Labour Relationships and Financial Contracts: Is There an Alternative to the Shareholder Value Maximization ?

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First draft

Abstract

In this paper, we consider an alternative configuration to the shareholder value maximization principle and we analyse its consequences on the workers' incentive to invest in human capital. We conceive a model in which an entrepreneur can resort to two types of regimes to set up its project. He can transfer the ownership rights on his project to a shareholder and become a wage-earner or remain the residual claimant on the project and contract with a lender. In both cases, the entrepreneur's incentive to invest in human capital increases (resp. decreases) in the liquidity (resp. in the specifity) of this human capital. But there exists a further incentice device in the second case, through the appropriation of the residual value of the project by the entrepreneur. So we show that the projects for which human capital is important and very specific should be financed through debt contract with fixed payments. On the contrary, when human capital is less important and less specific, shareholder value maximization may remain the best regime.

Key words : Labor market, human capital, shareholder, debt contract

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1 Introduction

The whole literature on corporate governance implicitely rests on the shareholder value maximization assumption, under which the residual value of the firm is alloted to its owners i.e. to the shareholders. In this view, the maximization of the shareholders' value is made similar to the maximization of the firm value. But the achievement of this maximization objective can be undermined by the existence of conflicts of interest within the firm. Notably the manager, who is entrusted the running of the firm by shareholders, is likely to be more keen on producing a private rent than on maximizing the whealth of shareholders. Performance-dependant payment system (such as stock options), takeover bids, capital concentration are as many means to control and to induce the manager to act in the interest of firm's owners (for a very complete survey about these practices and their respective efficency, see Becht, Bolton & Roell (2002)).

But the issue of corporate governance does not boil down to this opposition between the manager and shareholders. A more recent literature, devoted to institutional complementarities, has drawn the attention to another shape of interest conflict, which matches shareholders against workers (Vitols (1997), Roe (1999), Streeck (2001)). Not only the claims of workers (higher wages, better working conditions...) can be considered as costs for shareholders but their action can also affect the efficiency of manager-disciplining mechanisms for instance when they protest against the set up of a stock option system or a takeover bid (Roe (2000)). The action of workers may also be encouraged by the manager himself (Pagano & Volpin (2002)): granting workers a long term labour contract in the company allows him to make the firm less attractive for raiders ; paying them high wages is also a way to entice workers to preserve their position and to protest against a potential takeover. For Roe (1999), this opposition between shareholders' and workers' interests is well illustrated by the German codetermination system: the strong ownership concentration in German would stem from the strong power given to workers in the decision-making bodies of firms[1].

But these arguments only refer to the effect of workers' action on shareholders' situation whereas the reversed causality can also be considered. For instance Amable, Ernst & Palombarini (2001) argue that strong short term

[1]For a political approach of the interactions between the protection of shareholders and the regulation of the labour market, see notably Pagano & Volpin (2001) and Botero, Djankov, LaPorta, LopezDeSilanes & Shleifer (2004).

pressures from financial markets on the firm are likely to reduce the workers' time horizon and thus their productivity effort. The same idea is developed by Schnitzer (1995) who shows how the threat of takeover on a firm lowers their incentive to invest in human capital. Yet human capital is crucial for the success of many activities. For Streeck (2001), it is an intense investment in human capital that allowed European firms to carry out product differentiation strategies and to compet with American firms during the 70's. The role played by human capital in the success of the technology and knowledge-based industries from European "social democraties" during the more recent period of the "New Economy" is also underlined by Amable (2000), Amable (2002) and Amable & Petit (2001).

Hence, when the contents of a firm activity in human capital is high, the stake might be less to preserve the shareholder value against workers's actions than to define corporate governance practices in favour of the investment in human capital. To do this, the best way may be to return to the theoretical foundations of the shareholder value maximization objective. The raisonning, sumarized by Pollin (2004), is as follows. Contrary to the other claimholders of the firm (workers, suppliers, lenders...) whose payments are fixed by contract, capital owners are in a position of weakness since they do not benefit from any garantee. This implies that the formers may have no incentive to maximize the value of the firm and that this objective has to be alloted to the latters. Shareholders are thus granted the control rights on the firm and a residual claimant status. According to the firm theory, the weakness position of shareholders as regards other stakeholders is all the more important as their capital actually takes a physical shape. Because this physical capital is by definition closely associated to a specific industrial activity, it becomes less liquid and thus more risky for shareholders.

