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Debt renegotiation and entrepreneurial optimism

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Abstract

This paper studies the effect of entrepreneurial optimism on the renegotiation procedure outcome in the case of financially distressed companies. We model a three actor renegotiation procedure whit a realistic bank, an optimistic entrepreneur and a trade supplier (who is an optimistic entrepreneur himself). We show that optimism enables a renegotiation procedure even when immediate liquidation is socially optimal. We also show that realistic actors (banks) can exploit the divergence in beliefs with optimistic entrepreneurs in order to obtain premature repayment, while optimistic trade suppliers support the company since they believe that the project has great chances to succeed. Hence, we explain by this idea some empirical evidence over private renegotiation results and player's behavior.

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Private debt renegotiation is a subject of great interest in corporate finance as it is a crucial moment in a firm's life with great potential of conflict situations. In addition to this, evidence has been provided of some counterintuitive empirical results showing unexpected renegotiation behaviors of different actors. Indeed out-of-court renegotiations are quite common (according to Asquith and al. (1994) almost half of the companies of their sample have already avoided liquidation through a private renegotiation procedure while Roberts and Sufi (2009) estimate this ratio up to 75%). Also, the attitude of concerned actors within these procedures may differ. Petersen and Rajan (1997) and Franks and Sussman (2003) highlight two different renegotiation behaviors on behalf of financiers: banks would be quite strict and progressively retrieve their claim while trade supplier would bring up more support to distressed firms providing additional funds or postponing maturities. Moreover, some empirical studies such as Hotchkiss and Mooradian (2008) highlight that most of the companies concerned by a private renegotiation procedure have poor performances afterwards or are liquidated not long after the end of the renegotiation.

Several questions follow from these empirical facts: if the percentage of renegotiated contracts is as important what is the utility of initial contracts' terms? Should banks be more selective over projects they choose to finance in order to avoid renegotiation or should they on the opposite encourage renegotiation procedures allowing them to impose tougher terms? How do we explain the trade supplier's attitude during financial distress? Finally, are out-of-court renegotiations desirable judging from the weak success ratio of companies being subject to such a procedure?

A rich court of literature aims to explain some of the points mentioned above and different theoretical arguments have been proposed to justify the concerned actors' behavior. For example, Petersen and Rajan (1997) suggest that trade suppliers have better information than banks since they are more familiar with the sector and the specific market. Thus, they would be more able to control the firm and to recognize real economic distress. Moreover, they would attribute higher value to the firm's guarantees since they can reuse or sell them more easily. Another explanation, proposed by Mian and Smith, (1992), is related to commercial relationships between firms facing financial distress and their trade supplier: the supplier may benefit from his role of lender in order to increase prices. Similarly, Wilner (2000) explains this empirical result through the commercial dependence of the supplier

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towards his client. Finally, Vilanova (2004) justifies high concessions on behalf of the supplier by his weak protection in case of liquidation. The renegotiation behavior would then be related to the priority of the claim detained.

The goal of this paper is to propose an alternative explanation of these empirical results. The idea is to include in the analysis of different actors' renegotiation behavior their psychological profile. A growing literature provides evidence of the existence of some psychological biases that are likely to influence actors' beliefs and decisions. More precisely we focus here on a well evidenced cognitive bias, the managerial optimism[1]. We will define optimism as a psychological bias that induces individuals to make too positive forecasts about their future results and to believe that their chances of success and general positive outcomes are higher than the chances of their pairs.

Most papers that analyze the impact of optimistic bias on financial decisions point out negative effects of the previous on firm's performance and the main victims of these effects are often financial partners or investors. As a matter of fact, in these papers managers and entrepreneurs are often considered as biased optimistic actors while investors are presumed perfectly realistic. This is explained by the nature of the managerial activity: it is argued that realistic or pessimistic individual would rather work for a fixed salary and wouldn't engage in risky entrepreneurial activities (Busenitz, 1999; Cooper and al., 1988). Some even consider that it is optimism that explains the too frequent venture creation (Camerer and Lovallo, 1999) and their high level of failure (Hayward and al., 2006). In order to illustrate different negative effects of optimism developed in this literature we can take various examples: Manove and Padilla (1999) show the negative impact of optimism by modeling an adverse selection problem where banks cannot separate optimists from realists based only on the value of collateral. Similarly Malmendier and Tate (2001) show that optimistic managers may overinvest, while Vilanova (2009b) argues that they might refuse constructive advice from their financers (venture capitalists). All of these papers clearly show that optimistic bias is harmful to the firm's financial performance. A logical question would then be how do optimistic actors obtain external financial sources? If the entrepreneur's optimism really have negative impact on financiers' gain we would expect to have high level of credit rationing in sectors where optimism is common (in the case of start-ups' financing

[1] For a detailed review on optimism and overconfidence bias in financial and managerial literatures see Vilanova (2009a).

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for example). On the other hand, it is interesting to study the specific case of financiers, such as trade suppliers, that are both financers and entrepreneurs. We can imagine that their entrepreneurial status qualifies them as potential optimists even when they have the role of financers in a given situation. If this is the case, we should expect that their beliefs would be closers to the entrepreneur's ones and quite different from what a rational financier would believe.

In order to develop these intuitions, we model a multilateral renegotiation procedure with three actors: a perfectly rational and realistic bank, an optimistic trade supplier and an optimistic entrepreneur. This allows us to analyze the impact of optimism on the renegotiation behavior and more globally on the expected revenue of each player. Two main results are to be pointed out: first we show that entrepreneurial optimism may explain debt renegotiation in situations in which it is socially optimal to liquidate the firm. Second, we identify "winners" and "losers" from such a procedure as well as the reasons that justify this outcome.

The main contribution of this paper resides precisely in this "winners-losers" argument. In fact we highlight here the idea that realistic agents can exploit optimists' bias and benefit from the "*beliefs asymmetry*" the same way that they would benefit from an information asymmetry. This could explain their reluctance to impose credit rationing and identify optimists ex ante. Moreover, we suggest by this idea that the main victims of the optimism are optimists themselves and while they subjectively believe to be winning they are objectively loosing.

To our knowledge, there is no other article that directly studies this problem. Optimism have been considered in "bargaining" literature from a different viewpoint: Ali (2006) studies a bargaining game in which certain players are optimists about their bargaining power and Dickinson (2006) analyzes results of renegotiation when some actors are optimists about the arbitrator's settlement preferences in a final offer arbitration bargaining. In our setup optimism concerns beliefs about the project's final probability of success and all players are perfectly rational and informed about their bargaining power. Note also that we model a bargaining game with a limited number of offers, similar to the one we can find in Noe and Wang (2000) and in Vilanova (2007).

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The remainder of the paper is organized as follows. Section I presents the model framework and the bargaining game. Section II analyses the results of the renegotiation procedure and the impact of the latest on each actor's expected profit. Section III resumes the fundamental results and concludes. We propose some extensions of our model in Appendix1 and 2.

I. General framework and the bargaining game

1.1 Timing and hypothesis

Suppose that an entrepreneur without initial funds wants to invest the amount I in a project he is willing to implement. He decides to finance this project by credit and applies for two types of loan:

- a bank loan of the amount I^B for a total repayment R^B due to the bank (B)
- a trade loan of the amount I^{CC} for a repayment R^{CC} due to a supplier (noted CC)

We suppose that both loans are long term, they are to be repaid two periods later, at t=2. However the bank has the possibility to demand a premature repayment at an intermediary date (t=1). This is because at the intermediary date, the entrepreneur and both borrowers observe a signal (noted s) allowing them to estimate a final probability of success of the project. The signal can be good $(s = g)$ with an objective initial probability of p and bad $(s = b)$ with an initial probability of $(1 - p)$. Note that all the actors observe the same signal meaning there is no asymmetry of information in our model. However, there may be an asymmetry in the anticipations that agents form based on the observed signal. In other words, there might be an "asymmetry of beliefs" due to differences in the psychological profile of agents. Optimists' interpretation of the signal would be positively biased while realists would make the right anticipations about the project's probability of success.

Based on this signal the bank can choose between 3 possibilities: *(i)* let the firm continue its activity without modifying the structure of its debt, *(ii)* initiate a private renegotiation procedure and demand partial premature repayment, or *(iii)* liquidate the firm.

Finally, if the firm is not liquidated at date t=1, at the end of the project's life (t=2) all the actors observe the total amount of cash-flows the project has generated, CF_2. If the project is a success, cash-flows are high $(CF_2 = H_2)$ and both borrowers are repaid (at the initially agreed or the renegotiated repayment level). If the project has failed, no cash flows are

generated and the borrowers can't be repaid. The firm is then liquidated and the liquidation value equals L_2. Figure 1 resumes the timing of the model:

t=0	t=1	t=2
In order to finance a project, EN borrows from B and CC the amount of $I = I^{CC} + I^{B}$. The maturity of both debts is at date t=2 and the amount of the repayment is noted $R = R^{CC} + R^{B}$	The three players observe a signal concerning the quality of the project $s = (g, b)$ and based on this signal each player calculate his future expected revenue. At this moment, the bank chose between: - continue - liquidate - renegotiate	Final cash flows of the project are generated. If, $CF_2 = H_2$ both borrowers are repaid the initially decided or renegotiated amount. Else, the firm is definitely liquidated and the liquidation value equals L_2.

