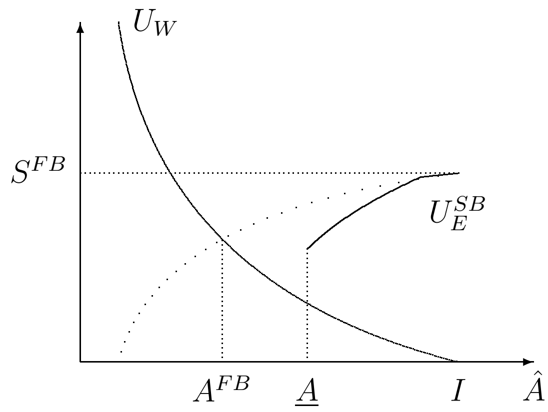

Figure 2

Note that if $\hat{A}$ is large enough, the liquidation rate of the marginal entrepreneur vanishes and he obtains the same utility as in the first-best, $U_E^{SB}(\hat{A}) = U_E^{FB}(\hat{A})$. Whenever there is rationing in equilibrium, the maximal ex-post liquidation rate is $\Lambda(\underline{A}) = 1$ by construction. By contrast, if there is no rationing in equilibrium, the maximal ex-post liquidation rate is typically bounded away from one.

Contrary to what happens in the first-best environment, the distribution of wealth is a key factor in explaining the allocation of workers and entrepreneurs in equilibrium. Specifically, the following proposition holds.

Proposition 4 *Suppose that F_1 first-order stochastically dominates F_2. Then, if there is rationing under F_1, there is rationing under F_2. Moreover, the mass of workers in equilibrium is higher under F_2 than under F_1, and the minimal amount of wealth required to become an entrepreneur is higher under F_1 than under F_2.*

This proposition states that an overall increase in wealth reduces credit rationing. Bernanke and Gertler (1989), Kiyotaki and Moore (1997) and Suarez and Sussman (1997) show that credit market imperfections amplify fluctuations in the business cycle. Downturns in the business cycle reduce agents' net wealth. This worsens credit rationing and thus depresses investment. Proposition 4 illustrates this idea, to the extent that a downturn in the business cycle leads to a stochastically dominated distribution of wealth.

Further, our model brings an additional twist to this argument. Since downturns in business cycle worsen credit rationing, they reduce labor demand and increase labor supply. This reduces the income of the poorest agents in the economy, the wage earners. In a dynamic extension of our model, this would in turn reduce the initial wealth of these agents in the next period, and thus exacerbate the credit rationing problems they face.

3.3. An Example

We now present a simple example, where some of the key variables in our model can be readily examined, which enables us to conduct some comparative statics exercises.

Suppose that the cost of labor is quadratic, $C(l) = cl^2/2$, and that the distribution of wealth is uniform over $[0, I]$, $F(A) = A/I$. By Proposition 1, the optimal mass of workers in the first-best is $\mu^{FB} = \sqrt{c/(2S^{FB} + c)}$. Intuitively, as c approaches zero, it becomes efficient to have as many entrepreneurs as possible in order to maximize total surplus. Let $P_{\max} \in (0, I)$ be the maximum ex-wages pledgeable income, that is:

$$P_{\max} = p_H\left(R - \frac{e}{\Delta p}\right) + (p_H B + (1 - p_H)L).$$

In this simple case, we can solve explicitly for the minimum amount of wealth that the marginal entrepreneur must have:

$$\underline{A} = \frac{I - P_{\max} - c + \sqrt{(I - P_{\max} - c)^2 + 4cI}}{2}.$$

The greater the cost of labor c, the greater the minimum amount of wealth the marginal entrepreneur must have. In limit case where c goes to zero, the minimum amount of wealth the marginal entrepreneur must have goes to $I - P_{\max}$. All agents with wealth below that threshold must be wage earners. Hence, in contrast with the first-best case, the mass of workers in the competitive equilibrium with moral hazard is bounded away from zero.

There is credit rationing whenever $U_E^{SB}(\underline{A}) > U_W(\underline{A})$. After some calculations this condition can be rewritten as:

$$p_H(R + B) + (1 - p_H)L - e - I > \frac{(P_{\max} - I + \underline{A})(I + \underline{A})}{2\underline{A}}. \tag{9}$$

By assumption, the left-hand side of (9) is strictly positive. The right-hand side is increasing in $\underline{A}$. Whenever c is close to zero, $\underline{A}$ is close to $I - P_{\max}$, and the right-hand side of (9) is close to zero. Thus there will always be rationing in equilibrium when the cost of labor is low. The intuition is that efficiency calls then for a low proportion of workers with a high individual labor supply. The resulting high proportion of entrepreneurs is however not compatible with equilibrium in the credit market, due to the presence of entrepreneurial moral hazard. Whenever c is large, $\underline{A}$ is close to I, and the right-hand side of (9) is close to $P_{\max}$. Thus there will be rationing in equilibrium no matter the cost of labor if the maximum pledgeable income is relatively low,

$$p_H(R + B) + (1 - p_H)L - e - I \geq P_{\max}.$$

This can be simplified to $I \leq p_L e/\Delta p$, which corresponds intuitively to situations in which the informational rent of the entrepreneur is high, and thus the moral hazard problem is severe. When the moral hazard is less severe, as $I > p_L e/\Delta p$, the financial regimes arising in equilibrium can be characterized as in the following proposition.