Finally, as it is also mentioned by Pollin (2004), this raisoning turns out debatable. On the one hand, the relative stronger illiquidity of the shareholders' capital is questionnable. Once broken, a specific commercial relationship with a customer or a supplier may be very difficult to redeploy. It is also well known that human capital can be very specific when a significant part of the skill is acquired within the firm. On the other hand, it is not clear why the above described ownership right allocation could not be reversed. The firm could write only fixed payment contracts (i.e. debt contracts) with fund providers, and would thus grant the ownership rights of the firm to

some other stakeholders, workers for example. By making workers the residual claimants of the firm, such a configuration may restore their incentive to invest in human capital. That is this alternative distribution of ownership rights we formalize in this article. Using Schnitzer (1995)'s theoretical framework, we aim at comparing it with the traditional shareholder value maximization principle, according to the contents of the firm activity in human capital as well as to the liquidity of human capital.
The remainder of the article is organized as follows. Section 1 presents the assumptions of the model. In Section 2, we solve the model. Section 3 concludes.

2 Assumptions

2.1 Technology

We consider an entrepreneur who is risk neutral and has an investment project which needs a unit amount of capital.

Unlike Schnitzer (1995), we assume that this project can fail. After the set up of the project, the entrepreneur receives a perfect signal on the state of the world:

— with an exogeneous probability μ, the good state of the world occurs and the project can have a positive return. The level of this return, denoted y is endogeneous. We will se later how it is determined.

— with a probability $1-\mu$, the bad state of the world occurs and the return is 0.

The entrepreneur can spend two types of effort:

- Before knowing the state of the world, he can exert an observable effort denoted i at a private cost i. This effort consists in investing in human capital in order to make the set up of the project more efficient.

- After learning about the state of the world (i.e. during the project) and if the state is good, the entrepreneur can spend an effort e at a private cost e to obtain the return y. If no effort is spent, the return y is 0. This effort is not necessary if the economy is in the bad state.

Furthermore, as in Schnitzer (1995) we assume that $e = e(y, i)$:

— the higher the level y is, the higher e has to be,

— the higher the investment in human capital was before receiving the signal on the state of the world, the more the entrepreneur can save the effort e, for a given level of y.

We thus have the following partial derivatives :

$$e_y(y, i) > 0 \tag{1}$$

$$e_i(y, i) < 0 \tag{2}$$

In the model, we will consider that the derivative $e_i(y, i)$ measures the contents of the project in human capital, a high $e_i(y, i)$ meaning that human capital matters very much. We also assume that :

$$e_{ii}(i) > 0 \tag{3}$$

$$e_{yy}(i) > 0 \tag{4}$$

$$e_{yi}(i) > 0 \tag{5}$$

Contrary to Schnitzer (1995), we deal with the specificity of human capital. When the project is over, the entrepreneur can enter the job market to participate in other projects. We suppose that in the good state of the world, his human capital will be all the more valued on the labor market than the effort i has been previously high :

$$L_i(i) > 0 \tag{6}$$

$$L_{ii}(i) < 0 \tag{7}$$

In the bad state, this gain will be weaker because of bad conditions in the job market. To simplify the analysis, we suppose it will be 0.

But the increase in L(i) can be more or less important according to the specificity of the skill acquired when exerting the effort i. A strong specificity means that this skill is not very usefull for other projects in the economy. It will not be very highly valued in the labor market when the project will be over: in other words human capital is not very liquid. A weak specificity means that the skill can be very usefull for other projects in the economy. It will be highly valued in the labor market: human capital is very liquid. So $L_i(i)$ measures the specificity (and the liquidy) of human capital, a higher $L_i(i)$ meaning a less specific and a more liquid human capital.