Figure 1: Timing of the model

Having presented the sequence of events we will now make some further assumptions. First of all we need to define the psychological profile of each actor. As we mentioned in the introduction we suppose that the bank is a perfectly realistic actor while the entrepreneur and his supplier (who is an entrepreneur himself) are optimists.

Different actors' beliefs will be modeled in the following way: we will note $Prob(\mathrm{CF}_2|s)$ the objective probability to obtain a certain result (H_2, L_2) at date t=2, given the signal observed at t=1, and $\widetilde{Prob}_i(CF_2|s)$ player's i subjective probability of obtaining this result. Suppose $Prob(H_2|g) = h$ and $Prob(H_2|b) = l$, than we can write:

$$\widetilde{Prob}_B(H_2|g) = h = Prob(H_2|g) \qquad \widetilde{Prob}_B(H_2|b) = l = Prob(H_2|b)$$
$$\widetilde{Prob}_{EN,CC}(H_2|g) = h + k \qquad \widetilde{Prob}_{EN,CC}(H_2|b) = l + k$$

The bank being perfectly rational her subjective relative probability of success is equal to the objective one. On the contrary, both entrepreneurs' (EN's and CC's) subjective probability of success is higher than the objective one, showing their optimistic bias. Therefore, k can be considered as a measure of the player's optimism level with

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$0 < k \leq (1-h)$.[2] We will further note the bank's expectations as the objective ones (without ^) and both entrepreneurs' expectations as subjective ones (with ^).

We further assume that when the intermediate signal is good, it is socially optimal to let EN continue his project's activity: $E(\mathrm{CF2}|g) = hH_2 + (1-h)L_2 \geq L_1$, and the bank has no credible liquidation threat. Therefore, the good signal case is not interesting from our perspective; the focus of this paper is oriented to the renegotiation procedure for firms in financial distress.

In the case of a bad intermediate signal the continuation of the project is still optimal for optimistic players (EN and CC) but from a realistic point of view this is not the case. Based on her (realistic) anticipations the bank would actually obtain more revenues if the project is immediately liquidated than if she waits for final results. This means that the bank has a credible threat to liquidate when the intermediate signal is bad.[3]

$$E(\widehat{\mathrm{CF2}}|b) = (l+k)H_2 + (1-l-k)L_2 \geq L_1$$
$$E(\mathrm{CF2}|b) = lH_2 + (1-l)L_2 < L_1$$

This assumption is very important since it shows that in the case of a bad signal different profile players have different preferences. Therefore we need to consider a minimal level of entrepreneurial optimism:

$$k_{min} = \frac{L_1 - lH_2 - (1-l)L_2}{H_2 - L_2}$$

Our model is focused on the situation where $k \geq k_{\min}$, that is the case where difference in beliefs is big enough to allow a renegotiations procedure between players.

Note also that we consider here firms which, beyond financial distress (modeled by the bad signal), have real economic difficulties since from an objective perspective these firms have a much too low probability of success. Immediate liquidation is therefore socially optimal and objectively preferable for all the players as soon as the bad signal has been

[2] As we fix $k > 0$ we make the assumption that there are no pessimists in our model. This is easily explained by the idea that pessimistic actors wouldn't engage in entrepreneurial activities since the chances of success are very low, they would be more likely to prefer stable fixed-compensation tasks. This assumption is consistent with most of the existing literature.

[3] Here we also make a hypothesis concerning the allocation of the liquidation value: it is implicit in the liquidation threat that the bank obtains all the liquidation value while other borrowers get nothing when the project fails. This suggests that the bank's loan is senior. The unique goal of this assumption is to simplify the reasoning and we test our model without it in Appendix 1.

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observed. However, because of their cognitive bias some actors can't realize this and prefer to continue until t=2.

Indeed, the question of social optimality in renegotiation procedures is a very interesting one and a great court of academic research studies the different facets of this problem. Much less explored is the question of the banks' behavior when its client's decisions reveal biased beliefs. Should we expect from banks to be socially responsible and knowing that the project is not sustainable, liquidate the firm as soon as possible? Or, on the opposite, it is more likely that banks would rather consider exploiting others' mistakes? We can imagine that when banks observe wrong anticipations among their clients they induce these borrowers to make concessions and thereby protect themselves against risk. Manove and Padilla (1999) mention the idea of a "paternalistic role" of certain members of society towards individuals whose beliefs are incorrect. Though interesting this question will not be further analyzed here. The scope of this model is more modest: we only focus on the position of each actor in case of distress relative to their psychological profile.

We point out here one more specific feature of our model: the optimistic beliefs only concern the probability of success once the signal has been observed. This means that our entrepreneurs are realists about the probability to observe a good signal: $\widetilde{Prob}(g) = Prob(g) = p$. In the case of the entrepreneur himself this assumption has no influence on the results of the model. For CC, the only impact of this assumption concerns his initial expected profit equation.[4] The effects of optimism that we will show below would be amplified if we introduce optimism at this level but no qualitative modification in results has been identified.

At last we will assume the following inequality: $R^B > L_1 > L_2$. This allows us to avoid the case where the bank is systematically better off by liquidating at t=1. Also, this assumption means that the bank loan is risky (in case of liquidation the bank obtains less than the face value of her claim). We also suppose that the liquidation value decreases in time (the bank has an incentive to react as soon as she observes the intermediary signal).

[4] The idea of introducing optimism only at the intermediary period is supported by the initial engagement theory. According to this theory, a person would confirm his past decisions even when they appear to be bad decisions. In the case of CC this would mean that his optimism about the project's probability of success is related to the initial decision to finance this project; it is only once he has agreed to be implicated in this project that he becomes optimist about itsprobability of success.

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1.2 The renegotiation procedure

We will consider the renegotiation procedure as a sequential game of three equally informed actors. Two bilateral bargaining phases compose this game: one between the bank and the entrepreneur and one between the entrepreneur and his supplier.

The first phase consists of the renegotiation between the bank and the entrepreneur concerning the bank loan terms. The first player is the bank who demands an amount of premature repayment and initializes this way the procedure of renegotiation. As a counterpart of this premature repayment the bank accepts not to liquidate the firm before the final maturity of the contract (at t=2).[5] Facing this initial demand by the bank the entrepreneur has two options: (i) accept the offer, or (ii) negotiate the amount i.e. propose a new (smaller) amount of premature repayment. By choosing the first option the entrepreneur is certain to avoid liquidation. The second option on the other hand is risky because we suppose that with a probability of $(1-\rho) \in [0,1]$ there may be an immediate liquidation of the firm.[6] If this is not the case, thus with the remaining probability of ρ, the entrepreneur is the last player to make an offer. The bank can then accept (and the premature repayment amount is finally the one proposed by the entrepreneur) or reject (and then liquidate the company). The bargaining game between these two players ends here; the bank cannot make a second offer to the company. We limit the bargaining at this level in order to avoid the situation where players never get to a common agreement.

The first phase of the renegotiation procedure that we have just described is in fact directly connected to the second one: the bargaining game between the entrepreneur and his supplier. As a matter of fact right after the first phase, the entrepreneur demands additional funds to his supplier. These funds should allow him to provide the premature repayment promised to the bank. It is therefore quite logical that the behavior of the entrepreneur at the first phase of the renegotiation depends on his estimation of the amount of additional funds his supplier would be willing to provide. Since our model is a model of symmetric information during the first phase of the procedure the entrepreneur can anticipate the exact

[5] As it is often assumed in this kind of models, strong covenants allow the bank to liquidate the company or renegotiate at an intermediary moment. In our setup, the bank is actually the only player to perceive an interest to renegotiation in the case of a bad intermediary signal. If the supplier had the opportunity to liquidate at t=1, this would change nothing to the model since the latest never considers liquidation to be preferable.

[6] Osborne and Rubinstein (1990) define this parameter as the cost of time while Noe and Wang (2000) name it the probability that the rent of renegotiation will be dissipated. In our case, we will simply presume that with a probability $(1-\rho)$ the bargaining between the bank and the entrepreneur does not come off and the bank liquidates the firm.

