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Labour Contract*

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# A MODEL OF RECIPROCAL FAIRNESS: APPLICATION TO THE LABOUR CONTRACT<sup>1</sup>

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## ABSTRACT

We investigate to what extent reciprocity, exhibited by employers and employees, lead to stable gift exchange practices in the labour contract, giving rise to non-compensating wage differentials among industries and firms. We use the concept of Sequential Reciprocity Equilibrium (Dufwenberg and Kirchsteiger 1998, 2004) to incorporate players' preferences for reciprocity in their utility function. We show that successful gift exchange practices may arise if both players actually care for reciprocity. We test the predictions of the model using a matched employer-employee French dataset. Our results show that French employers and employees' decisions are influenced by reciprocity concerns.

**JEL classifications:** C72, J33, J41

**Keywords:** reciprocity, fairness, sequential game, cheap-talk, efficiency wages.

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## 1. Introduction

Econometric studies initiated by Slichter (1950) and pursued more recently by Dickens and Katz (1987), Krueger and Summers (1988), Blanchflower et al. (1996) reach the conclusion that sizeable rents are paid by employers in addition to the competitive wage, giving rise to non-compensating wage differentials. Homogenous employees seem to get paid differently according to the industry or firm they belong to. Numerous studies based on the European labour market, notably Abowd and Allain (1996), Hildreth and Oswald (1992), Goux and Maurin (2002), not only confirm the non-compensating nature of wage determination but also show that the phenomenon transcends the institutional contexts of the surveyed countries. Moreover, these studies highlight that the wage structure cannot be explained by any form of unequal distribution of the unobserved workforce quality amongst industries. Indeed, as employees move from low wage to high wage firms (or vice versa), they incur notable changes in the level of their compensation even though their quality hasn't had time to improve or decrease through the transition (Abowd et al. 1999). These evidences suggest that non-competitive elements, intrinsic to the nature of the work relations established between employers and employees, enter the wage setting process.

A theoretical way for explaining this stylized fact can be drawn from the fair wage effort hypothesis developed by Akerlof and Yellen (1988, 1990) according to which wage premiums stem from gift exchange practices initiated by the employer. Wage premiums are offered in the hope that the employees will reply by productivity increases. Employees are sensitive to norms of compensation they consider fair to receive and the fact that these norms differ from one firm to another justifies the existence of non-compensating wage differentials. This view has recently received strong support from various experiments carried out notably by Fehr and al. (1996). In their gift exchange experiments, they observed that their subjects tend to behave reciprocally, rewarding fair proposals and punishing greedy opponents.

The aim of this paper is twofold. On a theoretical point of view, we aim at investigating to what extent reciprocal considerations, exhibited by employers and

employees, lead to stable gift exchange practices in the labour contract. We use a basic sequential gift giving game between an employer who proposes a wage given the employee's profitability level as exogenous and an employee who chooses his level of effort. We use the concept of Sequential Reciprocity Equilibrium developed by Dufwenberg and Kirchsteiger (1998, 2004) to incorporate players' preferences for reciprocity in their utility function.

We show that successful gift exchange practices may arise if both players are actually motivated by reciprocity. More precisely, we show that even though intentions act as a catalyst of opportunistic behaviours, the respect of the equity norm makes mutual cooperation more likely. Thus stable gift exchange practices may arise between the employer and employee without requiring too unrealistic conditions on their intrinsic motivation for reciprocity.

The second aim of this paper is to propose a direct evaluation of the determinants of gift exchange practices between French employers and employees, estimating the probabilities to observe productivity increases following upon the settlement of rent-sharing agreements in the firm. We use a French database extracted from the REPOSE 98 survey. The information being available both for the employer and the employee and the presence of more subjective questions in the survey make this database particularly suited for the estimations of the determinants of reciprocal behaviours.

Whether we estimate the probability for the employer to propose a rent-sharing agreement or the probability for the employees to raise their effort, we show that there exists an endogeneity bias related to the variable chosen as proxy to express the agents' perception of their opponent's fairness. This result gives support to the hypothesis that employers and employees' decisions are directly influenced by reciprocity concerns. Moreover, the estimations show that the equity (fairness) norms upon which the agents base their decisions of reward or retaliation are actually determined at the firm's level. This latter result gives support to the Akerlof and Yellen's fair wage effort hypothesis as an explanation of the persistence of non-compensating wage differentials.

## 2. Fairness considerations and labour relations

An appealing way to explain the persistence of non-compensating wage differentials lies in the fair-wage effort hypothesis developed by Akerlof and Yellen (1988, 1990). According to this hypothesis, employers and employees base their relationship on gift exchanges. The employer offers a higher wage expecting the employees to raise their productivity in return. The employees compare their actual wage to the norm they consider fair to receive (*fair wage*) and determine whether they should actually raise their effort and remain loyal to the employer's goals. The incompleteness of the labour contract involves that the employees are able to adjust their effort to the level of their compensation. Giving the fair wage to the employees enables to enforce effort maximization without resorting to costly mechanisms of control and punishment. Although Akerlof and Yellen (1990) base their interpretation on psychological and sociological observations, it represents an actual challenge in terms of modelling. Indeed, the wage premiums shouldn't, theoretically, constitute a sufficient incentive to have the employees maximize their effort. The situation described by Akerlof and Yellen (1990) is a typical *prisoner's dilemma*. Whatever the wage proposal, the employee who seeks to maximize her final payoff should shirk. Anticipating such behaviour, the employer should offer the market-clearing wage. The *fair wage* psychological and sociological foundations involve that the agents determine their optimal behaviours according to considerations going beyond the pure payoff maximization. These concerns lead the agents to seek for a certain distributive justice, adjusting their actions to their opponents'.