2.2 How to finance the project ?

The entrepreneur has no initial wealth and has to raise external capital to set up the project. Whatever the external funder, the entrepreneur is the only one to observe the state of the world. There exist two financial regimes.

—The shareholding regime

As in Schnitzer (1995), the entrepreneur can transfer the ownership rights on the project to the funder, who is assumed to be risk neutral. So in this regime the funder will be named "the shareholder" and the entrepreneur "the wage earner". The labor contract defines three variables: the wage w^g that has to be paid to the wage earner when he declares the good state, w^b to be paid if he declares the bad state and a production goal $\bar{y}$.
This contract is signed after the shareholder learns about the effort i but before the wage earner observes the state of the world. Once having observed the state of the world, the wage earner can breach the contractual relationship and leave the firm. As the shareholder is unable to observe the state of the world, the shareholder has to rely on the wage earner's report. But the wage earner's interest is to always declare he is in the bad state in order not to exert the effort e since in the bad state, no effort is necessary. We will see later how the design of the labor contract can entice the wage-earner to tell the truth.

—The lending regime

We consider another financial regime, that is not modeled in Schnitzer (1995). In this regime, the entrepreneur remains the residual claimant on the project and retains its residual value. So he can borrow funds from a "lender" and become a " borrower". We consider that the lender is risk neutral and that the credit market is competitive. The credit contract will define two variables: x^g, the amount to be paid to the lender when the borrower declares the good state and x^b the amount to be paid when he declares the bad state. The debt contract is also signed after the observation of the effort i by the lender and before the observation of the state by the borrower. Here again, the lender has to rely on the borrower's report. But the borrower's interest is always to declare the bad state of the world in order to pay a lower amount. Knowing the terms of the credit contract, the

borrower chooses the optimal level of the production level $\bar{y}$.

2.3 Summary and timing

These assumptions can be summarized graphically:

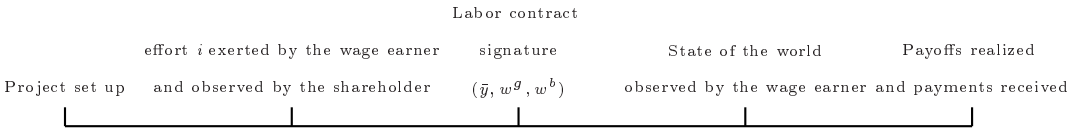


Figure 1: Timing in the shareholding regime

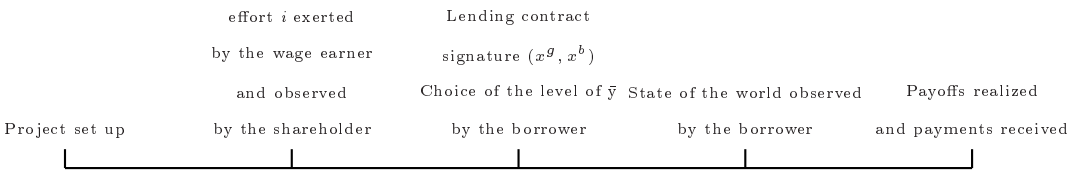


Figure 2: Timing in the lending regime

In the remainder of the article, we will analyse how each financial regime solves the private information problem and what are the consequences on production efficiency.
The model is solved by backward induction:

- first, we solve the asymmetrical information problem and we determine the terms of contracts considering i is given,
- then we analyse the incentive to invest in human capital and we determine the optimal level of i.

3 Solving the model

3.1 Optimal contracts and production return

Considering i as given, we define optimal payments to the funder as well as the optimal production return $\bar{y}$.