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amount that he will be able to obtain from his supplier. Actually, the bargaining game between EN and CC happens almost the same way as the one with the bank: the entrepreneur makes an initial demand and similarly the supplier can choose between accepting and bargaining. If he chooses to bargain, he knows that with a probability of $\hat{\rho}$ the company would be immediately liquidated and with a probability of $(1-\hat{\rho})$ his offer would be considered by the entrepreneur. The latest can once again either accept or refuse this last offer. In the aim of keeping the basic model simple we add here the following assumption: the entrepreneur has all the bargaining power against his supplier $(\hat{\rho}=1)$, i.e. CC will never bargain. Knowing the limits of this hypothesis we resolve our model without it in Appendix 2. The figure 2 illustrates the sequence of the bargaining game:

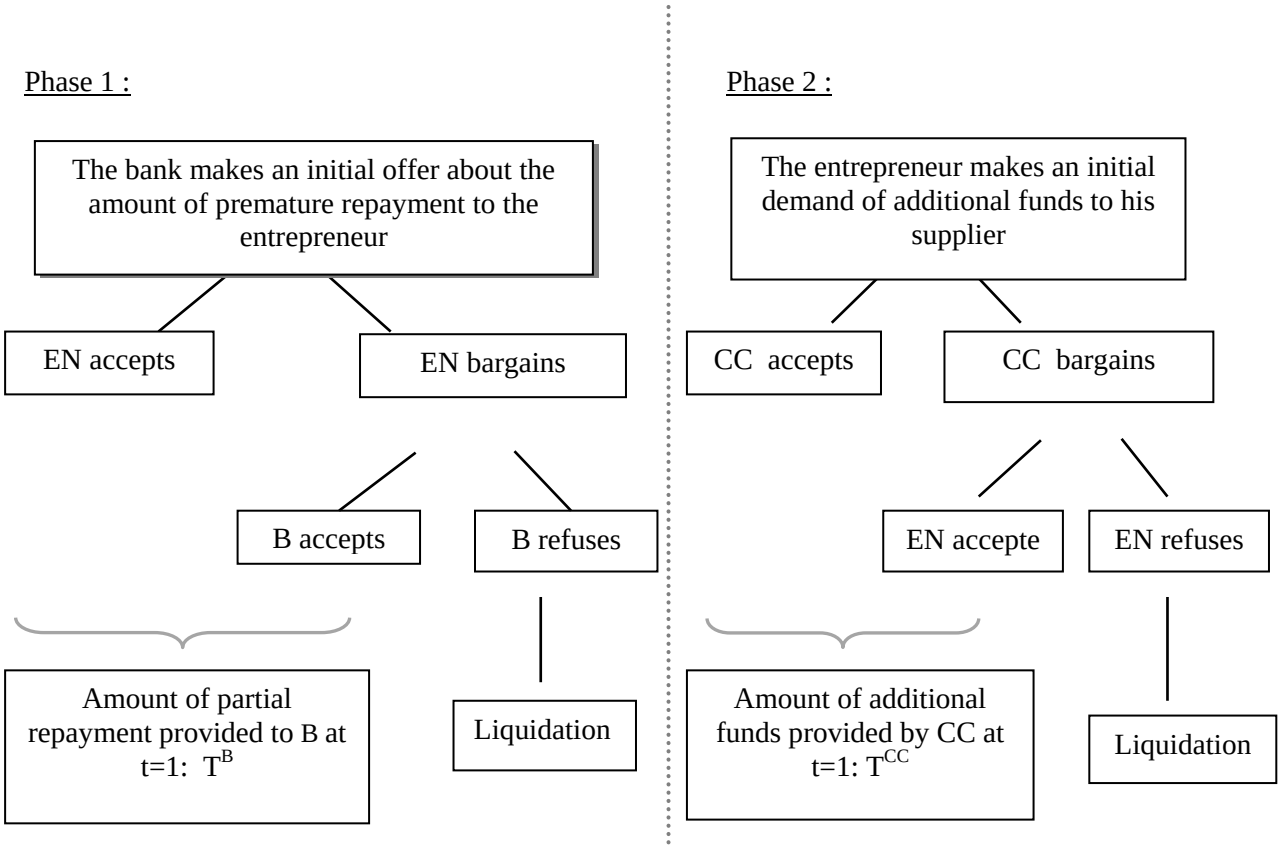


Figure 2 : The renegotiation game

II. The basic model

As usually for this type of games, we will build our model by backward induction: we will analyze first the results of the renegotiation procedure and then we will go back to the initial period and show the impact of the renegotiation results on the initial credit availability.

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2.1 Results of the renegotiation at t=1

We remind here that the renegotiation process concerns only the case where the intermediary signal is bad ($s = b$). As we mentioned before the bank initiates the procedure of renegotiation by making the first demand to the entrepreneur. Therefore, first of all we need to determine the amount of premature repayment she would demand. The goal of the bank is to propose to the entrepreneur an amount of repayment such that the he has no interest in bargaining and he prefers to accept the bank's demand. This means that when deciding this amount the bank will take into consideration:

- Her own incentive to renegotiate rather than liquidate;
- The amount of partial repayment that the entrepreneur together with his supplier would accept to provide; and
- The bargaining power of the entrepreneur.

First of all, the incentive constraint of the bank is:

$$T^B + l(R^B - T^B) + (1 - l)\min(L_2; R^B - T^B) \geq L_1 \quad (1)$$

Based on this incentive constraint we can calculate the limits of the repayment amount the bank can ask for at t=1:

- If $L_2 < R^B - T^B$ than the minimal level of premature repayment that the bank can accept rather than liquidate equals: $T^B_{min} = \frac{L_1 - lR^B - (1-l)L_2}{(1-l)}$.
- If $L_2 = R^B - T^B$ this means that if the bank obtains this level of premature repayment her loan becomes risk free because her revenue remains the same whatever the final result of the project. Beyond $T^B = R^B - L_2$ an increase in the premature repayment amount changes nothing in the final revenue of the bank. Thus, the maximal amount of premature repayment that the bank would ask for is: $T^B_{max} = R^B - L_2$

These two threshold amounts allow us to deduce the bracket of the bank's initial offer. In order to decide the exact amount of premature repayment to demand the bank needs to analyze the level of concessions both entrepreneurs are willing to make. Indeed, even though the bank is in a direct negotiation with the entrepreneur only, she knows that the bargaining

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decisions of her interlocutor are contingent on the supplier's willingness to provide additional funds. In other words, in addition to the optimistic entrepreneur's participation constraint, the bank should consider the optimistic supplier's one:

$$-T^{EN} + (l+k)(H_2 - R^B - R^{CC} - T^{CC} + T^{EN}) \geq 0 \quad (2)$$

$$-T^{CC} + (l+k)(R^{CC} + T^{CC}) \geq 0 \quad (3)$$

At equality (2) and (3) allow us to deduce the maximal level of additional funds that EN and CC are willing to provide at the intermediate period. The entrepreneur's maximal level of concessions is thus $T^{EN}_{max} = \frac{(l+k)[H_2 - R^B - R^{CC}]}{(1-l-k)}$ and CC is willing to provide at best $T^{CC}_{max} = \frac{(l+k)R^{CC}}{(1-l-k)}$.

We now have 4 threshold amounts of premature repayment ($T^{CC}_{max}, T^{B}_{max}, T^{B}_{min}, T^{EN}_{max}$) based on which we distinguish 3 possible situations in t=1:

- $T^{CC}_{max} + T^{EN}_{max} < T^{B}_{min}$: the sum of maximal concessions that the entrepreneur and the supplier can provide is not sufficient to dissuade the bank from liquidating. The firm is then liquidated at t= 1.
- $T^{B}_{max} \leq T^{CC}_{max}$: the additional funds eventually provided by the supplier alone are sufficient to cover the maximal amount the bank can ever demand. Since we have supposed for this basic model that the entrepreneur holds the totality of the bargaining power against his supplier, he does not need to make concessions in this case (he would only transfer funds from CC to B). Hence, the entrepreneur has no interest in bargaining against the bank at the first phase of the renegotiation procedure and he will accept any initial offer coming from the bank [7]. Quite logically the bank will then demand T^{B}_{max}.
- $T^{B}_{max} > T^{CC}_{max}$ and $T^{CC}_{max} + T^{EN}_{max} > T^{B}_{min}$: this example is the most complex one. As a matter of fact here the liquidation can be avoided but the bank can't expect to obtain directly the maximal level of concessions. This comes from the fact that the supplier's concessions alone are not high enough to cover the maximal level of concessions the bank can demand. In other words, EN has now an incentive to bargain with the bank in order to reduce the total amount of premature repayment and therefore reduce his own

[7] Note that by saying that the entrepreneur will not bargain when only the supplier's concessions are concerned we implicitly assume that EN prefers the bank over the supplier. It is as possible to have a situation where the entrepreneur prefers the supplier and always bargains with the bank in order to reduce the supplier's concessions. We tested both cases and we decided to keep the first one since it allows us so present stronger results.