The existence of extra-material concerns in the agents' decision process has been recently revealed by experimental studies carried out on bilateral negotiation games, and, more specifically, on the Ultimatum Bargaining Game (Güth et al. 1982). According to the standard theory, this kind of game allowing one of the players to send a *take it or leave it* offer, should result in the capture of the whole surplus by the offerer without incurring any refusal from the responder. In the experiments, this prediction is systematically refuted even if the stake of the negotiation is worth several months of wage (Fehr and Tougavera 1995; Slonim

and Roth 1998; Munier and Zaharia 2002) or if the game institutions are modified to allow for asymmetric information or varying degrees of veto power for the responder (Güth and Huck 1994; Croson 1996). Hence, social motivations significantly condition the outcomes reached by players involved into a negotiation.

Even though it has been observed that social motivations may take various forms, from pure altruism (Hoffman et al. 2000) to envy (Kirschsteiger 1994), experiments directly based on the gift-exchange game tend to show that reciprocity concerns prevail in the subjects' behaviours (Fehr et al. 1993, 1996; Charness 2004). The players are ready to sacrifice substantial amounts in order either to punish a greedy opponent or to reward a fair one according to the principle of one eye for one eye.

Since reciprocity seem to condition the agents' actual decisions, it seems interesting to relax the hypothesis of materialistic driven behaviours in the particular context of the employment relationship. Let's now investigate how to introduce reciprocity motivated employees and employers in the basic model of gift exchange.

### **3. Incorporating reciprocity motivated players in a sequential gift-giving game.**

Provided that the employer and the employees seem to act in a non-selfish way, part of the literature proposes to modify their utility functions directly so as to incorporate the alternative concerns ruling their behaviour. If there exists a large consensus about players' motivation variety, the way one should incorporate such concerns is still debating. The bulk of the researches focus their attention on distributional concerns (Bolton and Ockenfels 2000; Fehr and Schmidt 1999; Kirchsteiger 1994). The players are motivated by their material gain and the difference between their payoff and their opponent's payoff.

Another way to cope with these fairness motives which seems to be more accurate for our concern is to admit that employers and employees are motivated by intentions as well as by distribution. Indeed many field studies (Abowd and

Allain 1996; Bewley 1995; Levine 1993) highlight that *ability to pay* acts as a determinant of wage levels. In a gift-giving framework this result should induce employees to be sensitive to the employer's options when choosing their effort level. If reciprocity matters, players should be sensitive to the strategy set available to their opponent when they decide to retaliate or not. Hence, if an employer has no better choice but to make a low wage offer, his behaviour should not be seen as unfair as if he had denied an opportunity to give a raise.

The psychological game theory initiated by Geanakoplos et al. (1989) and developed by Rabin (1993) gives a framework to incorporate not only reciprocity concerns but also the underlying intentions in the employer and employees' utility functions. Since we are in a context where the employer first proposes a wage and the employee reacts by selecting an effort level, one needs a theoretical framework defined for extensive form games. That's what proposes Dufwenberg and Kirchsteiger (1998, 2004). The main purpose of such a modification in the utility functions is to introduce the retaliation and the reward as rational behaviours. A greedy proposal decreases the employee's material payoff (low wage instead of high wage) and makes her feel betrayed by the employer. However she compensates her material pain by a retaliation strategy, shirking instead of effort maximizing. Knowing that her behaviour will also decrease the employer's payoff makes her better off. The psychological part of her utility compensates her material loss.

Since the players are reciprocity motivated, they care for the extent to which their opponent has been kind towards them and hence determine how kind they should be. In our sequential game, the employer (first mover) has to assess the employee's kindness to take his decision. So beliefs about kindness are to be formed. The extent to which a player is kind depends both on his own action and on his beliefs on their consequences. A reciprocity caring second mover (employee) will therefore base her action on her beliefs on the employer's intentions. She has to make second-order beliefs; that is her own beliefs on the

employer's beliefs. Hence, cooperation on strategic grounds would be regarded differently than voluntary cooperation.<sup>3</sup>

The extent to which the two parties of the relation are fair toward each other is defined as the difference between the actual payoff one offers (or gets) and a reference allocation considered fair, which is called *equitable payoff*. It is defined as the average between the greatest and the lowest material payoff that can be given (or received) through action. If the actual payoff is equal to the equitable payoff, the player is neither kind nor unkind and then the psychological payoff doesn't influence the total utility. An employee who receives the fair wage does not feel betrayed but does not feel particularly favoured either.

The modified utility function can be then expressed (in the space of the *efficient strategies* of the game) as the sum between the material payoffs and the psychological payoffs defined as the product of the player's kindness (function) toward his opponent and his opponent's expected kindness (function) toward him.

In a two players ( $i$  and  $j$ ) game, player  $i$ 's utility function can be expressed as follows:

$$U_i(a_i, b_{ij}, c_{iji}) = \pi_i(a_i, b_{ij}) + Y_i \kappa_{ij}(a_i, b_{ij}) \lambda_{iji}(b_{ij}, c_{iji}) \quad (1)$$

with:  $a_i$ , player  $i$ 's action  $\in A_i$ , the set of player  $i$ 's action;  $b_{ij}$ , player  $i$ 's belief on player  $j$ 's strategy,  $b_{ij} \in B_{ij}$ , the set of possible beliefs on  $j$ 's strategy;  $c_{iji}$ , player  $i$ 's belief on player  $j$ 's belief on  $i$ 's strategy,  $c_{iji} \in C_{iji}$ , the set of possible beliefs of  $i$  on  $j$ 's beliefs on  $i$ 's strategy (beliefs of beliefs).

$\kappa_{ij}(a_i, b_{ij})$  corresponds to the extent to which player  $i$ 's action is kind toward  $j$ , given  $i$ 's beliefs on  $j$ 's selected strategy  $b_{ij}$ . As stated before,  $\kappa_{ij}(a_i, b_{ij})$  is given by the difference between the actual payoff  $i$  gives to  $j$  minus the equitable payoff  $j$  should receive, that is:  $\kappa_{ij}(a_i, b_{ij}) = \pi_j(a_i, b_{ij}) - \pi_j^e(b_{ij})$ .