Proposition 5 *Suppose the cost of labor is quadratic, $C(l) = cl^2/2$, the distribution of wealth is uniform over $[0, I]$ and $I > p_L e/\Delta p$. Then, there is no rationing in equilibrium if the cost of labor is above a threshold $\underline{c}$, and the liquidation rate of the marginal entrepreneur in case of failure is a weakly decreasing function of c which goes to zero as c goes to infinity. Moreover,*

(ii) If $I \leq p_L e/\Delta p + B$, the liquidation rate of the marginal entrepreneur is positive for any value of c, and debt and equity always coexist in equilibrium;

(ii) If $I > B + p_L e/\Delta p$, then debt and equity coexist in equilibrium only whenever c is lower than a threshold $\overline{c} > \underline{c}$. For $c > \overline{c}$, all investment projects are equity financed.

The interpretation of the proposition is the following. When the cost of labor is low, $c < \underline{c}$, productive efficiency requires that many agents should become entrepreneurs. For relatively poor agents, however, this contradicts incentive compatibility. Hence there is credit rationing. In contrast, when the cost of labor is relatively high, productive efficiency calls for less investment. Consequently, there is no credit rationing. Yet, if the initial investment level is not too high, $I < B + p_L e/\Delta p$, there still is a relatively large population of agents who become entrepreneurs. The poorest of these agents have relatively little initial wealth to invest. In order to obtain funding they must commit to some liquidation in case of failure, i.e., they issue risky debt. On the other hand, if the initial investment level is high, $I > B + p_L e/\Delta p$, then only a few investment projects should be undertaken. Thus, only the richest agents become entrepreneurs, and their projects are entirely equity financed.

In the context of this simple example, we can discuss the impact of labor productivity shocks. A positive shock implies that less hours of labor are needed to generate the same service. In our model, this corresponds to a decrease in c, which implies that one unit of labor service can be provided at a lower utility cost for the laborer. An increase in labor productivity should lead to an increase in investment. To achieve this, relatively less wealthy agents must obtain funding to become entrepreneurs. To access the credit market, however, these agents must commit to a relatively large liquidation rate, i.e., they must issue risky debt. Hence, the productivity shock should induce an increase in the fraction of project financed with risky debt. This corresponds to an increase in the average leverage of the economy. Bearing in mind that the firms in our sample are financially constrained, because they have limited wealth and face a moral hazard problem, our theoretical result is in line with the empirical findings by Koracjczyk and Levy (2003) that, for financially constrained firms, leverage is pro-cyclical.

The link between financing and business cycle implied by Proposition 5 above is different from that analysed by Bernanke and Gertler (1989), Kiyotaki and Moore (1997) and Suarez and Sussman (1990). These papers analyse the link between previous wealth creation and access to financing, in a context where debt is the unique optimal financial contract. The implication of Proposition 5 bears upon the link between productivity shocks, current wealth creation, and the structure of financing, in a context where debt or equity can be optimal.

4. Equilibrium with Moral Hazard and a Soft Bankruptcy Law

As discussed in the introduction, bankruptcy laws in many countries do not enforce financial contracts. In contrast, they frequently force continuation of activity in cases where the existing contract requested liquidation. While such continuations are ex-post efficient, they worsen credit rationing ex-ante, as we discuss in the first part of this section. We then spell out the empirical implications of this analysis. Finally, we discuss the divergent political preferences of different citizens relatively to the bankruptcy law and show that a soft law can maximize ex-ante social welfare.

4.1. Financial Contracts with a Soft Bankruptcy Law

When an entrepreneur is financed by debt, the optimal financial contract typically specifies a positive liquidation rate in case of failure. Under a soft bankruptcy law, however, courts can interfere with the application of the contract, and impose continuation. To model this process in the simplest possible way, we assume that, in the states in which the contract entails liquidation, then with probability π the project is liquidated, while with probability $1 - \pi$ the court overrules the contract and imposes continuation. Thus, when the financial contract states a nominal liquidation rate λ in case of failure, the actual liquidation rate is $\lambda\pi$. The parameter π can thus be seen as a measure of the toughness of the law: the higher it is, the tougher the law.

How do contracting parties react to this legal environment? Consider an agent endowed with initial wealth A. For a given wage w, the optimal liquidation rate for this agent is $\lambda(A, w)$. To obtain an actual liquidation rate equal to $\lambda(A, w)$, the agent must state in the contract a nominal liquidation rate $\lambda = \lambda(A, w)/\pi$. Since λ must be lower than one, the agent is actually able to secure his optimal liquidation rate if and only if $\lambda(A, w) \leq \pi$. Hence, the soft bankruptcy law constrains actual liquidation rates to be at most equal to π. We therefore obtain two distinct financing regimes, outlined in the following proposition.

Proposition 6 *Given a wage rate w, only agents with wealth $A \geq A(\pi, w)$ can obtain a loan. Out of the agents who demand a loan, those with wealth $A \geq A(0, w)$ are never liquidated in case of failure, while those with wealth $A(\pi, w) \leq A < A(0, w)$ are liquidated at a positive rate in case of failure.*

It should be noted that the actual liquidation rates for agents with initial wealth $A \geq A(\pi, w)$ remain the same as in the case of a tough bankruptcy law. Thus the only impact of a soft bankruptcy law is to increase the minimum amount of wealth required to obtain a loan.