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concessions. As we mentioned above, the goal of the bank in this particular case is to demand an amount of partial repayment (T^B) such that the entrepreneur accepts directly without bargaining. So she needs to assure that the expected revenue of EN when he accepts the offer of the bank is the same as the one he can expect when he bargains. But the gain of the entrepreneur from an eventual bargaining depends on his bargaining power (ρ), that is to say it depends on the probability to be the last player to make an offer in the bargaining game. On the other hand, the entrepreneur who anticipates the level of concessions of the supplier can have two different goals depending on wheatear he can completely eliminate his own concessions and report all the partial repayment of the bank on the shoulders of CC or he must make concessions himself. In other words, based on his anticipations concerning the second phase of the renegotiation procedure the entrepreneur will distinguish two cases:

1.) $T^B_{min} \leq T^{CC}_{max}$, the case where the concessions of the supplier alone are sufficient to avoid liquidation. The entrepreneur then anticipates that if he bargains and makes the last offer to the bank he will have no concessions to make himself

2.) $T^B_{min} > T^{CC}_{max}$, case where the supplier's concessions are not sufficient to avoid liquidation and the aimed premature repayment amount of the entrepreneur (the amount he can propose if he makes the last offer) is T^B_{min}

This distinction, made by the entrepreneur, adds some additional parameters in the decision of the bank concerning her initial demand of repayment. We will note the amount of premature repayment demanded by the bank T^B with $T^B_{min} \leq T^B \leq T^B_{max}$. In the first case mentioned above ($T^B_{min} < T^{CC}_{max}$), the maximal level of repayment that the bank can demand remaining certain that the entrepreneur will accept should verify the following equality:

$$E(\pi^{EN} | T^B_1 - T^{CC}_{max}) = E(\pi^{EN} | T^B_{min} - T^{CC}_{max}) \quad (4)$$

The left hand side of the equation (4) represents the expected revenue of the entrepreneur in a case of a bad signal when the amount of additional funds that he is supposed to provide himself is ($T^B - T^{CC}_{max}$). The right hand side of the same equation is his expected revenue when he bargains and gets to reduce the premature repayment to the lowest possible level, (T^B_{min}).

By resolving this equality we can obtain the amount initially demanded by the bank in the first of the two cases above:

$$T_1^B = (1-\rho)(T_{max}^{EN} + T_{max}^{CC}) + \rho T_{min}^B \quad (5)$$

The second case ($T_{min}^B \leq T_{max}^{CC}$) is similar to the first one. As we mentioned before, the main difference lies in the fact that the entrepreneur knows that if he gets to be the last one to make an offer he won't have any concessions to make. We can than calculate the amount the bank will demand initially in a similar way. In order to be accepted by the entrepreneur this amount should be such that the following is true:

$$E(\pi^{EN}|T_2^B - T_{max}^{CC}) = E(\pi^{EN}|0) \quad (6)$$

In other words the initial offer of the bank in the second from the two cases mentioned above would be[8]:

$$T_2^B = (1-\rho)T_{max}^{EN} + T_{max}^{CC} \quad (7)$$

We can now resume all the possible levels of premature repayment to the bank in the following lemmas:

Lemma 1: If in t=1 1the players observe a negative signal and $T_{max}^{CC} + T_{max}^{EN} < T_{min}^B$ *then there is no renegotiation and the bank liquidates the firm.*

Lemma 2: If in t=1the players observe a negative signal and $T_{max}^{CC} + T_{max}^{EN} \geq T_{min}^B$ *there is a renegotiation procedure. The amount of premature repayment provided to the bank would then be:*

(i) $T_{max}^B = R^B - L_2$ *if the additional funds that the supplier can provide are high enough so that the entrepreneur has no interest in bargaining* ($T_{max}^B \leq T_{max}^{CC}$)

(ii) $T_2^B = (1-\rho)T_{max}^{EN} + T_{max}^{CC}$ *if the entrepreneur bargains and aims to reduce the level of premature repayment to the supplier's concessions only* ($T_{min}^B \leq T_{max}^{CC}$).

(iii) $T_1^B = (1-\rho)(T_{max}^{EN} + T_{max}^{CC}) + \rho T_{min}^B$ *, when the entrepreneur bargains aiming to reduce the amount of premature repayment to the minimal level allowing to avoid liquidation*($T_{min}^B > T_{max}^{CC}$).

2.2 Renegotiation results and optimism

It is now interesting to see how the levels of premature repayment to the bank and their distribution between the two optimistic agents are actually related to their degree of optimism, $\boldsymbol{k}$.

[8] Once again we assume here that the entrepreneur prefers the bank over the supplier.

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First of all, we need to determine the level of entrepreneurial optimism necessary for the first period liquidation to be avoided through a renegotiation procedure. Based on Lemma 1 we can see that in order to avoid liquidation the sum of both entrepreneurs maximal concessions should be at least as high as the bank's minimal repayment level. We will note the level of entrepreneurial optimism satisfying this equality $\boldsymbol{k_l}$, and we can say that the first period liquidation will be avoided as long as $\boldsymbol{k \geq k_l = \frac{(1-l)[L_1-(1-l)L_2-lH_2]}{L_1+(1-l)[H_2-L_2]-R^B}}$.

Lets us consider now the different possible cases when the renegotiation procedure takes place ($k \geq k_l$). The point *(i)* of Lemma 2, represents the case where for a given level of debt, the optimism is so high that the supplier alone can cover the bank's maximal premature repayment demand. By equalizing T^B_{max} to T^{CC}_{max} we obtain the optimism degree beyond which this case is possible, that is $k_{cc} = \frac{(1-l)(R^B-L_2)-lR^{CC}}{R^B+R^{CC}-L_2}$. Thus we can say that based on the suppliers concessions alone, the bank's loan becomes entirely risk free as the entrepreneur has no interest in bargaining with the bank as long as the entrepreneurial optimism level is higher than k_{cc}.

Quite intuitively, when the optimism level is between the two threshold points designed previously ($k_l < k < k_{cc}$), that is for an intermediate level of optimism, the entrepreneur has an interest in bargaining and the bank's premature repayment amount is contingent on the entrepreneur's bargaining power. However, inside this bracket we have distinguished two different bargaining behaviors on behalf of the entrepreneur. The distinction comes essentially from the level of concessions provided by the optimistic supplier and indirectly from the necessity of the entrepreneur to provide his own funds. Case *(ii)* of Lemma 2 designs the situation where the entrepreneur hopes not to make concessions at all. If he chooses the bargaining option he then offers to the bank only the additional funds he has anticipated to obtain from the supplier. The case *(iii)* concerns the situation where the entrepreneur knows that he has to bring in some of his own funds and his goal is to provide the minimum possible to the bank. In this case his bargaining incitation is stronger so the bank's premature repayment amount is lower. This means that in the first case the bank profits from the entrepreneurs' indifference concerning the concessions the supplier would have to make. The level of optimism allowing her to do this will therefore correspond to the following equality: $T^{CC}_{max} = T^B_{min}$. Note k_b this level of optimism, with $k_b = \frac{(1-l)[L_1-l(R^B-R^{CC})-(1-l)L_2]}{L_1-lR^B-(1-l)(L_2-R^{CC})}$. We can then say that even if the entrepreneur bargains in

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both cases, the bank's premature repayment amount is higher when $k_b \leq k \leq k_{cc}$ and lower when $k_l \leq k \leq k_b$.

We resume the different optimism threshold levels in the following proposition:

Proposition 1: When the intermediary signal is bad (s=b) :

(i) *If $k < k_l$, the firm is liquidated immediately;*

(ii) *If $k_l < k < k_b$ there is a debt renegociation and the bank obtains a weak constant level of premature repayment provided by both the entrepreneur and the supplier;*

(iii) *If $k_b < k < k_{cc}$, there is a debt renegotiation and the bank obtains a higher optimism contingent level of partial repayment provided by both the entrepreneur and the supplier;*

(iv) *If $k_{cc} < k \leq (1-h)$ there is a debt renegotiation and the bank obtains the highest possible premature repayment amount (her loan becomes risk free) provided by the supplier alone.*

The Proposition 1 contains two key results of our model: the first one is that the more the entrepreneurial optimism level is high the higher the premature repayment provided to the bank and so the lower the level of risk of her debt; the second is that the higher the entrepreneurial optimism level the less the entrepreneur himself brings in the additional funds. This means that the supplier is the first player to be expropriated and his objective expected revenue is negatively related to the optimism level. However, from his subjective optimistic point of view he believes that the renegotiation procedure results in, at least, a zero-sum game. Based on this we can directly write the following Corollary:

Corollary :1 In a case of a bad intermediary signal :

- *The subjective expected revenue of the bank is a positive non monotonic function of the entrepreneurs' optimism leve;l*
- *The subjective expected revenue of the commercial supplier equals zero for a weak or an intermediary level of optimism ($k < k_{cc}$) and it is a positive linear function of the latest when its level is high ($k \geq k_{cc}$).*

Note once again that the Corollary 1 concerns the *subjective* expected revenue of financiers. In the case of the bank this is not of great importance since the bank's subjective

expected revenue is the same as the objective one. We illustrate the curve of the bank's expected revenue based on different level of optimism in figure 3.