$\lambda_{iji}(b_{ij}, c_{iji})$  corresponds to  $i$ 's assessment of  $j$ 's intentions, i.e.  $i$ 's beliefs about  $j$ 's kindness. And since  $j$ 's kindness depends on his beliefs,  $\lambda_{iji}(b_{ij}, c_{iji})$

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<sup>3</sup> Brandts and Charness (1999) observe that perceptions of intentions underlying cooperative behaviours substantially modify the outcome of the game they experiment.

represents  $i$ 's second order beliefs, i.e.  $i$ 's beliefs on  $j$ 's beliefs on  $i$ 's strategy. Like  $\kappa_{ij}$ ,  $\lambda_{iji}(b_{ij}, c_{iji})$  is defined as  $\lambda_{iji}(b_{ij}, c_{iji}) = \pi_i(b_{ij}, c_{iji}) - \pi_i^e(c_{iji})$ .

$Y_i$ , represents player  $i$ 's intrinsic preference for reciprocity.  $Y_i$  is non-negative. If player  $i$  is selfish,  $Y_i$  is null. This parameter enables to introduce players' heterogeneity on the basis of the nature of their motivations as observed in the various experiments of bargaining games.

Given this modified utility function introduced by Dufwenberg and Kirchsteiger (1998, 2004), one can apply this framework to the gift giving game of wage setting<sup>4</sup> between the employer and the employee.

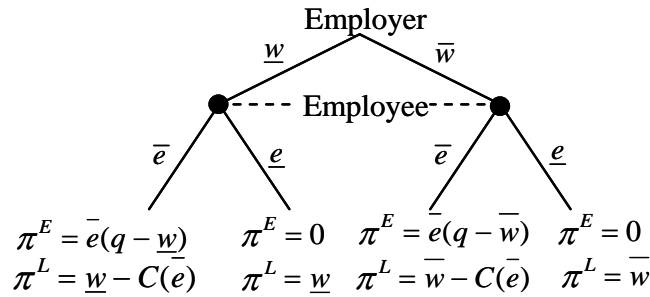
#### 4. The model

We use a one shot gift exchange game whose material payoffs are inspired from Fehr et al. (1996). The employer can either propose a high wage  $\bar{w}$  or a low wage  $\underline{w}$  offer being informed on his employee's profitability  $q$ . The employee can either respond by a high effort level  $\bar{e}$  or by a low effort level  $\underline{e}$ . If she maximizes her effort, she incurs a cost  $C(\bar{e})$  and gets  $\bar{w} - C(\bar{e})$  or  $\underline{w} - C(\bar{e})$  depending on the proposal. If she shirks she incurs a zero cost from effort and gets either  $\bar{w}$  or  $\underline{w}$ . The employer gets the surplus between the profitability and the wage offer times the effort level, depending on the strategy actually selected by the employee. Let's consider the game in its extensive form.

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<sup>4</sup> One must notice that this utility function is not invariant with the choice of the monetary unit because the psychological payoffs are squared as compared to the material payoffs. The theoretical model is presented with such a function only for perspicuity purposes.

**Figure 1: Gift exchange game in extensive form**



With  $\pi^E$  and  $\pi^L$  being respectively the employer and employee's payoffs. The incompleteness of the relationship lies on the inability of the employer to observe the effort level actually selected by the employee at the moment of her decision. Thus any effort level desired beyond the minimum is merely *cheap talk* from the employee's side since no mechanism ensures its enforcement. Given this framework, it is straightforward to show that the Subgame Perfect Nash Equilibrium is constituted by  $(\underline{w}, \underline{e})$ . Indeed, if the players are only interested in their material payoffs, the employee should always shirk whatever the proposal because she eventually earns more. Since the employer expects the worker to shirk, he should propose the low wage, getting a zero payoff.

Given the structure of the game and the nature of the payoffs, we assume that a low wage offer would result in the employee systematically selecting the low effort level even when reciprocity is taken into account. We now express the conditions for cooperative outcomes to arise when the employer offers the high wage, taking into account players' fairness considerations.

#### 4.1 *Employee's optimal behaviour*

Upon being offered the high wage, the employee assesses the employer's kindness according to both the intentions underlying such an offer and whether it fits the equitability criterion as imposed by the comparison between all the possible offers. The employee then chooses the appropriate reaction that maximizes her utility.

Through her effort choice, the employee can give the employer at least 0 or at most  $\bar{e}(q - \bar{w})$ . The equitable payoff from the employer's point of view would be  $\pi_E^{eq} = \frac{1}{2}\bar{e}(q - \bar{w})$ . The employee's kindness toward the employer is then given by  $\kappa_{LE}^{\bar{e}} = \frac{1}{2}\bar{e}(q - \bar{w})$  when she maximizes her effort, and  $\kappa_{LE}^{\bar{e}} = -\frac{1}{2}\bar{e}(q - \bar{w})$  when she shirks.

In order to express the employee's utility function incorporating reciprocity concerns, one needs to give an expression to the last element of the utility function: the employee's belief on the employer's kindness toward her when he offers  $\bar{w}$ . For that purpose one must know her belief on the employer's belief on her selected strategy being proposed the high wage offer. Let's call this second order belief of choosing a maximum effort  $\rho$ . The employee's belief on what the employer wants to give her when he proposes  $\bar{w}$  depends on what strategy the worker actually selects between shirking and effort maximizing, that is  $\rho"(\bar{w} - C(\bar{e})) + (1 - \rho)"\bar{w}$ <sup>5</sup>.

The worker's belief on the employer's kindness toward her when he proposes  $\bar{w}$  ( $\lambda_{LEL}^{\bar{w}}$ ) can be expressed as the difference between the worker's belief on what the employer intends to give her minus the employee's equitable payoff. Since her material payoff resulting from a  $\underline{w}$  proposal is  $\underline{w}$  for sure,  $\lambda_{LEL}^{\bar{w}}$  can be expressed as

$$\lambda_{LEL}^{\bar{w}} = \frac{1}{2}(\bar{w} - \underline{w} - \rho"C(\bar{e})).$$

The expression of  $\lambda_{LEL}^{\bar{w}}$  is interesting in the sense that the more the employer expects the employee to choose a high effort level, the less kind he is perceived by the employee. The gift, represented by the high wage offer loses part of its meaning if the employer is considered to be sure that it will lead to the employee's cooperation.