4.2. Competitive Equilibrium

As in the previous section, let $\hat{A}$ be the cutoff level of wealth below which an agent becomes a worker. Since the soft bankruptcy law constrains actual liquidation rates to be at most equal to π, the maximal pledgeable income is equal to:

$$p_H\left(R - \frac{e}{\Delta p}\right) + \pi(p_H B + (1-p_H)L) - C'\left(\frac{1-F(\hat{A})}{F(\hat{A})}\right).$$

This is lower than the maximum pledgeable income obtained for the tough law, reflecting the constraint on the liquidation rate. To characterize equilibrium in this context, we can proceed similarly to the tough law case. Define $\underline{A}(\pi)$ as the level of wealth for the marginal entrepreneur at which the maximal pledgeable income is equal to the required funding:[11]

$$p_H\left(R - \frac{e}{\Delta p}\right) + \pi(p_H B + (1-p_H)L) - C'\left(\frac{1-F(\underline{A}(\pi))}{F(\underline{A}(\pi))}\right) = I - \underline{A}(\pi).$$

Note that, reflecting the upper bound on the liquidation rate under the soft law, this cutoff level is higher than its tough law counterpart, $\underline{A}(\pi) > \underline{A}(1) = \underline{A}$. The marginal agent must have wealth at least equal to $\underline{A}(\pi)$, or else he could not obtain a loan in equilibrium. The utility of the marginal agent with wealth $\hat{A} \geq \underline{A}(\pi)$ is given by $U_E^{SB}(\hat{A})$ as before, since the actual liquidation rates for agents with initial wealth $\hat{A} \geq \underline{A}(\pi)$ are the same as under the tough bankruptcy law.[12] Hence the following proposition.

Proposition 7 *The following holds:*

(i) If $U_E^{SB}(\underline{A}(\pi)) > U_W(\underline{A}(\pi))$, then there exists a unique competitive equilibrium in which the agents who become workers are those with initial wealth below $\underline{A}(\pi)$;

(ii) If $U_E^{SB}(\underline{A}(\pi)) \leq U_W(\underline{A}(\pi))$, then there exists a unique competitive equilibrium in which the agents who become workers are those with initial wealth below A^T.

In Case (ii) there is no credit rationing. Thus, equilibrium and welfare are the same with a tough and with a soft law. This corresponds to the case where the maximum liquidation rate with a tough law is in equilibrium lower than π. Correspondingly, the constraint imposed by the soft law does not bind.

[11]Using the fact that the ex-wage minimum pledgeable income is positive, the existence of $\underline{A}(\pi)$ follows along similar lines as that of $\underline{A}$.

[12]Note in particular that, by construction, $\Lambda(\underline{A}(\pi)) = \pi$.

In Case (i) there is credit rationing. While the marginal entrepreneur with wealth $\underline{A}(\pi)$ obtains a strictly higher utility than workers, agents with initial wealth below $\underline{A}(\pi)$ cannot obtain financing and thus are constrained to be wage earners. In that case, the maximal ex-post liquidation rate is π. Since $\underline{A}(\pi) > \underline{A}$, there is more credit rationing than under the tough law. In fact, a soft bankruptcy law can generate credit rationing in circumstances where none would be present with a tough law.

4.3. Empirical Implications

Our theoretical analysis generates a series of empirical implications for the variation of financial structures across countries with different bankruptcy laws.

First soft bankruptcy laws reduce the scope for debt financing, consistently with the empirical results of La Porta et al. (1997).

Second, note that L can be interpreted as collateral. Pledging it to creditors, by committing to high liquidation rates, enhances access to credit. Soft laws, however, reduce the extent to which this can be achieved. Thus, our analysis implies that the positive impact of collateral for access to credit should be lower in countries with soft bankruptcy laws. It could be interesting to test this implication with firm level data from different countries, as that used by Giannetti (2000).

Third, soft laws depress investment, and thus labor demand and wages. In our simple model, aggregate profits before debt service are equal to:

$$(1 - F(\underline{A}(\pi)))\, p_H R,$$

while aggregate wage income is:

$$(1 - F(\underline{A}(\pi)))\, p_H C'\left(\frac{1 - F(\underline{A}(\pi))}{F(\underline{A}(\pi))}\right).$$

Thus our theoretical analysis predicts that the ratio of aggregate profits to aggregate wages is higher in countries with soft laws.

Fourth, consider the situation where the law is soft and there is credit rationing. Given an equilibrium wage rate $w(\pi) = \frac{1}{p_H} C'\left(\frac{1-F(\underline{A}(\pi))}{F(\underline{A}(\pi))}\right)$, the aggregate, economy-wide leverage ratio is:

$$\frac{\int_{\underline{A}(\pi)}^{A(0,w(\pi))} (I - A)\, \mathrm{d}F(A)}{\int_{A(0,w(\pi))}^{I} (I - A)\, \mathrm{d}F(A)}.$$

The numerator is the total value of debt in the economy. The denominator is the total value of outside equity. In this context consider the effect of an increase in the toughness of the law. This increase in π yields a decrease in $\underline{A}(\pi)$, which tends to raise the numerator, reflecting greater access to debt financing. The increase in π also yields an increase in $A(0, w(\pi))$

through an increase in wages. This further contributes to increasing the numerator, and also reduces the denominator. Indeed, greater wages tend to reduce the pledgeable income, and thus make it more difficult to finance projects through equity. Overall, we obtain that an increase in π triggers an increase in the leverage ratio. Thus, our analysis yields the new empirical implication that, in a cross section of countries, the aggregate leverage ratio should be positively correlated with the toughness of the law.

4.4. Political Preferences

The goal of this subsection is to characterize the preferences of agents over the softness of the law. The space of possible policies is $[0,1]$, and each element $\pi \in [0,1]$ represents the probability with which the courts will enforce financial contracts when they call for liquidation. We shall focus on the case in which there is no credit rationing under the tough law, i.e., $U_E^{SB}(\underline{A}) \leq U_W(\underline{A})$, and the marginal entrepreneur is liquidated at a positive rate $\lambda^T = \underline{A}^{-1}(A^T)$ in case of failure, i.e., $A^T < \underline{A}(0)$. Then any law $\pi \geq \lambda^T$ is actually equivalent to the tough law, calling for strict enforcement of contract. Hence, in this case, there is no rationing in equilibrium, and the agents who become workers are those with wealth below A^T. Thus, all agents are then indifferent between all policies $\pi \in [\lambda^T, 1]$. Therefore, there is no loss of generality in restricting the policy space to $[0, \lambda^T]$. On the other hand, if the bankruptcy law involves a maximum liquidation rate $\pi < \lambda^T$, then strict enforcement of financial contracts is precluded. With such a law there will be credit rationing. Agents with wealth below $\underline{A}(\pi) > A^T$ are constrained to be wage earners. In this context, three different types of agents must be considered.