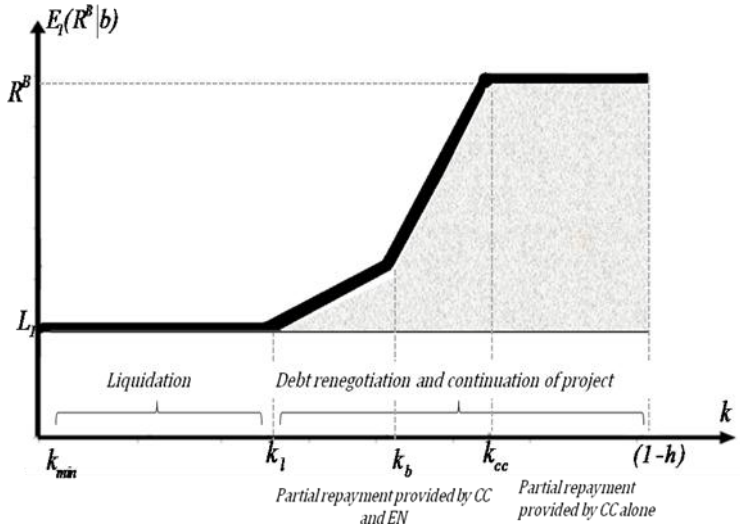


Figure 3 : Bank's expected revenue at t=1, when she observes a bad signal (s=b)

The grey part of the graph represents the bank's gain when she renegotiates her claim with optimistic agents

On the opposite, the supplier's objective expected revenue is quite different than his subjective optimistic expectations. Because of his optimistic bias, the supplier is willing to give up on a part of his future funds and save the company from liquidation, option that he considers to be optimal since he overestimates the probability of success of the project. But from an objective realistic point of view the liquidation is the optimal choice for the supplier in the case of a bad signal. Thus, the more his willingness to make concessions during the renegotiation is important (the stronger his optimism bias) the more his situation moves away from optimum. He is therefore objectively loosing even when from his own perspective he is winning. Besides, since we have assumed in this basic framework that the supplier has no bargaining power, his objective expected revenue is quasi symmetric to the bank's one (he brings in the majority of the funds provided to the bank). This is graphically illustrated in the Figure 4.

On the whole, this analysis shows the position of each player when a firm faces financial distress: the realistic player (the bank) has a comparative advantage over the optimistic players and he will participate in a renegotiation procedure only if he is objectively winning. The optimistic players are, on the opposite, disadvantaged by their bias and they both lose in the renegotiation game. The supplier, by his willingness to save the company from liquidation, ends up scarifying the totality and more of his future expected revenues.

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The entrepreneur, also a victim of his own willingness to pursuit the project, loses when the project is not liquidated but his loss is compensated by his possibility to expropriate his supplier.

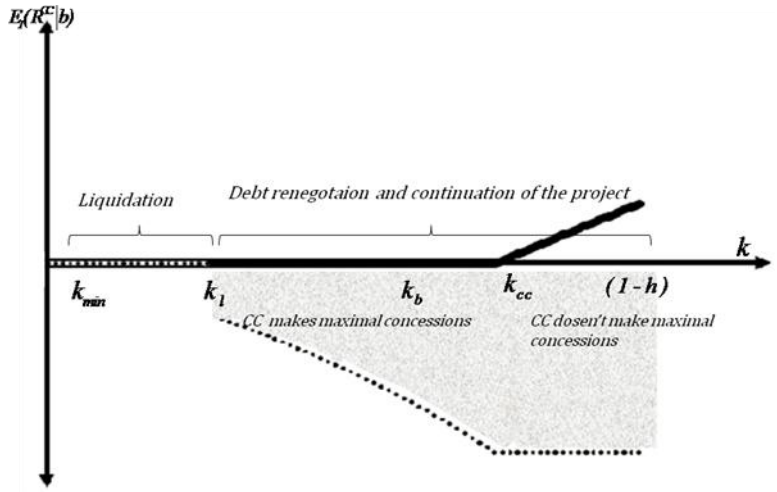


Figure 4 : Supplier's expected revenue at t=1, when he observes a bad signal (s=b)

The full line represents the supplier's subjective expected revenue while the broken line represents his objective expected revenue. The grey part of the graph illustrates the objective loss of future revenues due to concessions in the renegotiation procedure

2.3 Credit grants at t=0

We now return to the period t=0 in order to show how both financiers could anticipate the eventual renegotiation procedure and integrate this information in their credit grant decisions. [9] We propose to study each financier's case apart.

A. The bank loan

Within our model framework we can write the initial expected profit of a financier i, with $i = (B, CC)$ as:

$$E(\pi^i) = pE(R^i|g) + (1-p)E(R^i|b) - I^i \qquad (8)$$

[9] From the supplier's point of view the bank is too pessimistic about the project's probability of success. He therefore anticipates that if a bad signal is observed the bank would want to liquidate if she doesn't obtain a partial premature repayment.

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As far as the bank is concerned the first term of the right hand side of (8) is trivial: when observing a good signal the bank has no credible threat of liquidation ant its expected revenue is:

$$E(R|g) = hR^B + (1-h)L_2 \tag{9}$$

As we can see the entrepreneurial optimism plays no role in this part of the equation. Note however that our model does not take in consideration the impact of the optimism bias of the entrepreneur on his intermediary operational decisions or any other decisions not related to the renegotiation procedure. More generally, it has been argued that the optimism bias influence a great number of choices along the project's existence (overinvestment, overproduction, non voluntary risk taking, etc.). This could deteriorate the intrinsic quality of the given project and reduce its final probability of success even when the intermediate signal is good. For clarity reasons we have chosen not to introduce this aspect of the optimism bias in our model. Still, a more detailed analysis of the interdependence of different effects of optimism at this level can inspire some interesting further research.

The second term of the equation (8) is, in our model, the one that allows us to evaluate the effects of optimism on the expected revenues of the bank at t=0. It follows from Proposition 1:

$$E(\pi^B) = p(hR^B + (1-h)L_2) + (1-p)\left\{\int_0^{k_l} L_1 f(k)dk + \int_{k_l}^{k_b} \rho L_1 + (1-\rho)\left[lR^B + (1-l)(L2 + \frac{(l+k)(H_2 - R^B)}{1-l-k}\right] f(k)dk + \int_{k_b}^{k_{cc}} lR^B + (1-l)\left[L_2 + \frac{l+k}{1-l-k}[(1-\rho)(H_2 - R^B) - \rho R^{CC}]\right] f(k)dk + \int_{k_{cc}}^{(1-h)} R^B f(k)dk\right\} - I^B \tag{10}$$

This equation not only confirms the positive impact of entrepreneurial optimism on the bank's expected revenue as mentioned above, but also completes this result by showing that for a certain level of optimism the bank is better off when the intermediary signal is bad than when the intermediary signal is good. Take for example the case where $k > k_{cc}$ i.e. the case where through the renegotiation procedure the bank knows for certain that whatever the final result of the project she will be entirely repaid. This is not the case when the signal is good since there is still a probability of $(1-h)$ that the project will fail and the bank will only obtain L_2. As a matter of facts this result does not only concern the case where $k > k_{cc}$.There is an optimism level, noted k^*, above which bad projects become less risky for the bank then good ones. It is indeed the level that verifies the following

equality: $E(R^i|g) = E(R^i|b)$. At this point we present this level of optimism only graphically (Figure 5) but a calculation of the value of k^* when k is uniformly distributed is developed in Appendix 3.

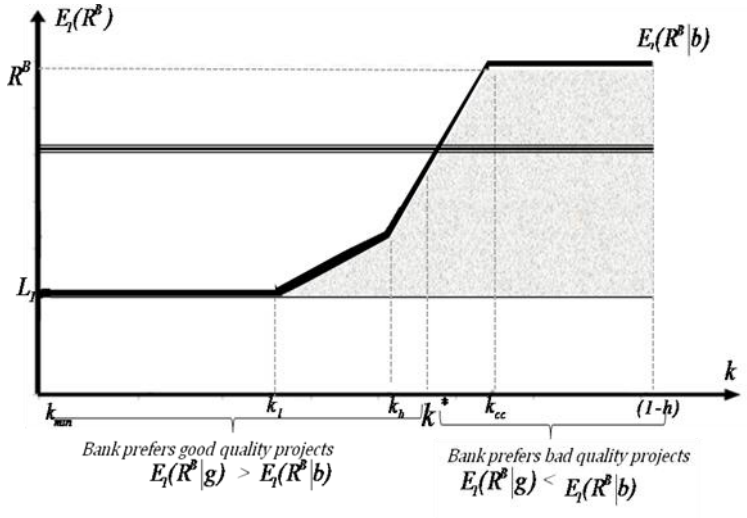


Figure 5 : Expected revenue of the bank at t=1 :
In case of a good signal (═══) in case of a bad signal (▬▬).