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<sup>5</sup> We use double apostrophes for  $\rho$  in order to differentiate between subjective and posterior probability.

Therefore the employee's utility function incorporating reciprocity concerns assumes two values  $U_L^{\bar{e}}$  and  $U_L^{\underline{e}}$ , depending on her effort choice:

$$U_L^e = \begin{cases} \bar{w} - C(\bar{e}) + \frac{1}{4} Y_L \bar{e} (q - \bar{w}) (\bar{w} - \underline{w} - C(\bar{e})) & \text{if } e = \bar{e} \\ \bar{w} - \frac{1}{4} Y_L \bar{e} (q - \bar{w}) (\bar{w} - \underline{w} - C(\bar{e})) & \text{if } e = \underline{e} \end{cases} \quad (2)$$

where  $Y_L$  represents the worker's intrinsic motivation for reciprocity.

Given the modified utility function, the condition for the employee to always select a high effort level being proposed  $\bar{w}$  should be such that the total utility arising from that strategy overcomes the utility of shirking, that is  $U_L^{\bar{e}} > U_L^{\underline{e}}$  which yields :

$$\frac{1}{2} Y_L \bar{e} (q - \bar{w}) (\bar{w} - \underline{w} - \rho'' C(\bar{e})) \geq C(\bar{e}) \quad (3)$$

Two cases arise from condition (3) depending on the value of the difference between the high and low wage offer that is the sign of  $(\bar{w} - \underline{w} - \rho'' C(\bar{e}))$ . When  $\rho''$  approaches unity this expression may turn negative if the difference between the two offers is not large enough or if the cost of effort is too large. However such a distinction is not worth being taken into account as the case where  $(\bar{w} - \underline{w} - \rho'' C(\bar{e}))$  would be negative seems unrealistic in the context of the wage setting. It would mean that the difference between the two wage offers is so thin that it could not really be considered as a raise. We then investigate only the case where it is strictly positive.

$$(3) \text{ then becomes } Y_L (\bar{w} - \underline{w} - \rho'' C(\bar{e})) \geq \frac{2C(\bar{e})}{\bar{e} (q - \bar{w})} \quad (4)$$

When the employer and the employee reach equilibrium, their beliefs should be fulfilled and if the worker chooses to maximize her effort, (4) should hold for

$\rho'=1$ . The condition for the employee to cooperate implies that her motivation for reciprocity must be such that:

$$Y_L \geq \frac{2C(\bar{e})}{\bar{e}(q-\bar{w})(\bar{w}-\underline{w}-\rho C(\bar{e}))} = Y_L^* > 0. \text{ There's a minimum threshold on the}$$

worker's preference for reciprocity that induces her whole cooperation when offered the high wage. This result tends to confirm the idea that reciprocal fairness should act as an enforcement device for cooperative behaviours in the employment relationship.

Moreover, if the employee chooses a low effort level, (4) should not hold for  $\rho'=0$ , which happens if:

$$Y_L < \frac{2C(\bar{e})}{\bar{e}(q-\bar{w})(\bar{w}-\underline{w})} = Y_L^{**} > 0. \text{ For reciprocity parameter types smaller than } Y_L^{**},$$

the worker always shirks. Note that since  $C(\bar{e})$  is positive,  $Y_L^{**} < Y_L^*$ . This implies that the more selfish the employee the most likely she will shirk.

For intermediate parameter values between  $Y_L^{**}$  and  $Y_L^*$ , a mixed equilibrium may exist, making the employee indifferent between shirking and maximizing her effort, given her type, that is if  $U_L^{\bar{e}} = U_L^{\underline{e}}$ . Then, given the worker's preference for reciprocity, her probability to select a high effort should be such that:

$$\rho = P(\bar{e}|\bar{w}) = \frac{\bar{w}-\underline{w}}{C(\bar{e})} - \frac{2}{Y_L \bar{e}(q-\bar{w})}, \text{ with the first member of this probability}$$

representing the relative surplus induced by a high compensation and the second one making the probability depend positively on the worker's preference for reciprocity.

The following figure summarizes the employee's behaviour according to her type.

**Figure 2: Employee's optimal behaviour according to her type**

		values of $Y_L$		
Wage offer	0	$Y_L^{**}$	$Y_L^*$	
$\underline{w}$		Always shirks : $\underline{e}$		
$\bar{w}$	$\underline{e}$	$P(e=\bar{e}) = \rho$		$\bar{e}$

These results are consistent with the assumption that reciprocal fairness may trigger the employee's cooperation. She maximizes her effort for sure only and only if her preference for reciprocity is large enough and with a probability positively linked to this preference when she is moderately motivated by reciprocity. However one can notice that the employee takes her decision observing the wage offer. Her lack of information lies only on her belief on the employer's intentions when offering her a high wage. It is more complicated for the employer, because he can only observe the employees' behaviour ex-post. We now show that this lack of information from the employer's point of view may thwart possible cooperation between some reciprocity motivated employers and employees. Recall that if reciprocal fairness prevails, two reciprocal players should always reach a cooperative equilibrium represented by a high wage and max effort. Let's now investigate the employer's behaviour given his employee's preferences for reciprocity.

#### 4.2 *Employer's optimal behaviour*

When choosing his strategy, the employer typically faces three types of employees as described in the previous paragraph.

For employees whose type is  $Y_L^{**}$  or below, the employer knows for sure that the worker is mostly motivated by her material payoffs and that she will shirk whatever the offer. Since he gets a zero material payoff with certainty, he pre-empts, proposing  $\underline{w}$ . The unique equilibrium should be  $(\underline{w}, \underline{e})$ , the SPNE of the game.