—The first best production return

The *first best* production return y^{fb} will be the reference in the ramainder of the article. We have:

$$y^{fb} = ArgMax\Pi^{fb} = ArgMax\mu(y - e(y,i))$$

—The shareholding regime

Now let us turn to the optimal labor contract in the shareholding regime. w^g, w^b and $\bar{y}^s$ solve the following program:

$$\{w^g, w^b, \bar{y}^s\} = ArgMax\Pi^s = ArgMax\mu(y - w^g) + (1-\mu)(-w^b)$$
$$s.c. w^b \geq 0 \quad (8)$$
$$w^g - e(\bar{y}, i) + L(i) \geq 0 \quad (9)$$
$$w^g - e(\bar{y}, i) + L(i) \geq w^b + L(i) \quad (10)$$

In this regime, we maximize the shareholding value since the shareholder is the residual claimant on the project. Constraints (8) et (9) are the wage earner's participation constraints respectively in the bad and in the good state. The inequality (10) is an incentive compatibility constraint, which ensures that in the good state cheating is less profitable than telling the truth. As in Schnitzer (1995), these contraints refer to the revelation principle from Myerson (1979).

We thus obtain:

Proposition 1:
In the shareholding regime, the design of the optimal labor contract is as follows:
- The wage in the bad state is 0,
- the wage in the good state is $w^g = e(\bar{y}^s, i)$.
- The production objective $\bar{y}^s$ equals the first best production return $\bar{y}^{fb}$ and verifies : $e_y(\bar{y}^s, i) = e_y(y^{fb}, i) = 1$.

Proof: See Appendix.

Let us first imagine the situation without any private information problem. In this case, there would have no need to induce the wage earner to tell

the truth. So the incentive constraint would not exist and only participation constraints would matter, ensuring that w^g and w^b are not lower than the wage earner's payoff without any participation in the project, i.e. lower than 0. Solving such a program would give: $w^g = e(\bar{y}^s, i) - L(i)$ and $w^b = 0$. The wage in the good state would equal the wage earner's effort cost, less the indirect gain he can obtain later when the skill acquired by investing in human capital is valued in the labor market.
When information is asymmetrical, the point is to entice the wage earner not only to participate in the project but also to tell the truth to the shareholder when the good state occurs. So his payoff if he tells the truth in the good state has to be higher than his gain $L(i)$ if he lies in the good state (i.e. if the shareholder believes the bad state occured). Asymmetrical information thus raises the wage w^b by $L(i)$. In other words, the shareholder lets the entrepreneur appropriate $L(i)$ in order to entice him to tell the truth. L(i) can be regarded as a rent for the wage earner, which comes from his informationnal advantage. We will see in the second stage how this rent affects the entrepreneur's decision to invest in human capital.

—**The lending regime**

To define the optimal credit contract, we just use results from the Costly State Verification literature (Townsend (1979), Dowd (1992)). According to this literature, we know that the contract that induces the borrower to tell the truth is as follows: the amount to be paid when the borrower declares the good state has to be fixed. It could not be conditionnal on the level of the project payoff since the state of the world is observed only by the entrepreneur. If the borrower declares the bad state, the lender appropriates all the payoff of the project after a costly verification of the state of the world. Let us now apply this result to our model. Since the payoff in the bad state is 0, we have $x^b = 0$. Furthermore as the credit market is competitive the lender profit equals 0 and we can write: $\mu x^g + (1-\mu)(x^b - C) = 0$. So we have: $x^g = \frac{(1-\mu)C}{\mu}$ where C denotes the verification cost.

Knowing these terms, the borrower determines the optimal level $\bar{y}^l$. He maximizes the residual value of the project:

$$\bar{y}^l = ArgMax\Pi^e = ArgMax\mu(\bar{y}^l - e(y,i) - \frac{(1-\mu)C}{\mu} + L(i))$$

We obtain immediately:

Proposition 2:
The optimal production return in the lending regime $\bar{y}^l$ equals the optimal production return in the shareholding regime and the first best production return:

$$e_y(\bar{y}^s, i) = e_y(\bar{y}^l, i) = e_y(y^{fb}, i) = 1 \tag{11}$$

The optimal level of y is the same in both regimes. In this stage, i is given. So only the relationship between y and e matters. It is defined by assumption (1) which is not affected by the nature of the financial regime. In the lending regime, the optimum is reached when the increase in $\bar{y}$ equals the increase in the effort cost e. In the shareholding regime, it is reached when the increase in $\bar{y}$ is equal to the increase in the cost of the effort for the shareholder, i.e. the wage paid to the wage earner. As Proposition 1 indicates that this wage equals the wage earner's effort cost, both optimal level of $\bar{y}$ are similar.