What is more interesting for us is the implication of this result. The existing literature seems to agree that banks are quite aware of the existence of optimists among entrepreneurs. Never the less the level of credit rationing generally observed is quite low. Our model allows to partially explain this incoherence: as we have shown the bank can protect itself from credit risk by exploiting the asymmetry of beliefs between the two entrepreneurs and herself. Along with the argument of "lazy banks" of Manove and al. (2000) if the bank anticipates this protection she will have fewer incentives to monitor the projects that are presented to it. Moreover, we show that when the level of entrepreneurial optimism is high the bank may even prefer projects that are more likely to be in distress rather than projects which would be more likely to generate good intermediary signal.

At last, this allows us to reconsider the cost of credit the bank is going to apply to its clients. Quite intuitively we can expect that banks, which are protected from risk whatever the quality of the project, are willing to provide cheap financing. This idea has been confirmed by many empirical studies showing that bank loans are often less expensive than other sources of finance.

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B. The trade loan

The trade supplier's anticipation at the moment of the credit grant are a little more complex. As a matter of fact, the entrepreneurial optimism that he sees as the difference in beliefs between the bank and himself (due to the bank's "pessimism") can have a double effect on his subjective expected profit: a positive one in the case of a good signal and a globally negative one in the case of a bad intermediary signal.

In order to demonstrate this let us go back to the equation (8), describing the expected profit of financiers at t=0. As far as CC is concerned, the first part of the right hand side of this equation is positively correlated to the level of optimism since:

$$E(R^{CC}|g) = (h+k)R^{CC} \tag{11}$$

The second part of this equation, that is the expected profit in case of a bad signal does not show a univocal relation between the level of optimism and the expected profit of CC. As we have seen before, for a low or intermediary level of optimism (as long as $k_l < k < k_{cc}$) CC has, from his subjective point of view, zero expected profit. The impact of optimism ("difference in beliefs") is than negative since it induces him to makes concessions. More precisely, the supplier believes that his divergence in beliefs with the bank forces him to give up on his future revenues. On the other hand, for a high level of optimism the amount of concessions that he needs to make is fixed. The bigger the difference between his and the bank's beliefs, the more he has the feeling that concessions are low compared to his expected revenue. In other words, the stronger the bias of the supplier, the more the part of revenues he needs to leave to the bank compared to his total expected revenues is relatively small. The effect of overestimating future revenues wins over the effect of concession making. We can see all of these elements in the equation of the suppliers expected profit at t=0.

$$E(\pi^{CC}) = \underbrace{p(h+k)R^{CC}}_{\text{Positive linear effect of optimism}} + (1-p)\Big[\underbrace{\int_{k_{min}}^{k_{cc}} 0\,dx}_{\text{Negative effect of optimism}} + \underbrace{\int_{k_{cc}}^{(1-h)} [(l+k)R^{CC} - (1-l-k)(R^B - L_2)]\,dx}_{\text{Positive effect of optimism with } (l+k)R^{CC} \geq (1-l-k)(R^B - L_2)}\Big] - I^{CC} \tag{12}$$

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Another issue showed by the expected profit equation concerns the incentive of the supplier to scan the projects he finances. Being aware of the divergence in beliefs that he will potentially have with other financers, CC is probably more motivated than the bank to select the projects with higher p, that is projects that are less likely to be in distress. In particular, this is true when the general optimism level ("bank's pessimism" for CC) is moderate. For a very strong level of optimism the supplier might anticipate positive revenues whatever the signal.

More generally, this result reveals the ambiguity that we can observe in financial relationships between firms and their suppliers. Some empirical studies such as Peterson and Rajan (1997) and Franks and Sussman (2005) evidence that while in situation of financial distress commercial suppliers support the company and increase their credits, at the initial financing moment they propose costly loans and are quite selective in the credit grant decision. The anticipations of concessions in case of bad signal might be at the origin of high credit prices even for optimistic suppliers who actually overestimate the probability of success.

III. Conclusion

A great part of the existing literature argues that entrepreneurial optimism has negative effects and financiers are often the first to bear the consequences of this bias. Our model proposes a less clear-cut result. Ignoring the direct impact of optimism on operational decisions, we show that in the case of financial distress this bias may actually be a source of advantage for realistic financiers. Several empirical implications follow from our model:

- When the level of optimism is high bank loans are expected to be weakly rationed whatever the quality of applicants. This result is easy to explain: banks feel protected in case of financial distress and this protection is not uniquely due to provided guaranties [10] but also to the possibility to extract concessions from the entrepreneur or his supplier, who both wrongly believe the project needs to be saved. At a high level of optimism the bank may even prefer bad projects to good ones (by entirely expropriating the entrepreneurs the bank may obtain a higher level of probability of success with a bad project than with a good one).

[10] Manove et Padilla (1999) argue that an optimistic entrepreneur would provide higher collateral since he is convinced that there is little chance to actually give this collateral away to the bank.

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- In the case of financial distress banks are expected to have a strict attitude and retrieve their claims while commercial suppliers would be more supportive towards firms lending them additional funds. As a matter of fact we explain the tough attitude of banks in case of financial distress as a strategic behavior allowing her to expropriate agents with biased beliefs.

- In a context of strong entrepreneurial optimism, objectively insolvent companies can temporarily be saved through a private renegotiation procedure. In other words, projects that should objectively be liquidated for the sake of all actors can survive only because of the optimistic bias of some of them. Moreover, a large number of studies provide some evidence about fact that most of the firms who have survived financial distress through renegotiation procedures have mere performances and are often liquidated shortly after. Hotchkiss (1995) examines for example the operational performance of companies during three years following the renegotiation procedure and he concludes that 75% of these have significantly less good results than their direct concurrence. More recently Hotchkiss and Mooradian (2008) confirmed this result and showed that most of these companies stayed over indebted three years later. By modeling the survivor of unsustainable projects we propose some explanation of this weak performance. Quite logically when a project which was not good enough to avoid liquidation avoids it, its further performance is very likely to be bad.

– Even when realistic financiers are completely aware of the entrepreneurs' optimistic bias, there would not be credit rationing and projects would not be liquidated at the socially optimal moment. This prediction comes as response to a very important question: if we can explain the too high intensity of venture creation by the fact that nascent entrepreneurs are often too optimistic (Cooper and al., 1988), how can we explain that these optimists obtain external finance and are thereby supported in this venture creation? A priori, there is no reason to believe that financial institutions (such as banks) also suffer from an optimism bias. Our model shows that banks finance optimistic entrepreneurs or firms because it may be in their interest to do so. Once again this model analyses only one side of the coin, we ignore the optimism effect on permanent managerial behavior (operational decisions, investments, etc.).

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References

Ali S.N.M. (2006). Waiting to settle: Multilateral bargaining with subjective biases. Journal of Economic Theory 130 (1), 109-137.

Asquith,P., R. Gertner and D.Scharfstein (1994). Anatomy of Financial Distress: An Examination of Junk-Bond Issuers. The Quarterly Journal of Economics 109(3), 625-658.

Busenitz, L. W. (1999). Entrepreneurial risk and strategic decision making: It's a matter of perspective. Journal of Applied Behavioral Science 35 (3), 325–340.

Camerer, C. and D. Lovallo (1999). Overconfidence and excess entry: An experimental approach. American Economic Review 89, 306-318.

Cooper, A., C. Woo, and W. Dunkelberg (1988). Entrepreneurs' perceived chances for success. Journal of Business Venturing 3(2), 97-108.

Dickinson D.L. (2006). The chilling effect of optimism: The case of final-offer arbitration. Journal of Socio-Economics 35(1), 17-30.

Franks, J and Sussman O. (2005). Financial innovations and corporate bankruptcy. Journal of Financial Intermediation 14 (3), 283-317 .

Gilson, S. C, K. John and L. H.P. Lang (1997). Troubled debt restructurings Anempirical study of private reorganization of firms in default. Journal of Financial Economics 27, 315-353.

Hayward, M., D. Shepherd, and D. Griffin (2006). A hubris theory of entrepreneurship. Management Science 52(2), 160-172.

Hotchkiss, E. S. (1995). Postbankruptcy Performance and Management Turnover. Journal of Finance 50, 3-21.

Hotchkiss, E. S., K. John, R. M. Mooradian and K. S. Thorburn (2008). Bankruptcy and the Resolution of Financial Distress. Forthcoming in B. Espen Eckbo (ed.), Handbook of Corporate Finance: Empirical Corporate Finance, Vol 2, Ch. 14, 2008

Malmendier, U. and G. Tate. (2001). CEO Overconfidence and Corporate Investment. Mimeo, Harvard University.