For employee's types  $Y_L$  equal to  $Y_L^*$  or above, that is when coupled with an unambiguously reciprocity motivated employee, the employer can expect the employee to choose  $\bar{e}$  if she is proposed  $\bar{w}$  and  $\underline{e}$  if proposed  $\underline{w}$ . The outcome of the game depends on the employer's own preference for reciprocity<sup>6</sup>. We can infer the conditions for the employer to select the high wage. His utility from both strategy can be expressed as:

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<sup>6</sup> See demonstration in the appendix

$$U_E^w = \begin{cases} U_E^{\bar{w}} = \pi_E(\bar{w}, \bar{e}) + Y_E \kappa_{EL}^{\bar{w}} \lambda_{ELE}^{\{(\bar{w}, \bar{e}), (w, e)\}} & \text{if } w = \bar{w} \\ U_E^{\underline{w}} = \pi_E(\underline{w}, \underline{e}) + Y_E \kappa_{EL}^{\underline{w}} \lambda_{ELE}^{\{(\bar{w}, \bar{e}), (w, e)\}} & \text{if } w = \underline{w} \end{cases} \quad (5)$$

Replacing the components by their value, the employer's utility function is given by:

$$U_E^w = \begin{cases} U_E^{\bar{w}} = \varepsilon \bar{e}(q - \bar{w}) + \frac{1}{4} Y_E (\bar{w} - \underline{w} - C(\bar{e})) (\varepsilon \bar{e}(q - \bar{w}) - (1 - \varepsilon) \bar{e}(q - \underline{w})) \\ U_E^{\underline{w}} = -\frac{1}{4} Y_E (\bar{w} - \underline{w} - C(\bar{e})) (\varepsilon \bar{e}(q - \bar{w}) - (1 - \varepsilon) \bar{e}(q - \underline{w})) \end{cases} \quad (6)$$

The employer systematically offers the high wage if the utility corresponding to this strategy is greater than the utility associated to the SPNE of the game, that is if  $U_E^{\bar{w}} > U_E^{\underline{w}}$ . This condition implies:

$$\bar{e}(q - \bar{w}) + \frac{1}{2} Y_E (\bar{w} - \underline{w} - C(\bar{e})) (\varepsilon \bar{e}(q - \bar{w}) - (1 - \varepsilon) \bar{e}(q - \underline{w})) > 0 \quad (7)$$

Several cases can be highlighted in the resolution of inequality (7). Beside the investigation of the conditions for a cooperative equilibrium, the distinction based on the sign of  $(\bar{w} - \underline{w} - C(\bar{e}))$  is useful to differentiate two main possible behaviours. Indeed, when  $(\bar{w} - \underline{w} - C(\bar{e}))$  turns negative, the actual profit to be proposed the high wage from the employee's point of view also turns negative. Why should then be some observed cooperative behaviours of effort maximizing? This particular case remains of interest because it corresponds to a peculiar situation where the higher wage may be coupled with some alteration of the labour contract per se. For instance, we can imagine that the high wage is paired with a different status inside the firm conferring the employee a lower management position where the number of hours worked per week is no longer specified. The higher wage means also longer hours in the firm which may result in the quantity  $(\bar{w} - \underline{w} - C(\bar{e}))$  turning negative. In spite of this, reciprocal

employees may respond by an effort increase as the high wage corresponds to a higher position inside the organization, hence a gift from the employer even though it does not materialize in terms of higher payoffs. It is then worth investigating both cases.

If  $(\bar{w} - \underline{w} - C(\bar{e})) > 0$ , (7) becomes

$$Y_E > -\frac{2(q - \bar{w})}{(\bar{w} - \underline{w} - C(\bar{e}))(\varepsilon''(q - \bar{w}) - (1 - \varepsilon'')(q - \underline{w}))} \quad (8)$$

When players reach equilibrium, their beliefs should be fulfilled and if the employer sets for  $\bar{w}$ , (8) should hold for  $\varepsilon''=1$ . The condition for the employer to always offer the high wage implies that his motivation for reciprocity must be such that:

$$Y_E > -\frac{2}{(\bar{w} - \underline{w} - C(\bar{e}))} = Y_E^* < 0 \quad (9)$$

By construction, the intrinsic reciprocity parameter is positive or null. Hence, this condition always holds.

If the employer opts for  $\underline{w}$ , (8) should not hold for  $\varepsilon''=0$ , that is for  $Y_E$  values given by:

$$Y_E > \frac{2(q - \bar{w})}{(q - \underline{w})(\bar{w} - \underline{w} - C(\bar{e}))} = \tilde{Y}_E^{**} > 0 \quad (10)$$

This condition seems counterintuitive since it suggests that a reciprocal employer tends to offer the low wage rather than trusting in a reward from the employee. The game structure is at the origin of this result. Indeed, at odds with the employee, the employer has the first hand in the game without observing past actions from the employee. At the first node of the game tree, the employer is unable to draw any accurate anticipation about the nature of the employee's actual

motivations. Mutual confidence acts as a constraint since just one party can assess intentions. We now turn to the computation of the critical thresholds for the particular case where the high wage is not actually associated with higher payoffs for the employee.

If  $(\bar{w} - \underline{w} - C(\bar{e})) < 0$ , (7) becomes

$$Y_E < -\frac{2(q - \bar{w})}{(\bar{w} - \underline{w} - C(\bar{e}))(\varepsilon''(q - \bar{w}) - (1 - \varepsilon'')(q - \underline{w}))} \quad (11)$$

When players reach equilibrium, the second order beliefs must be fulfilled. This implies that when the employer selects  $\bar{w}$ , the condition (11) should hold for  $\varepsilon''=1$  and should not hold for  $\varepsilon''=0$  when the employer opts for the low wage. These two conditions entail the following reciprocity thresholds:

$$Y_E < -\frac{2}{\bar{w} - \underline{w} - C(\bar{e})} = \tilde{Y}_E^* > 0 \text{ and } Y_E < \frac{2(q - \bar{w})}{((q - \underline{w})\bar{w} - \underline{w} - C(\bar{e}))} = Y_E^{**} < 0$$

The latter condition never holds by construction.