Finaly, we also have:

Corrolary 1:
In both financial regimes, the optimal production return is increasing in the effort i.
Proof: See Appendix.

This corrolary indicates that exerting (and observing) a higher effort i allows the parties to define a higher production return objective in the good state of the world.

3.2 The optimal investment in human capital

We now explore the optimal investment in human capital in each regime.

—The first best effort of human capital investment

The first best effort i^{fb} solves the following program:

$$i^{fb} = ArgMax\mu(y - e(y^{'}i)) - i$$

—The shareholding regime

In the shareholding regime, the wage earner takes two effects into account when he invests in human capital:
— the increase in $L(i)$ implied by an increase in i,
— The cost of the effort i.

Notice that without asymmetrical information, the informational rent would not exist and the wage earner would have no reason to investment in human capital. So it is the wage earner's informationnal advantage that allows a positive investment in human capital.

The maximization program is:

$$i^s = ArgMax\Pi^s = ArgMax\mu L(i) - i$$

—The lending regime

In the lending regime, there is three forces at play:
— the increase in $L(i)$ implied by an increase in i,
— The cost of the effort i,
— the saving of the effort e.

The program is:

$$i^l = ArgMax\Pi^e = Argmax\mu(y^l - e(y^l, i) + L(i) - \frac{(1-\mu)C}{\mu}) - i$$

Therefore we obtain:

Proposition 3:
Optimal efforts in human capital investment can be summarized in the following way:
Proof: See Appendix.

We thus have:
Corrolary 2:
i^{fb}, i^s and i^l are increasing in the project's success probability μ.

Regimes	Effort	Optimum
First best	i^{fb}	$-\mu e_i(y^{fb}, i^{fb}) = 1$
Shareholding	i^s	$\mu L_i(i^s) = 1$
Lending	i^l	$-\mu e_i(y^{fb}, i^l) + \mu L_i(i^l) = 1$

Table 1: First order conditions

Proof: See Appendix.

The intuition behind this result is straightforward. When μ is high, the entrepreneur's skill is very likely to be valued in the labor market. So the effort in human capital investment is worth exerting.

Finally, we obtain the following proposition:

Proposition 4:

a) There exists a threshold e_i* such that: if $e_i < e_i*$, the lending regime dominates the shareholding regime, and if $e_i > e_i*$, the shareholding regime dominates the lending regime.

b) There exists a threshold L_i* such that: if $L_i < L_i*$, the lending regime dominates the shareholding regime, and if $L_i > L_i*$, the shareholding regime dominates the lending regime.

Proof: See Appendix.

The intuition for Proposition 4 is as follows:

—The shareholding regime solves the private information problem by defining an incentive wage that allows the wage earner to appropriate $L(i)$. This rent supplies an incentive to invest in human capital because an increase in i is valued on the labor market. The investment level in the shareholding regime can be higher or lower than in the welfare maximization program, according to the relative sensitivity of individual gains (L(i)) and collective gains (e(y,i)) to the investment in human capital.

—In the lending regime, the private information problem is solved by a debt contract. The incentive to invest in human capital comes from L(i) (that the lender cannot appropriate) but also from the saving of the effort e(y,i) that is internalized by the borrower (since he is the residual claimant

on the project) [2]. The coexistence of these two incentive mechanisms implies a higher human capital investment level than in the shareholding regime and than in the welfare maximization program : $i^s < i^l$ and $i^{fb} < i^l$.