Manove, M., Padilla, A. J., and M. Pagano (2000),.Collateral vs. Project Screening : a Model of Lazy Banks. The Rand Journal of Economics 32, 726-744.

Manove, M. and J.Padilla (1999). Banking (Conservatively) With Optimists. The Rand Journal of Economics 30(2), 324-350.

Mian, S. L. and C. W. Smith (1992). Accounts Receivable Management Policy: Theory and Evidence. The Journal of Finance 47(1), 169-200.

Noe ,T. H. and J. Wang (2000). Strategic Debt Restructuring. Review of Financial Studies 13, 985-1015.

Osborne, M., and A. Rubinstein, (1990) Bargaining and Markets. Academic Press, New York.

Petersen, M.,A and R.G. Rajan (1997). Trade credit: theories and evidence. Review of Financial Studies 10 (3), 661-691.

Roll, R. (1986). The Hubris Hypothesis of Corporate Takeovers. Journal of Business 59 (2), 197-216

Vilanova, L. (2007). Bank Seniority and Debt Restructurings of Small Firms. Working Paper University of Lyon.

Vilanova, L. (2009a). Should we be less confident in entrepreneurial overconfidence? Working Paper University of Lyon.

Vilanova, L. (2009b). Financial and managerial support with (some) optimistic entrepreneurs. Working Paper University of Lyon.

Wilner, Benjamin S. (2000). The exploitation of relationships in financial distress: the case of trade credit. Journal of Finance 55, 153-178.

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Appendix

Appendix 1: The bank's loan seniority

In our basic model we have supposed that the bank's loan is senior so in case of liquidation the bank has rights on the totality of the liquidation value. This assumption is too strong; Vilanova (2004) shows that in case of renegotiation with two claimers whose claims have different priority, the senior lender can expropriate the junior one because the latest has nothing to lose if he renegotiates (he is too weakly protected in case of liquidation). This means that a renegotiation procedure could be possible in our model even when all the players have the same beliefs. Therefore we need to verify if the effects of optimism persist in case of *paru passu* loans.

Note β_i the proportion of value obtained in case of liquidation by the financier i, with $i = (B, CC)$. Actually, β_i corresponds to the part of the total debt due to the claimer i, that is for instance $\beta_B = \frac{R^B}{R}$ and since the entrepreneur did not participate to the initial financing we can write $\beta_B + \beta_{CC} = 1$. It is logical to expect that with this new distribution of

the liquidation value the participation and incentive constraints would be different. The bank's incitation constraint and the supplier's participation constraints would be:

$$T^B + l(R^B - T^B) + (1-l)\,min(\beta_B L_2 ; R^B - T^B) \geq \beta_B L_1 \quad \text{(A.1.1)}$$

$$-T + (l+k)(R^{CC} + T) + (1-l-k)\beta_{CC} L_2 \geq \beta_{CC} L_1 \quad \text{(A.1.2)}$$

On the other hand the entrepreneur's situation does not change since he still obtains nothing in the case of liquidation. Based on these new constraints we can write the four threshold levels of premature repayment:

- $T_{min}^{B^*} = \frac{\beta_B L_1 - l R^B - (1-l)\beta_B L_2}{(1-l)}$, the minimal amount accepted by the bank
- $T_{max}^{B^*} = R^B - \beta_B L_2$, the maximal amount demanded by the bank
- $T_{max}^{CC^*} = \frac{(l+k)R^{CC} - \beta_{CC} L_1}{(1-l-k)} + \beta_{CC} L_2$, the maximal amount of funds CC can provide
- $T_{max}^{EN^*} = \frac{(l+k)[H_2 - R^B - R^{CC}]}{(1-l-k)} = T_{max}^{EN}$, the maximal amount of funds EN can provide

Thus, we can directly deduce the optimism levels corresponding to the different cases developed in the basic model. First the company is liquidated when $T_{max}^{EN^*} + T_{max}^{CC^*} < T_{min}^{B^*}$ so the minimal optimism level allowing to avoid liquidation is k_l^* with $k_l^* = \frac{(1-l)[L_1 - (1-l)L_2 - lH_2]}{\beta_B L_1 + (1-l)[H_2 - L_2] - R^B}$.

When $k > k_l^*$, the entrepreneur can have three different anticipations concerning the level of funds he would obtain from the supplier (cf. *Lemma 2*).

- $T_{max}^{CC^*} < T_{min}^{B^*}$, the amount of premature repayment provided to the bank is then equl to $T_1^{B^*} = (1-\rho)\left(T_{max}^{EN\ *} + T_{max}^{CC\ *}\right) + \rho T_{min}^{B\ *}$
- $T_{max}^{CC^*} \geq T_{min}^{B^*}$, the amount of premature repayment provided to the bank is $T_2^B = (1-\rho)T_{max}^{EN} + T_{max}^{CC}$.
- $T_{max}^{CC^*} \geq T_{max}^{B^*}$, the bank obtains maximal premature repayment $T_{max}^{B^*}$.

The level of optimism allowing to pass from the first to the second case is the one that certifies $T_{max}^{CC^*} = T_{min}^{B^*}$, that is $k_b^* = \frac{(1-l)[L_1 - l(R^B - R^{CC}) - (1-l)L_2]}{\beta_B L_1 - l R^B - (1-l)(L_2 - R^{CC})}$ while the level of optimism allowing the bank to obtain $T_{max}^{B^*}$ is $k_{cc}^* = \frac{(1-l)(L_2 - R^B) + l R^{CC} - \beta_{CC} L_1}{L_2 - R^B - R^{CC}}$.

The main result of this extension is the following: when both claims are of same priority, the effects of optimism on the renegotiation procedure are weaker since:

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- $k_l^* > k_l$, a higher level of optimism is necessary to avoid liquidation,
- $k_b^* > k_b$, a higher level of optimism is necessary to obtain high premature repayment,
- $k_{cc}^* > k_{cc}$, a higher level of optimism is necessary to obtain maximal premature repayment.

To resume, we show hereby that two different elements have equally oriented effects on the renegotiation procedure:

- The weak protection of junior claimers
- The entrepreneurial optimism

Appendix 2: The supplier's bargaining power

This extension tests the basic model without the assumption that the supplier has no bargaining power against the entrepreneur. Therefore we will no longer consider that $\hat{\rho}$ equals 1, but we will model the general case where $\hat{\rho} \epsilon [0,1]$.

When he has some bargaining power the supplier can refuse the demand of additional funds from the entrepreneur and bargain. This means that he will no longer systematically provide T_{max}^{CC}. Note the amount of additional funds the entrepreneur will demand $\hat{T}^{CC}$. Likely to the bank's in the first phase, the goal of the entrepreneur in the second phase of the renegotiation would now be to demand an amount of additional funds such that the supplier is at least indifferent between accepting and bargaining.

$$E\left(\pi^{CC} \middle| \hat{T}^{CC}\right) = E\left(\pi^{CC} \middle| \hat{T}^{B} - T_{max}^{EN}\right) \quad \text{(A.2.1)}$$

The main difference with the basic model case is that now the entrepreneur can no longer anticipate the exact amount of funds he will obtain from the supplier as long as he doesn't know the amount of pre mature repayment he needs to provide to the bank. In other words the amount of concessions the entrepreneur will obtain from the supplier is contingent on the amount of premature repayment he agreed to with the bank. Thus, at the first phase of the renegotiation the entrepreneur can only anticipate the proportion of total amount of premature repayment provided by the supplier without knowing its exact amount.

The left hand side of the equation (A.2.1) is the expected revenue of the supplier if he accepts the entrepreneur's offer; the right hand side is his expected revenue if he bargains and with a probability of $(1 - \hat{\rho})$ gets to subject the majority of the premature repayment on the entrepreneur's account. Developing this equation we obtain a primary idea about the level of the supplier's concessions.

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$$\ddot{T}^{CC} = \hat{\rho} T_{max}^{CC} + (1 - \hat{\rho})\ (T^B - T_{max}^{EN}) \qquad \text{(A.2.2)}$$

Based on this the entrepreneur can, as previously, make two types of anticipations:

1.) $T_{min}^B > \hat{T}^{CC}$, the additional funds provided by the supplier are not sufficient to avoid liquidation. In this case, similarly as in the basic model, in order to be accepted the initial amount demanded from the bank should verify the following equality:

$$E\left(\pi^{EN} \middle| \hat{T}_1^B - \hat{T}^{CC}\right) = E\left(R^{EN} \middle| T_{min}^B - \hat{T}^{CC}\right) \qquad \text{(A.2.3)}$$

Consequently, the first possible amount of premature repayment is: $\hat{T}_1^B = (1-\rho)\left(T_{max}^{EN} + \hat{T}^{CC}\right) + \rho T_{min}^B$

2.) $T_{min}^B \leq \hat{T}^{CC}$, the case where the entrepreneur bargains and aims to reduce the level of premature repayment to the amount of additional funds provided by the supplier only:

$$E\left(\pi^{EN} \middle| \hat{T}_2^B - \hat{T}^{CC}\right) = E(R^{EN}|0) \qquad \text{(A.2.4)}$$

So the second possible amount of premature repayment is: $\ddot{T}_2^B = (1-\rho) T_{max}^{EN} + \ddot{T}^{CC}$.