Poor Agents. Consider first the case of an agent with wealth $A \leq A^T$. Irrespective of the bankruptcy law, this agent has no other choice than to become a worker. The utility obtained by this agent is $U_W(\underline{A}(\pi))$. This is is increasing in π, the toughness of the law. Indeed, wage earners benefit from tough laws, which facilitate firm creation and investment, and result in higher labor demand and higher wages. Thus poor agents favor the toughest bankruptcy law, $\pi = \lambda^T$, calling for full enforcement of contracts .

Rich Agents. Consider next the opposite case of an agent with wealth $A \geq \underline{A}(0)$. Irrespective of the bankruptcy law, this agent will become an entrepreneur, and will never be liquidated in equilibrium. (He does not want to become a wage earner, since his utility as an entrepreneur is greater than that of the marginal agent $U^{SB}(\underline{A}(\pi))$, which is greater than the utility $U_W(\underline{A}(\pi))$ of a worker for any $\pi \in [0, \lambda^T]$.) The payoff of this agent for a given bankruptcy law π is:

$$S^{FB} - C'\left(\frac{1 - F(\underline{A}(\pi))}{F(\underline{A}(\pi))}\right),$$

which is decreasing in π. Intuitively, an agent who is never credit rationed always benefit from lower firm creation, as it reduces the competition for labor and lowers the wages. Thus rich agents do not favor a strict enforcement of financial contracts. They want the law to be as soft as possible, $\pi = 0$.

Intermediate Agents. Consider finally the intermediate case of an agent with wealth $A^T < A < \underline{A}(0)$. Then there exists degree of toughness of the law, $\pi_A \in (0, \lambda^T)$, such that the agent is just rich enough to have access to credit, $A = \underline{A}(\pi_A)$. If a softer bankrupcty law $\pi < \pi_A$ is enforced, then in equilibrium, this agent will be forced to become a wage earner. In that case, his payoff is $U_W(\underline{A}(\pi))$, which is increasing on $[0, \pi_A)$. In contrast, if a tougher bankruptcy law $\pi \geq \pi_A$ is enforced, then in equilibrium, this agent will become an entrepreneur. In that case, his expected utility is:

$$S^{FB} - C'\left(\frac{1 - F(\underline{A}(\pi))}{F(\underline{A}(\pi))}\right) - \lambda\left(A, \frac{1}{p_H} C'\left(\frac{1 - F(\underline{A}(\pi))}{F(\underline{A}(\pi))}\right)\right)(1 - p_H)(B - L),$$

which is decreasing in π. Note that, as $U_E^{SB}(\underline{A}(\pi_A)) > U_W(\underline{A}(\pi_A))$, there is an upward discontinuity in the payoff of the agent at the point π_A where he can become an entrepreneur. The fact that the payoff is decreasing on $[\pi_A, \lambda^T]$ simply reflects that, conditional on becoming an entrepreneur, this agent prefers that as few as possible other agents become entrepreneurs, in order to benefit from lower wages. His payoff is maximal whenever $\pi = \pi_A$ and all agents who are poorer than himself become workers. Thus agents with intermediate level of wealth A always favor an intermediate bankruptcy law, $\pi = \pi_A$.

A key observation is that, because of the conflict of interest between the rich and the poor, the different bankruptcy laws are not comparable in the Pareto sense. So there is no clear efficiency reason why any particular bankruptcy law should be enforced. In the remaining of this section, we shall consider two procedures by which a bankruptcy law could be decided upon, namely voting and maximization of ex-ante social welfare.

4.5. Voting on the Bankruptcy Law

The upshot of the previous discussion is that all agents have single-peaked preferences with respect to the toughness of the law as measured by $\pi \in [0, \lambda^T]$. This implies that the median voter theorem applies, and thus the policy π^{MV} favored by the median agent cannot be defeated under majority voting by any other alternative. In particular, if the proportion of poor agents is high enough, $F(A^T) > 1/2$, the bankruptcy law that emerges from majority voting is tough, $\pi^{MV} = \lambda^T$. For instance, in the quadratic example of Subsection 3.3, it is easy to check that, for $I \in [p_L e/\Delta p, p_L e/\Delta p + B)$, this will occur if c is sufficiently large.

It is unclear, however, that majority voting adequately reflects the procedure by which laws are enacted in practice. As discussed by Benabou (2000), relatively poor citizens have less influence on the political process than relatively rich citizens. In line with empirical results from Rosenstone and Hansen (1993), Benabou notes that the poorest 16% account for only 12.2% of the votes and 4% of the number of campaign contributors. In contrast the richest 5% account for 6.4% of the votes and 16.3% of the contributors. As noted by Benabou (2000), for campaign contributions the figure understates the bias, since the data reflects only the number of contributions and not their amounts. It should also be emphasized that, regarding lobbying and political contributions, small entrepreneurs are in a particularly difficult position, as the limited financial resources they have must be used in order to pledge income to outside financiers and thus cannot be used for political contributions.