In this model, no financial regime allows to reach the first best level of human capital (except in the very special case of the shareholding regime where $L_i = e_i$). But we can look for the second best regime, according to the contents of the project in human capital:
— if human capital does not matter very much (i.e. e_i is high): the first best effort of investment is low. The second best regime is the one that implies the lowest effort, i.e. the shareholding regime.
— when the contents in human capital becomes higher (i.e. e_i becomes lower), the first best effort increases. So the incentive implied by the shareholding regime becomes too low relatively to the one supplied by the two incentive mechanisms (L(i) *and* e(y,i)) of the lending regime. So there is some threshold (in terms of e_i) below which the lending regime dominates.

The second best regime also depends on how human capital is specific (L_i):

—If human capital is very specific and not very liquid (i.e. L_i is low), the incentive supplied by the shareholding regime is too low. This can be solved by the lending regime since the saving of the effort e(y,i) constitues a further incentive mechanism. The lending regime thus dominates.
— When the human capital becomes more specific and less liquid (i.e. L_i becomes higher), the incentive supplied by L(i) increases. The investment generated by the shareholding regime becomes higher ans closer to the first best level. On the contrary, the the incentive supplied by the lending regime is excessive. So there is some threshold (in terms of L_i) below which the lending regime dominates.

In the line of the literature on institutional complementarities, the model predicts that financial structures, labor relationships and industrial struc-

[2]In Amable et al. (2001), the debt contract with monitoring is regarded as a "patient" source of financing that "allows social partners to devise long term arrangements" and can increase long term productivity. Here, the approach is quite different. The debt contrat implies fixed payments and thus allows the entrepreneur to remain the residual claimant on the project and to internalize the benefits of the investment in human capital.

tures are closely related:
—The liquidity of human capital can be linked with the competitive strategy of firms. When the product market is based on price competition and standardization, the skill acquired in one firm can be highly valued in the others. So it is likely to be very liquid and the shareholding regime may be dominant. On the contrary, when firms choose differentiation by quality, the human capital acquired in one firm may be more specific and thus less liquid. Then the lending regime could be the best one.
The liquidity of human capital can also depend on the structure of the labor market. Human capital is likely to be more liquid in very flexible labor markets, as in anglo-saxon countries. On the contrary, it may be less liquid when the labor market is mostly internal and based on long term and close relationships between firms and wage-earners, as in Japan for example.
— The contents in human capital for the project refers to the opposition between knowledge based activities and "taylorist" industries. Innovation and RD activities, which need very high level of education should be financed through debt contracts (implying fixed payoffs for the funders) and by granting to employees a large stake in the firm. But when the business relies on blue collars and on a lower level of education, shareholder value maximization associated with a fixed wage for wage-earners may be the best regime.

4 Conclusion

The aim of this article was to consider an alternative to the shareholder value maximization objective and to analyse its stake in terms of human capital. We proposed a model in which an entrepreneur can resort to two types of regimes to set up its project. In the shareholding regime, he can transfer the ownership rights on his project to a shareholder and become a wage-earner. Il the lending regime, he remains the residual claimants on the project and contracts with a lender. It is interesting to underline the symmetry of both financial regimes: one of the two agents is the residual claimant on the project while the other receives a *fixed* payment. In both cases, the entrepreneur's incentive to invest in human capital increases (resp. decreases) in the liquidity (resp. in the specifity) of this human capital. But there exists a further incentice device in the second case, through the appropriation of the residual value of the project by the entrepreneur. So we showed that projects for which human capital is important and very specific should be financed

through debt contract with fixed repayments. On the contrary, when human capital is less important and less specific, shareholder value maximization may remain the best regime.

These results indicate that the issue of corporate governance does not boil down to the shareholder value maximization objective. They show it can be efficient to take into account the interest of the other stakeholders of the firm, such as workers. By showing the existence of strong interactions between labour relationships, financial contracts and the nature of the productive system, our model also joins the wider issue of institutional complementarities (Amable (2000), Amable (2002), Amable & Petit (2001)). According to this literature, labour relationships are not the only ones to interact with financial contracts and corporate governance. The structure of savings, the legal environment are also important

Appendix

Proof of Proposition 1
— The first best production return:
The first order condition is :

$$e_y(y^{fb}, i) = 1$$

From assumption (4), the second order condition is satified.