For threshold values beyond  $Y_E^* = -\frac{2}{\bar{w} - \underline{w} - C(\bar{e})}$ , one can find a mixed equilibrium making the employer indifferent between offering a high wage or a low wage, resolving  $U_E^{\bar{w}} = U_E^{\underline{w}}$  which yields the following probability:

$$\varepsilon = P(\bar{w} | \{(\bar{w}, \bar{e}), (\underline{w}, \underline{e})\}) = \frac{q - \underline{w}}{(q - \bar{w}) + (q - \underline{w})} - \frac{2(q - \bar{w})}{Y_E (\bar{w} - \underline{w} - C(\bar{e})) (2q - \bar{w} - \underline{w})} \quad (12)$$

From the employer's point of view, the main difference between the two cases lies in the fact that when  $(\bar{w} - \underline{w} - C(\bar{e})) > 0$ , the employer's behaviour implies no uncertainty, either he proposes the high wage or the low wage depending on his own preference for reciprocity compared to the theoretical threshold  $\tilde{Y}_E^{**}$ . In the

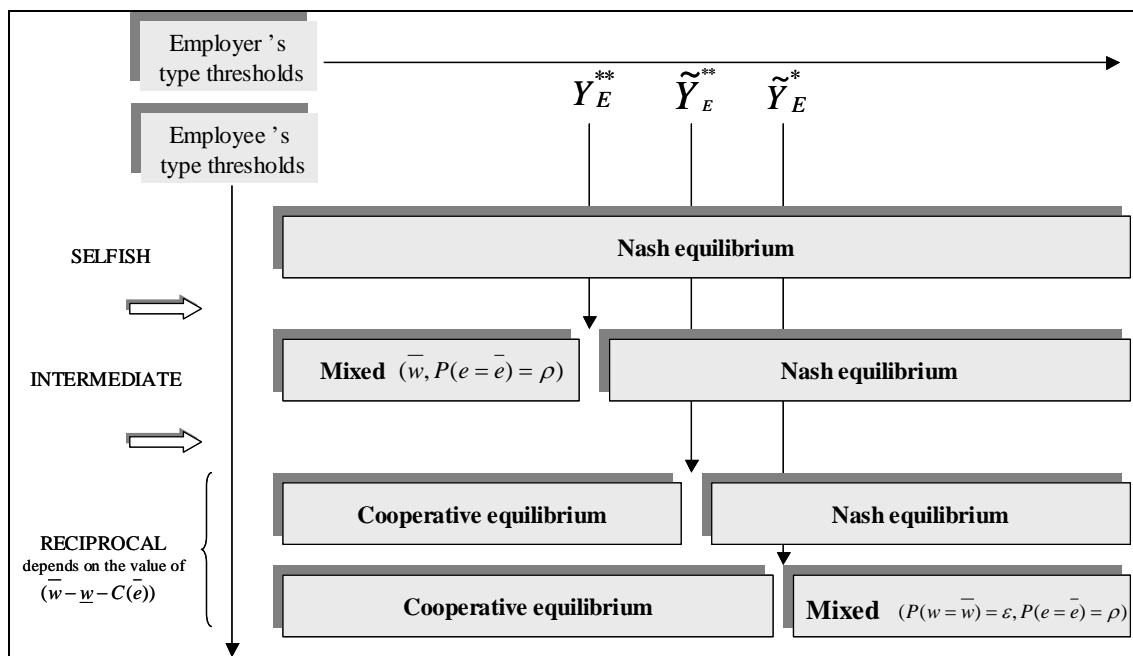
other case, the uncertainty is larger because only reciprocal employees reward a high wage offer with an effort increase.

A third case arises when the employee is no longer clearly motivated neither by reciprocity considerations nor by pure selfishness that is when his type is  $Y_L^{**} < Y_L < Y_L^*$ . Since the employee is more ambiguously motivated by reciprocity, the area of high wage proposal is rationally smaller. We can show that the employer offers the low wage so long as his preference for reciprocity is such that

$$Y_E > \frac{2\rho(q - \bar{w})}{(\bar{w} - \underline{w} - \rho C(\bar{e}))(q - \underline{w})} = Y_E^{**} > 0.$$

Given the two players' optimal behaviour structure, we can draw a typology of the possible equilibria for the game and highlight the conditions for the existence of mutual cooperation between the employer and the employee in this wage determination game according to their type. These conditions are summarized in the following figure.

**Figure 3: Theoretical equilibria of the gift exchange game**



The following comments may be made about the typology of equilibria in this game. First, reciprocity acts as a necessary condition for a cooperative equilibrium to occur in this gift giving game. So long as the employee's preference for reciprocity is greater than  $Y_L^*$ , she acts reciprocally which the employer anticipates. This first element tends to confirm the conclusion given by Fehr et al. (1996) on the reciprocal nature of the observed behaviours adopted by the subjects in their experiment.

Second, the behaviours remain qualitatively similar whether the high wage offer implies a positive or a negative real return for the employee. Reciprocal employees are more sensitive to the practice of the gift in itself than to the final material payoff attached to it. Fehr et al. (1996) observation of a positive relationship between the offered wage and the level of costly effort is then justified and may be attributed to reciprocity concerns exhibited by the employee. The model enables to show that whenever gift practices are set into a population of reciprocity motivated employees, its efficiency is guaranteed by the employees systematically maximizing their effort. However, the employee exhibits an aversion for strategic cooperation from the employer (as shown by the expression of  $\lambda_{LEL}^w$ ), especially if the real return attached to the high wage offer is low, that is if the opportunity cost of effort maximizing is rather large. This result implies that there exists an arbitration between the real return linked to the offer and the intention attributed to the employer. Therefore, there may exist an optimal value for this real return so that the employee's probability to cooperate is maximum. As a consequence, the positive relationship observed between wage and effort should reach a maximum determined by the actual gap between the two wage offers<sup>7</sup>. Beyond this optimal value, two elements contribute to shrink this probability. On the first hand, the greater the wage difference the greater the employee's material payoff. The condition on the reciprocity parameter gets then more constraining. On the other hand, for employees meeting the constraint on the reciprocity parameter, their type makes them more concerned by the employer's

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<sup>7</sup> Simulations of this same model in Mahuteau (2002) show that there actually exists optimal values for the level of the wage raise the employer should grant the employee for him to maximize the probability of mutual cooperation.

underlying intentions. The more attractive the offer, the less likely they consider the employer as being actually fair but rather strategic cooperators. Charness and Rabin (2002) show that strategic cooperators tend to be punished by their opponents in trust games and investment games experiments. Our model gives theoretical grounds to such observed behaviours.