This discussion points at an empirical implication of our analysis: the greater the weight of the relatively rich agents in the political process, the softer the bankruptcy law is expected to be. To measure the degree of toughness of the law one could use the index of creditors' rights proposed by La Porta et al. (1998). To measure the weight of the rich in the political process, one could rely on the representation ratio discussed by Benabou (2000).

To model the link between wealth and political influence, we follow Benabou (2000). Given a weighting function g, let the proportion of votes cast by agents with wealth less than $\hat{A}$ be given by $G(\hat{A})/G(I)$, where:

$$G(\hat{A}) = \int_0^{\hat{A}} g(A)\,\mathrm{d}F(A).$$

Given the fact that preferences are single-peaked and that the preferred policy is monotonic in wealth, with wealthier agents preferring a lower level of π, it is easy to check that the agent with wealth A^P given by $G(A^P)/G(I) = 1/2$ is pivotal. For instance, suppose that F is uniform over $[0, I]$, $F(A) = A/I$, and consider a power weighting function $g_\gamma(A) = A^\gamma$, where $\gamma > -1$. The case $\gamma = 0$ corresponds to the standard median voter situation, whereas $\gamma > 0$ corresponds to a situation where the rich have more political influence than the poor. In that case, the pivotal agent has wealth $A^P = I/2^{1/(\gamma+1)}$, which is higher than the median voter wealth $I/2$. Everything happens as if there were majority voting and the distribution of wealth were shifted toward $F_\gamma(A) = (A/I)^{\gamma+1}$, and thus in favor of the rich. In that case, a soft bankruptcy law may emerge, even if the proportion of the poor is greater than 1/2.

4.6. The Welfare Maximizing Bankruptcy Law

We now turn to the case where the bankruptcy law is chosen by a benevolent social planner so as to maximize ex-ante social welfare. A soft bankruptcy law typically generates more rationing than the tough law in which contracts are perfectly enforced. Therefore less investment takes place under a soft than under a tough bankruptcy law. This does not mean, however, that the tough bankruptcy law always maximize social welfare. Indeed, a soft bankruptcy law reduces wages, and thus relaxes the pressure on entrepreneurs with intermediate levels of wealth by reducing the equilibrium rate of liquidation in case of failure. This in turn limits the efficiency losses from liquidation.

To see this, let us suppose as above that there is no rationing under a tough law, so that, by Proposition 3, the wage earners are the agents with wealth below A^T, and that the marginal entrepreneur is liquidated at a positive rate $\lambda^T = \underline{A}^{-1}(A^T)$ in case of failure. We want to evaluate the impact on social welfare of decreasing the maximum liquidation rate from its equilibrium value λ^T under the tough law. Social welfare under a soft law with maximum liquidation rate $\pi < \lambda^T$ is equal to:

$$\begin{aligned} SW(\underline{A}(\pi)) = {} & (1 - F(\underline{A}(\pi)))S^{FB} - F(\underline{A}(\pi))\, C\left(\frac{1 - F(\underline{A}(\pi))}{F(\underline{A}(\pi))}\right) \\ & - \int_{\underline{A}(\pi)}^{A(0,w(\pi))} \lambda\left(A, \frac{1}{p_H}\, C'\left(\frac{1 - F(\underline{A}(\pi))}{F(\underline{A}(\pi))}\right)\right)(1 - p_H)(B - L)\,\mathrm{d}F(A), \end{aligned}$$

where $w(\pi) = \frac{1}{p_H}\, C'\left(\frac{1-F(\underline{A}(\pi))}{F(\underline{A}(\pi))}\right)$ is the equilibrium wage rate given the law π. The first two terms in this expression reflect the first-best surplus corresponding to a marginal entrepreneur with wealth $\underline{A}(\pi)$. The last term corresponds to the average cost of liquidation supported by entrepreneurs with wealth between $\underline{A}(\pi)$ and $A(0, w(\pi))$ who finance their projects by issuing debt. Using the definitions of U_E^{SB}, U_W, and $\underline{A}(\pi)$, one can verify that:

$$\begin{aligned} SW'(\underline{A}(\pi)) = {} & -f(\underline{A}(\pi))(U_E^{SB}(\underline{A}(\pi)) - U_W(\underline{A}(\pi))) \\ & + (F(A(0, w(\pi))) - F(\underline{A}(\pi)))\, \frac{(1 - p_H)(B - L)}{p_H B + (1 - p_H)L}\, C''\left(\frac{1 - F(\underline{A}(\pi))}{F(\underline{A}(\pi))}\right) \frac{f(\underline{A}(\pi))}{F^2(\underline{A}(\pi))}. \end{aligned}$$

The first term in this expression represents the loss of surplus generated by a soft law. It is proportional to the difference between the utility of the marginal entrepreneur with wealth $\underline{A}(\pi)$ and that of a worker, which is positive as $\pi < \lambda^T$. Since C is strictly convex, the second term is positive and represents the gain in surplus generated by a soft law. It is proportional to $F(A(0, w(\pi))) - F(\underline{A}(\pi))$, the mass of entrepreneurs who face a positive liquidation rate in case of failure. For these entrepreneurs, a decrease in π, and thus an increase in $\underline{A}(\pi)$ has a positive impact on their utility since it lowers the wage, and thus their liquidation rates. The corresponding wage effect is:

$$-\frac{\mathrm{d}}{\mathrm{d}\underline{A}(\pi)}\, C'\left(\frac{1 - F(\underline{A}(\pi))}{F(\underline{A}(\pi))}\right) = C''\left(\frac{1 - F(\underline{A}(\pi))}{F(\underline{A}(\pi))}\right) \frac{f(\underline{A}(\pi))}{F^2(\underline{A}(\pi))}.$$

In other terms, the marginal entrepreneur exerts an externality by increasing wages and thus the liquidation rates of the mass $F(A(0, w(\pi))) - F(\underline{A}(\pi))$ of entrepreneurs who finance their projects with debt.