— The shareholding regime :
The constraint (9) is ignored because it derives from the constraint (10). The Lagrangian can be written:

$$\Psi = \mu(y - w^g) + (1 - \mu)(-w^b) + \lambda_1(w^b) + \lambda_2(w^g - e(y, i) - w^b)$$

First order conditions give:

$$\delta\Psi/\delta y = \mu - \lambda_2 e_i(y, i) = 0$$
$$\delta\Psi/\delta w^b = -(1 - \mu) + \lambda_1 - \lambda_2 = 0$$
$$\delta\Psi/\delta w^g = -\mu + \lambda_2 = 0$$

We obtain :

$$\lambda_1 = 1$$
$$\lambda_2 = \mu$$

Solutions are therefore defined by:

$$w^b = 0$$
$$w^g = e(\bar{y}^s, i)$$
$$e_y(\bar{y}^s, i) = 1 \blacksquare$$

Proof of Corrolary 1
Applying the implicit function theorem to (11) implies: $\delta y/\delta \bar{y}^l = \delta y/\delta \bar{y}^s = \delta y/\delta y^{fb} = \frac{-e_{yi}(y^{fb},i)}{e_{yy}(y^{fb},i)}$ which is positive by (4) and (5). ■

Proof of Proposition 3
For i^{fb} and i^s, first order conditions are obtained immediately. From assumption (7), second order conditions are satisfied.
For i^l, the first order condition gives:

$$\mu[\delta \bar{y}^l/\delta i - (\delta \bar{y}^l/\delta i . e_y(\bar{y}^l, i)) - e_i(\bar{y}^l, i) + L_i(i)] - 1$$

Since Proposition 2 indicates that $e_y(\bar{y}^l, i) = 1$, the optimal level i^l verifies: $-\mu e_i(y^{fb}, i^l) + \mu L_i(i^l) = 1$. From assumptions (3) and (7), the second order condition is satisfied. ■

Proof of Corrolary 2
Applying the implicit function theorem to first order conditons in Table (1) gives:
$\delta i^{fb}/\delta \mu = \frac{-e_i}{\mu e_{ii}}$ $\delta i^s/\delta \mu = \frac{-L_i}{\mu L_{ii}}$, and $\delta i^l/\delta \mu = \frac{-(-e_i+L_i)}{-\mu e ii+\mu L_{ii}}$.
From assumptions (2), (3), (6) and (7), these expressions are positive.■

Proof of Proposition 4

Part (a):

• First let us show that $i^s < i^l$ and that $i^{fb} < i^l$:

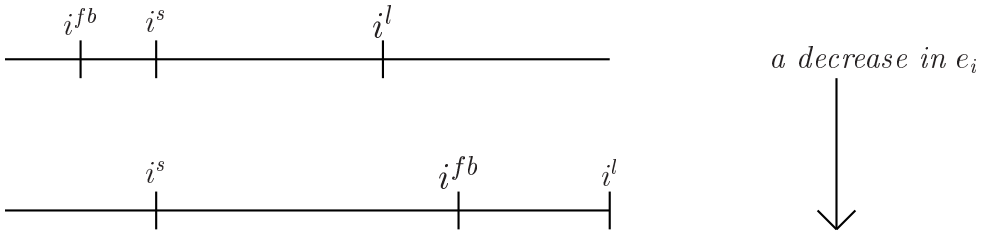
From Table (1), we have $\mu L_i(i^s) - \mu L_i(i^l) = -\mu e_i(y^{fb}, i^l)$. Since $-\mu e_i(y^{fb}, i^l) > 0$, we have $\mu L_i(i^s) - \mu L_i(i^l) > 0$. From assumption (7) L_i is decreasing in i. So we obtain $i^s < i^l$.