Third, beside the employee's behaviour, the theoretical results point out that the major difficulty lies in the very appearance of the gift from the employer. Indeed, there exists a wide area for non-cooperative actions from a reciprocity motivated employer. Such actions would then immediately be punished by the employee, whatever her type and lead to the Subgame Perfect Nash Equilibrium of the game. The reason why the employer does not offer the gift lies in his misleading assessment of the employee's optimal strategy. This leads to self-fulfilling prophecies equilibria endangering the employment relationship's efficiency. This situation is due to the asymmetric structure of the game in terms of available information when the decisions must be made. The employee may determine the employer's fairness through the observation of his action whereas the employer must assess the employee's fairness without any tangible observation of her past action. The employer is founded in fearing shirking from the employee even after a  $\bar{w}$  offer. Provided the optimal behaviour of a selfish employer (strategic cooperation inducing a  $\bar{w}$  offer), the employee may then misleadingly interpret the employer's type if she receives  $\bar{w}$ . As a consequence, these *self-fulfilling prophecies* equilibria seem to have a strong theoretical stability since the two players are likely to stand into a trust less relationship. Because a reciprocal employer may fear to be assimilated to a strategic cooperator, the virtuous circle of the gift exchange practices may fail to actually appear.

The theoretical results highlight that the nature of the reciprocity match between the employer and the employee is crucial in determining the level of cooperation prevailing in the relationship. However, one must be aware that the model has been built so as to make the non-cooperative outcome the most attractive equilibrium for the players. Beside that, we can observe that stable gift exchange practices may arise between the employer and the employee, as long as the reciprocity threshold for the employer, which conditions the appearance of

self-fulfilling prophecies equilibrium, remains high enough. As suggested by Falk and Gächter (1998), the long term nature of the employment relationship may well alter the occurrence of such non-cooperative outcomes.

In the next section, we propose a direct evaluation of the gift exchange practices occurring between French employers and employees, taking into account the potential reciprocal aspect of both the decision to offer the gift and to increase productivity.

## **5. Estimation of the gift exchange hypothesis in the French context.**

We first describe our database and outline the econometric models we used to carry out the estimation of the gift exchange relationships between French employers and employees.

### *5.1. Database and econometric model*

Our estimations are based on the REPOSE 98 survey directed by the DARES,<sup>8</sup> French Ministry of Employment and Solidarity. This survey gathers a nationally representative sample of French workplaces of more than 20 employees up to 17,000. It includes both private and publicly owned establishments operating in the private sector and all activities except agriculture. Its structure is comparable to the British Workplace Employment Relations Survey (WERS) conducted in 1998 in that both managers and employees have been surveyed. Indeed, the data stem from two questionnaires. Managers of 2978 establishments were interviewed in a face-to-face context while 5 to 10% of the employees of each establishment were surveyed through self-completion questionnaires to be returned by mail. Altogether, 1792 manager interviews are matched with, at least, one returned employee questionnaire, representing 60.17% of the establishments.<sup>9</sup> 10304 employees have returned the questionnaire. Data obtained both on the employer and employee's side and the subjective nature of some of the questions make this

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<sup>8</sup> Direction de l'Animation de la Recherche, des Etudes et des Statistiques.

<sup>9</sup> Estimations have been carried out in order to ensure that the absence of returned questionnaires for the 1186 remaining establishments doesn't induce systematic biases.

database particularly rich for evaluating the impact of reciprocity considerations in the wage-effort relation. Moreover, questions related to themes like motivation, negotiation and conflicts are common between the employer and the employee. The survey also supplies variables in order to control for the effects related to the size, sector, capital structure, and to the type of manpower used in the firm (See Appendices for descriptive statistics of the variables used in the estimations).

Given the database, we propose a direct evaluation of the gift exchange practices between the employer and the employee, estimating the probabilities to observe productivity increases following upon the settlement of rent-sharing agreements in the firm.

Since the agents interpret the other's actions through the prism of their social motivations, costly reward behaviours may be rationally adopted by employers and employees. The theory implies that the agents found their behaviour on arbitrations between material payoffs and psychological gains, whose outcome depends on their level of motivation for reciprocity. Moreover, their behaviours are supposed to be direct reactions to their perception of their opponent's degree of fairness. On a practical point of view, this latter characteristic involves that the estimation should entail an endogeneity bias related to such perception. Indeed, one can no longer consider that individuals are randomly drawn from the population if one accepts the hypothesis that agents have their own preference for reciprocity and adjust their behaviour to their perception of fairness. This leads to incorporate the agents' assessment of the other party's fairness in the estimations of the probabilities to both offer rent-sharing agreements and increase productivity levels in response. The perception of the social climate over the past three years<sup>10</sup>, available for both agents, is used as a proxy describing how employers and employees feel toward each other (variable CLIMAT and CMWCLIMAT).

The correction of the potential endogeneity bias related to the perception of the other's reciprocity implies that one should estimate this perception and incorporate the estimated probabilities respectively in the estimation of the probability to offer rent-sharing agreements for the employer and the probability

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<sup>10</sup> The question is expressed as follows in the survey: "Do you reckon the social climate has been good in the firm for the past 3 years?".

to respond by an effort increase for the employee. However, one also needs to take into account the sequential nature of the gift exchange that leads to an asymmetry between the employer and the employee. Indeed, the employee decides upon his level of productivity after being proposed the rent sharing agreement while the employer makes her choice before observing the productivity gains, only relying on her subjective assessment of how the employee will respond. Thus, from the employees' standpoint, it is the observation of the employer's fairness that should be incorporated into the estimations rather than the expectation. The inclusion of the social climate variables in the estimations of both probabilities enables us to assess the behavioural consequences of the perceptions of fairness. If reciprocity actually matters, then we expect these perceptions to induce behavioural responses and to be the major determinants of the probabilities to offer rent-sharing agreements and increase productivity.