We are now ready to characterize the welfare maximizing degree of softness of the law, π^{SW}. From the expression for $SW'(\underline{A}(\pi))$, it is clear that lowering the maximum liquidation rate from λ^T has only a negligible cost, as $U_E^{SB}(\underline{A}(\lambda^T)) = U_W(\underline{A}(\lambda^T))$ by construction. This reflects that the contribution to social welfare of the marginal entrepreneur is negligible, precisely because there is no rationing in the initial situation. However, the efficiency gains of lowering π from λ^T are strictly positive. It therefore follows that $SW'(\underline{A}(\lambda^T)) > 0$. Symmetrically, it is easy to see that $SW'(\underline{A}(0)) < 0$, which reflects the fact that if liquidation is completely prohibited, the positive impact of a soft law on social welfare vanishes as debt financing is no longer an option. (This last point remains true whatever the nature of equilibrium under the tough law.) Hence the following proposition.

Proposition 8 *If there is no rationing and the marginal entrepreneur is liquidated at a positive rate λ^T under the tough law, the welfare maximizing bankruptcy law is soft and calls for some rationing in equilibrium,* $0 < \pi^{SW} < \lambda^T$.

Thus rationing may be welfare improving, and a soft bankruptcy law can be used as a mean to achieve this objective. In particular, from a utilitarian viewpoint, freedom of contracting can be harmful, and interference with the enforcement of contracts beneficial. It should be noted that this result relies only on two ingredients: the existence of a moral hazard problem in the credit market, and the endogeneity of wages. The externality that is corrected by a soft bankruptcy law is endogenous, since it would not occur in the absence of moral hazard, and it does not follow from assuming that the lenders' liquidation rights stand in conflict with the public interest, as when liquidation implies costs for society as a whole.

The optimality of a soft law relies on the assumption that there is no rationing under the tough law. By continuity, this result remains true if there is little rationing under the tough law, i.e., if the difference $U_E^{SB}(\underline{A}) - U_W(\underline{A})$ is small. In the quadratic example of Subsection 3.3, this typically holds whenever $I > p_L e/\Delta p$ and c is close to but smaller than $\underline{c}$. If this is not the case, then the comparison between the positive and negative impacts of a soft law becomes ambiguous, because the social welfare loss associated to making the marginal entrepreneur a worker is no longer negligible. In the quadratic example, it can be shown that the welfare maximizing law is tough whenever c is close enough to zero. In that case, the externality generated by the marginal entrepreneur on debt holders is small, because the cost of labor is small, and it is therefore optimal to perfectly enforce the contracts.

5. Conclusion

This paper studies the economics of bankruptcy laws. We consider an imperfect financial market, where moral hazard can generate credit rationing. To cope with this problem, entrepreneurs must sometimes commit to ex-post inefficient liquidation. Liquidation increases the expected revenue of the outside financiers. It also enhances the incentives of managers to exert effort to increase the probability of success of their projects. Indeed, in case of failure, when the firm is liquidated, the manager cannot enjoy the non-transferable private benefits from continuation.

In this context we obtain the following results. There is a two-way link between the labor market and the credit market. On the one hand, the credit market influences the labor market, as more efficient credit markets increase investment, and thus labor demand and wages. On the other hand, the labor market influences the credit market: higher wages reduce the revenue entrepreneurs can pledge to outside investors, which makes higher liquidation rates necessary, and thus increases the incidence of ex-post inefficient liquidations.

The results of our model are in line with the country level evidence offered by La Porta et al. (1997) and the firm level evidence offered by Giannetti (2000) that access to debt financing is reduced in countries with soft bankruptcy codes. Our theoretical analysis also delivers some new testable implications on the links between the softness of the law and (i) the consequences of collateral for access to credit, (ii) the average leverage in the economy, (iii) the ratio of total wage income to total profits, (iv) the amplification of business cycle fluctuations due to credit market imperfections. Our analysis also implies that positive labor productivity shocks should lead to an increase in investment associated with a shift of the average financial structure of the economy towards risky debt.

While a soft bankruptcy law, interfering with the application of financial contracts, can worsen credit rationing, a tough law, simply enforcing financial contracts, does not necessarily maximize ex-ante social welfare. Switching to a somewhat soft law leads to excluding some relatively poor entrepreneurs from the credit market. This reduces investment and thus wages. For richer agents, who still have access to credit, the decrease in wages increases pledgeable income. In turn, this lowers the liquidation rates and the associated inefficiencies.

While our analysis sheds some light on the socially optimal bankruptcy law in the utilitarian sense, it also emphasizes that a soft law does not lead to a Pareto improvement compared to a tough law. Agents with different initial ressources typically have different preferences towards the bankruptcy law. Hence different laws can be chosen in different countries, reflecting the political influence of the different social classes, and possibly at odds with social welfare. For example, the richer agents prefer soft laws. There are two ways in which they benefit from the reduction in wages brought about by such laws. First, soft laws reduce wages, which directly increase the profits of these rich entrepreneurs. The second effect is more indirect. As discussed above, by reducing wages soft laws reduce inefficient liquidations.

From a theoretical perspective, our analysis points out that in the presence of market imperfections, such as moral hazard, a second-best allocation does not necessarily involve freedom of contracting and perfect enforcement of contracts. Indeed, in this context, the contracts between certain parties have an external effect on other parties, reflecting general equilibrium effects.