We can now return to the anticipations concerning the second phase and calculate the exact amount of additional funds provided by the supplier. In the first case, with $\hat{\mathrm{T}}^{\mathrm{B}} = \hat{\mathrm{T}}_1^{\mathrm{B}}$ this amount would be:

$$\hat{T}_1^{CC} = \frac{\hat{\rho} T_{max}^{CC} + (1-\hat{\rho})\rho(T_{min}^B - T_{max}^{EN})}{\rho + \hat{\rho} - \rho\hat{\rho}} \qquad \text{(A.2.5)}$$

In the second case, with $\hat{\mathrm{T}}^{\mathrm{B}} = \hat{\mathrm{T}}_2^{\mathrm{B}}$, the amount of the supplier's concessions is:

$$\hat{T}_2^{CC} = \frac{\hat{\rho} T_{max}^{CC} - (1-\hat{\rho})\rho T_{max}^{EN})}{\hat{\rho}} \qquad \text{(A.2.6)}$$

To resume, the entrepreneur can have two possible anticipations about the additional funds he would be able to obtain at the phase 2 of the renegotiation: one that implies his own concessions and one which doesn't (if he is the last player to make an offer to the bank). His behavior during the first phase of the renegotiation depends on these anticipations and the bank will make an initial offer based on all these parameters.

Lemma 3: When there is a renegotiation procedure and every actor holds some bargaining power, the initial demand of the bank such that the entrepreneur would accept it is:

(iv) $T_{max}^B = R^B - L_2$ *when the suppliers concessions are enough to cover the bank's maximal demand, so the entrepreneur does not negotiate,* $T_{max}^B \leq \hat{T}_2^{CC}$

(v) $\hat{T}_2^B = (1-\rho) T_{max}^{EN} + \hat{T}_2^{CC}$ *if the entrepreneur bargains and aims to reduce the level of premature repayment to the supplier's concessions only*

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(vi) $\hat{T}_1^B = (1-\rho)\left(T_{max}^{EN} + \hat{T}_1^{CC}\right) + \rho T_{min}^B$, *when the entrepreneur bargains aiming to reduce the amount of premature repayment to the minimal level allowing to avoid liquidation*$(T_{min}^B > \hat{T}_1^{CC})$.

Of course when $T_{max}^{CC} + T_{max}^{EN} \leq T_{min}^B$ *the bank liquidates the company without renegotiations.* Analogically, the threshold levels of optimism become:

- $\hat{k}_l = k_l$, the level of optimism necessary to avoid liquidation
- $\hat{k}_b = \frac{(1-\delta)[L_1 - l(R^B + R^{CC}) - (1-\delta)L_2 + \frac{\rho(1-\hat{\rho})}{\hat{\rho}} l(H_2 - R^B - R^{CC})]}{L_1 - lR^B - (1-\delta)(L_2 - R^{CC}) - \frac{\rho(1-\hat{\rho})}{\hat{\rho}}(1-l)(H_2 - R^B - R^{CC})} > k_b$, the level of optimism allowing for the bank's repayment amount to pass from $\hat{T}_1^B$ to $\hat{T}_2^B$
- $\hat{k}_{cc} = \frac{(1-\delta)\left[L_1 - l(R^B + R^{CC}) - (1-\delta)L_2 + \frac{\rho(1-\hat{\rho})}{\hat{\rho}} l(H_2 - R^B - R^{CC})\right]}{L_1 - lR^B - (1-\delta)(L_2 - R^{CC}) - \frac{\rho(1-\hat{\rho})}{\hat{\rho}}(1-\delta)(H_2 - R^B - R^{CC})} > k_{cc}$, the level of optimism allowing the bank to obtain a premature repayment protecting her entirely against risk.

Both financiers expected profits follow these changes in the threshold optimism level. We present in Figure 6 the expected revenue of the bank in case of a bad signal and we put the accent of the loss of value for the bank induced by the supplier's possibility to bargain.

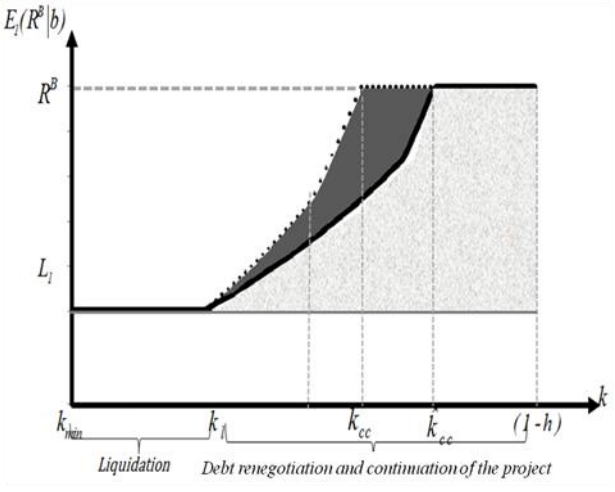


Figure 6 : Bank's expected revenue when $\hat{\rho} < 1$

B's subjective expected revenue when s=g and $\hat{\rho} < 1$,
B's subjective expected revenue when s=g and $\hat{\rho} = 1$,
B's objective gain due to the renegotiation procedure
B's objective loss due to the supplier's possibility to bargain

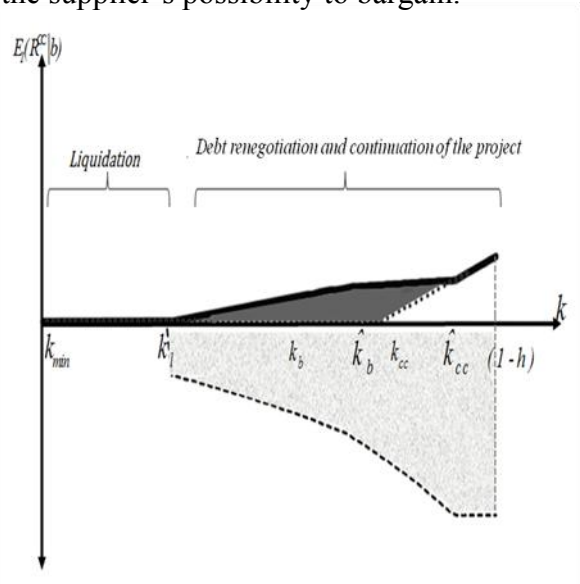


Figure 7: Supplier's expected revenue when $\hat{\rho} < 1$.

CC's subjective expected revenue when s=g and $\hat{\rho} < 1$,
CC's subjective expected revenue when s=g and $\hat{\rho} = 1$,
CC's objective expected revenue when s=g and $\hat{\rho} < 1$
CC's objective loss due to the renegotiation procedure
CC's subjective gain due to the renegotiation procedure

As we can see, the bank's expected revenue is only weakly affected by this distribution of bargaining powers. The lack of revenue coming from the supplier's weaker contribution is partly covered by larger concessions on the entrepreneur's side.

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On the other hand, the suppliers expected revenue is significantly different when the latest doesn't always bring in maximal additional funds. His expected revenues are positive much more often than in the case where he couldn't refuse the entrepreneur's demand (cf. Figure 7). The general impact is that the supplier has now less the feeling that his divergence in beliefs with the bank is negative for him. In other words, more bargaining power would dissuade the supplier to closely select projects he finances.

Appendix 3: Value of k^* for a uniformly distributed k

Suppose k is a uniformly distributed variable, with $k \in [k_{min}, (1-h)]$. We need to calculate the value of k such that $E(R^B|g) = E(R^B|b)$ is true. We start by writing the probability that k belongs to one of the domains distinguished previously:

$Prob(k_{min} < k < k_l) = k_l - k_{min}$

$Prob(k_l < k < k_b) = k_b - k_l$

$Prob(k_b < k < k_{cc}) = k_{cc} - k_b$

$Prob\big(k_{cc} < k < (1-h)\big) = 1 - h - k_{cc}$.

We can now write that k^* corresponds to the value of k that verifies the following equality:

$$hR^B + (1-h)L_2 = (k_l - k_{min})L_1 + (k_b - k_l)\left[L_1 + (1-\rho)(lR^B + (1-l)(L2 + \frac{(l+k)(H_2 - R^B)}{1-l-k})\right] + (k_{cc} - k_b)\left[\rho L_1 + (1-\rho)(lR^B + (1-l)(L2 + \frac{(l+k)(H_2 - R^B)}{1-l-k})\right] + (1 - h - k_{cc})R^B \quad \text{(A.3.1)}$$