We also have $-\mu e_i(y^{fb}, i^{fb}) = -\mu e_i(y^{fb}, i^l) + \mu L_i(i^l) = 1$. So we have: $-\mu e_i(y^{fb}, i^{fb}) - (-\mu e_i(y^{fb}, i^l)) = \mu L_i(i^l)$. Since $L_i(i^l) > 0$ we have also:

$-\mu e_i(y^{fb}, i^{fb}) - (-\mu e_i(y^{fb}, i^l) > 0$. From assumptions (3) $-e_i$ is decreasing in i. So we obtain $i^{fb} < i^l$.

• Then let us show that a decrease in e_i implies a rise in i^{fb} and in i^l:
From Table (1), we have $e_i(y^{fb}, i^{fb})) = -\frac{1}{\mu}$. Let us suppose a decrease from $e_i(i)$ to $e_i'(i)$. We can write: $e_i'(i) < e_i(i)$. Thus we have: $e_i'(y^{fb}, i^{fb}) < e_i(y^{fb}, i^{fb}) = -\frac{1}{\mu}$. Let us also consider i'^{fb} that verifies the first order condition: $e_i'(y^{fb}, i'^{fb}) = -\frac{1}{\mu}$. So we obtain: $e_i'(y^{fb}, i^{fb}) < e_i'(y^{fb}, i'^{fb})$. Since e_i' is increasing in i, we have: $i^{fb} < i'^{fb}$. We can conclude that a decrease in e_i leads to an increase in i^{fb}.
The rise in i^l can be proved in the same way.

• These results can be depicted in the following graph:



When e_i is high, i^s is the nearest to i^{fb}. The shareholding regime dominates. When e_i is low, i^l is the nearest to i^{fb}. The lending regime dominates. By continuity, there exists a threshold e_i* such that below e_i*, shareholding dominates and that above e_i* lending dominates. ■

Part (b):

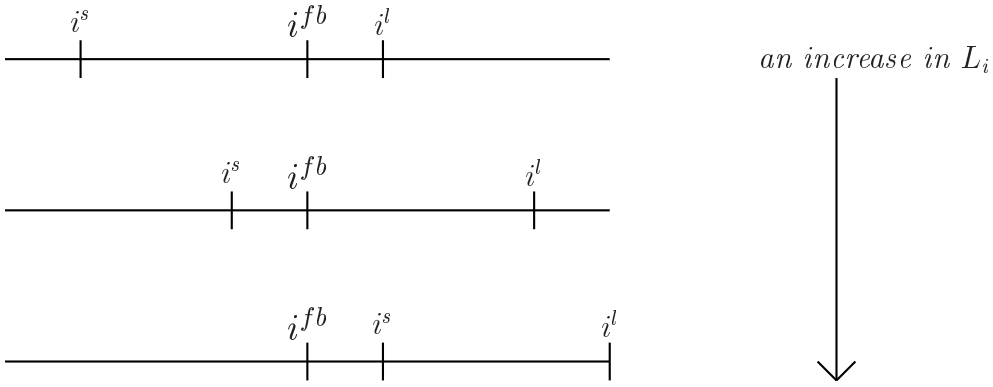
•We have already shown that $i^s < i^l$ and that $i^{fb} < i^l$.

• Then let us show that an increase in L_i implies a rise in i^s and in i^l:

From Table (1), we have $L_i(i^s) = \frac{1}{\mu}$. Let us suppose an increase from $L_i(i)$ to $L_i''(i)$. We can write : $L_i''(i) > L_i(i)$. we therefore have: $L_i''(i^s) > L_i(i^s) = \frac{1}{\mu}$. Let us also consider i''^s that verifies the first order condition: $L_i''(i''^s) = \frac{1}{\mu}$. So we obtain: $L_i''(i^s) > L_i''(i''^s)$. Since L_i'' is decreasing in i, we

have: $i''^s > i^s$. We can conclude that an increase in L_i leads to an increase in i^s.
The rise in i^l can be proved in the same way.

- These results can be depicted in the following graph:



When L_i is low, i^l is the nearest to i^{fb}. The lending regime dominates. When L_i is high, i^s is the nearest to i^{fb}. The shareholding regime dominates. By continuity, there exists a threshold L_i* such that below L_i*, lending dominates and that above L_i* shareholding dominates. ■

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