From a policy perspective, our analysis suggests that, when the labor market is tight, and the inefficiencies of liquidation are large, opting for a tough law that strictly enforces financial contracts does not necessarily maximize social welfare. Note however that this result hinges on our assumption that courts, implementing the soft law, are efficient and honest. Corrupt judges could take advantage of the discretion granted by soft law to demand bribes, e.g., by demanding a share of the liquidation proceeds in exchange for rulings in favor of liquidation. Such bribes would reduce the pledgeable income of the project, which would undermine the positive effect of soft laws. Thus, with corrupt judges, soft laws would be associated with low investment, low wages and large inefficiencies.[13]

[13] This is studied in Biais and Recasens, 2000.

Appendix

Proof of Proposition 1. Let (W, l) be an optimal allocation. Suppose that l is not constant, and let $\hat{l} = (1 - \mu(W))/\mu(W)$. The strict convexity of C together with Jensen's inequality implies that:

$$
\begin{aligned}
-\int_W C(l(a))\,\mathrm{d}\mu(a) &< -\mu\,(W)\,C\left(\frac{1}{\mu(W)}\int_W l(a)\,\mathrm{d}\mu(a)\right) \\
&= -\mu(W)\,C(\hat{l}),
\end{aligned}
$$

so the allocation $(W, \hat{l})$ would strictly dominate the allocation (W, l), a contradiction. Hence, in an optimal allocation, all workers supply the same amount of labor, $(1 - \mu)/\mu$, where μ is the total mass of workers. The optimal work force is obtained by solving:

$$
\max_{\mu}\left\{(1-\mu)\,S^{FB} - \mu C\left(\frac{1-\mu}{\mu}\right)\right\}.
$$

Equation (1) is simply the first-order condition for this problem. ■

Proof of Proposition 4. Consider the cutoffs $\underline{A}_1$ and $\underline{A}_2$ corresponding respectively to F_1 and F_2. We first prove that $\underline{A}_1 \geq \underline{A}_2$ and $F_1(\underline{A}_1) \leq F_2(\underline{A}_2)$. As for the first point, simply observe that, for each $i = 1, 2$, $\underline{A}_i$ is obtained as the solution to:

$$
C'(F_i(A)^{-1} - 1) - A = \kappa,
$$

where κ is a constant independent from i. Since C is convex, the left-hand side of this equation is decreasing in A. Moreover, by first-order stochastic dominance, $C'\big(F_1(A)^{-1} - 1\big) \geq C'\big(F_2(A)^{-1} - 1\big)$ for each $A \in [0, I]$. Hence $\underline{A}_1 \geq \underline{A}_2$, as claimed. As for the second point, note that:

$$
C'(F_1(\underline{A}_1)^{-1} - 1) - C'(F_2(\underline{A}_2)^{-1} - 1) = \underline{A}_1 - \underline{A}_2.
$$

Since this difference is positive as $\underline{A}_1 \geq \underline{A}_2$, and C is convex, $F_1(\underline{A}_1) \leq F_2(\underline{A}_2)$, as claimed. To prove that if there is rationing under F_1, there is rationing under F_2, it is enough to show that $U^{SB}_{E,2}(\underline{A}_2) - U_{W,2}(\underline{A}_2) \geq U^{SB}_{E,1}(\underline{A}_1) - U_{W,1}(\underline{A}_1)$, or:

$$
\Phi(F_1(\underline{A}_1)^{-1}) \geq \Phi(F_2(\underline{A}_2)^{-1}),
$$

where $\Phi(x) = C'(x-1)\,x - C(x-1)$ for each $x \in [1, \infty)$. From the convexity of C, Φ is increasing, and the result follows immediately and the fact that $F_1(\underline{A}_1) \leq F_2(\underline{A}_2)$. It remains to prove that the proportion of workers in equilibrium is higher under F_2 than under F_1, and that the minimal amount of wealth required to become an entrepreneur is higher under F_1 than under F_2. From the above argument, there are three cases to consider.

If there is rationing both under F_1 and F_2, then the proportions of workers in equilibrium are respectively $F_1(\underline{A}_1)$ and $F_2(\underline{A}_2)$, and the result follows directly from the fact that $F_1(\underline{A}_1) \leq F_2(\underline{A}_2)$ and $\underline{A}_1 \geq \underline{A}_2$.

If there is rationing under F_2 but not under F_1, then $U^{SB}_{E,2}(\underline{A}_2) > U_{W,2}(\underline{A}_2)$ but $U^{SB}_{E,1}(A^{SB}_1) = U_{W,1}(A^{SB}_1)$ for some $A^{SB}_1 \geq \underline{A}_1$. The first relation can be rewritten as:

$$
S^{FB} - (1 - p_H)(B - L) > \Phi(F_2(\underline{A}_2)^{-1}),
$$

and the second as:

$$
\Phi(F_1(A^{SB}_1)^{-1}) = S^{FB} - \Lambda_1(A^{SB}_1)(1 - p_H)(B - L).
$$

Since $\Lambda_1(A_1^{SB}) \in [0,1]$, it follows that $\Phi(F_1(A_1^{SB})^{-1}) > \Phi(F_2(\underline{A}_2)^{-1})$ and, since Φ is increasing, $F_1(A_1^{SB}) < F_2(\underline{A}_2)$. As $A_1^{SB} \geq \underline{A}_1 \geq \underline{A}_2$, the result follows.

If there is no rationing both under F_1 and F_2, then $U_{E,1}^{SB}(A_1^{SB}) = U_{W,1}(A_1^{SB})$ and $U_{E,2}^{SB}(A_2^{SB}) = U_{W,2}(A_2^{SB})$ for some $A_1^{SB} \geq \underline{A}_1$ and $A_2^{SB} \geq \underline{A}_2$. We first prove that $A_1^{SB} \geq A_2^{SB}$. One can check that, for each $i = 1,2$, A_i^{SB} is obtained as the solution to:

$$\Psi(F_i(A)^{-1}) - \kappa' A = \kappa'',$$

where $\kappa' = (1-p_H)(B-L)/(p_H B + (1-p_H)L)$ is positive, κ'' is a constant independent from i, and $\Psi(x) = \Phi(x) + \kappa' C'(x-1)$ for each $x \in [1,\infty)$. Since Φ is increasing and C is convex, Ψ is increasing, and thus the left-hand side of this equation is decreasing in A. Moreover, by first-order stochastic dominance, $\Psi(F_1(A)^{-1}) \geq \Psi(F_2(A)^{-1})$ for each $A \in [0,I]$. Hence $A_1^{SB} \geq A_2^{SB}$, as claimed. Last, note that:

$$\Psi(F_1(A_1^{SB})^{-1}) - \Psi(F_2(A_2^{SB})^{-1}) = \kappa'(A_1^{SB} - A_2^{SB}).$$

Since this difference is positive as $\kappa' > 0$ and $A_1^{SB} \geq A_2^{SB}$, and Ψ is increasing, $F_1(A_1^{SB}) \leq F_2(A_2^{SB})$. As $A_1^{SB} \geq A_2^{SB}$, the result follows. ■

Proof of Proposition 5. The cutoff $\underline{c}$ below which there is rationing is determined by the condition that (9) holds as an equality. Whenever $c > \underline{c}$, there is no rationing, and the wealth $A^T(c)$ of the marginal entrepreneur is obtained as the solution to $U_E^{SB}(\hat{A}) = U_W(\hat{A})$. In the quadratic specification, this holds whenever S^{FB} is equal to:

$$c\,\frac{I - A^T(c)}{A^T(c)} + \left(I - A^T(c) - P_{\min} + c\,\frac{I - A^T(c)}{A^T(c)}\right)^+ \frac{(1-p_H)(B-L)}{p_H B + (1-p_H)L} + \frac{c}{2}\left(\frac{I - A^T(c)}{A^T(c)}\right)^2,$$

where $P_{\min}$ is the minimum pledgeable income and x^+ the positive part of x. We shall first investigate whether, for some value of c, it is the case that the liquidation rate of the marginal entrepreneur is just zero, i.e.,

$$c = \frac{A^T(c)(P_{\min} - I + A^T(c))}{I - A^T(c)}.$$

Then $A^T(c)$ is equal to the first-best level:

$$A^T(c) = I\sqrt{\frac{c}{c + 2S^{FB}}}.$$

It follows that $A^T(c)$ must satisfy a quadratic equation:

$$Q(A^T(c)) = (P_{\min} - I + A^T(c))(I + A^T(c)) - 2S^{FB}A^T(c) = 0,$$

where we have eliminated the solution $A^T(c) = I$ which corresponds to $c = +\infty$. The relevant set of values for $A^T(c)$ is $(I - P_{\min}, I)$. Clearly $Q(I - P_{\min})$ is negative, while $Q(I)$ is positive only whenever $P_{\min} > S^{FB}$, or equivalently $I > B + p_L e/\Delta p$. In that case, Q has a unique root in the interval $(I - P_{\min}, I)$, and we denote by $\bar{c}$ the corresponding value of c. It is then easy to check that for $c > \bar{c}$, the liquidation rate of the marginal entrepreneur is zero, and thus only equity finance is possible. On the other hand, if $p_L e/\Delta p < I \leq B + p_L e/\Delta p$, the liquidation rate of the marginal entrepreneur is positive for any value of c, and debt and equity always coexist in equilibrium. The fact that $A^T(+\infty) = I$ corresponds to zero probability of liquidation implies that the liquidation rate of the marginal entrepreneur tends to zero as c goes to infinity.

Focusing without loss of generality on the case where $p_L e/\Delta p < I \leq B + p_L e/\Delta p$, we now check that the liquidation rate $\lambda^T(c)$ of the marginal entrepreneur is decreasing on $[\underline{c}, +\infty)$. By the equilibrium condition:

$$\begin{aligned}
\lambda^T(c)(1-p_H)(B-L) &= S^{FB} - c\,\frac{I-A^T(c)}{A^T(c)} - \frac{c}{2}\left(\frac{I-A^T(c)}{A^T(c)}\right)^2 \\
&= S^{FB} - (P_{\min} + \lambda^T(c)(p_H B + (1-p_H)L) - I + A^T(c))\,\frac{I+A^T(c)}{2A^T(c)} \\
&= S^{FB} - \Omega(\lambda^T(c), A^T(c)),
\end{aligned}$$

where $\Omega(x,y) = (P_{\min} + x(p_H B + (1-p_H)L) - I + y)\,(I+y)/2y$ for each $(x,y) \in [0,1] \times (0,I]$ and the second equality follows from the definition of $\lambda^T(c)$. The equilibrium condition implies that $A^T(c)$ is increasing in c. Suppose that $\lambda^T(c)$ is increasing in c. Then since obviously $\Omega_1(\lambda^T(c), A^T(c)) > 0$, we get a contradiction if $\Omega_2(\lambda^T(c), A^T(c)) \geq 0$. It is easy to check $\Omega_2(\lambda^T(c), A^T(c))$ has the same sign as $A^T(c)^2 + I^2 - (P_{\min} + \lambda^T(c)(p_H B + (1-p_H)L))I$, which is positive as $P_{\min} + \lambda^T(c)(p_H B + (1-p_H)L) \leq P_{\max} < I$. Hence the result. ■

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