If an endogeneity bias due to the perceptions of fairness exists in the estimations, then one can accept the assumption that agents actually react to such perceptions. The employer should be more inclined to propose a rent sharing agreement if she has good feelings toward her employee. The latter should determine his productivity level in response to both the *gift* proposal but also to his observation of the employer's fairness.<sup>11</sup>

If the perception of the employee's assessed degree of fairness actually determines the employer's choice to propose rent-sharing agreements, the following model can describe the probability for the employer to set up such agreements:

$$Gift^* = Z\gamma + pemplc \alpha + \varepsilon, \text{ with } \begin{cases} Gift = 1 \text{ if } Gift^* > 0 \\ Gift = 0 \text{ if } Gift^* \leq 0 \end{cases} \quad (13)$$

$$Pemplc^* = R\xi + \nu, \text{ with } \begin{cases} Pemplc = 1 \text{ if } Pemplc^* > 0 \\ Pemplc = 0 \text{ if } Pemplc^* \leq 0 \end{cases} \quad (14)$$

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<sup>11</sup> Numerous experiments, notably on the investment game or the trust game, show that receiving a gift is not enough to provoke cooperation if the underlying intentions of the offerer are not clearly identified as not being purely strategically driven.

$Gift^*$  represents the probability for the employer to offer the rent-sharing agreement.  $Pemplc^*$  is a dichotomous variable indicating the employer's perception of a favourable social climate in the firm.  $\varepsilon$  is the error term. The influence of her perception of the employee's degree of fairness is measured by  $\alpha$ .  $R$  represents the set of the individual exogenous characteristics determining the employer's perception. Our assumption is that such perception of the employees is made up through the comparison with what is considered by the employer as fair behaviour. Consequently, variables suspected to be affecting this *norm*, such as the age of the firm, the number of employees, the characteristics of the product market should be significant.  $\nu$  is the error term associated to the estimation of this equation. If an endogeneity bias exists, it stems from an unobserved characteristic of the employer since it is related to her intrinsic motivation for reciprocity. Technically, the model described above involves that  $E[R \varepsilon] = 0$  but also that  $E[\nu \varepsilon] \neq 0$ <sup>12</sup>. A method for correcting this potential endogeneity bias consists in estimating the probability for the employer to perceive a favourable social climate using a binomial Probit model and keep the estimated probability vector as an instrument to evaluate the probability for the employer to propose rent-sharing agreements. The equation to be estimated in the second stage would then be:

$$Gift^* = Z\gamma + \hat{pemplc} \cdot \alpha + \varepsilon, \quad (15)$$

with  $\hat{pemplc}^* = R\hat{\xi}$ , the probability estimated at the first stage.

Once the second stage has been achieved, one needs to estimate the probability for the employee to increase his effort after being proposed rent-sharing agreements. One then estimates the following model:

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<sup>12</sup> An endogeneity bias stemming from observable factors would involve  $E[R_i \varepsilon_i] \neq 0$ , with  $E[\nu_i \varepsilon_i] = 0$ . In this case, the correction is simpler as it only consists in incorporating the variables  $R_i$  directly in the equation (See Barnow, Cain and Goldberger, 1996). This latter method is used for the case of the employee as he bases his perception of fairness on an observation.

$$produc^* = X\beta + \mathcal{G}, \text{ with } \begin{cases} produc = 1 \text{ if } produc^* > 0 \\ produc = 0 \text{ if } produc^* \leq 0 \end{cases} \quad (16)$$

The dichotomous variable *PRODUC* (productivity increases or not) is not observable if the employer has not introduced the rent sharing agreement. Yet, since the employer and the employees belong to the same firm, it is likely that their respective decision rely on common determinants. Thus, one needs to correct the selection bias potentially caused by the focus of the analysis only on the group of employees who benefited from the introduction of profit sharing.

A two-stage method, analogous to the one developed by Heckman (1979) may be used. This method takes the non-linear nature of the estimation into account. We first estimate the probability for the rent-sharing scheme to be adopted:

$$Gift^* = D\gamma + \varepsilon, \text{ }^{13} \text{ with } \begin{cases} Gift = 1 \text{ if } Gift^* > 0 \\ Gift = 0 \text{ if } Gift^* \leq 0 \end{cases} \quad (17)$$

We then focus on the probability for the employees to return the gift by a productivity increase, that is  $P(produc = 1 / Gift = 1) = P(produc / \varepsilon < D\gamma)$ .

$\mathcal{G}$  and  $\varepsilon$  are not independent since employer and employees' behaviour may be caused by common non observed elements. If we assume that  $\mathcal{G}$  and  $\varepsilon$  are distributed according to a bivariate normal distribution with  $\rho$  as correlation coefficient, then the expected value of the error term  $\mathcal{G}$ , provided that the employer has introduced the profit sharing scheme, can be defined by:  $E(\mathcal{G} / \varepsilon < D\gamma) = \rho\lambda$ , with  $\lambda$ , the inverse of the Mill's ratio obtained in the selection equation. The  $\lambda$  vector must then be incorporated as an explanatory variable in the estimation of the probability to observe productivity increases in order to ensure  $E(\tilde{\mathcal{G}} / \varepsilon < D\gamma) = 0$ . However the introduction of the inverse of the Mill's ratio in the second equation does not allow us to obtain an unbiased

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<sup>13</sup>  $D$  includes  $Z$  and  $\hat{p}_{emplyc}$

estimation of the coefficients  $\beta$ . A correction must be added in order to take the latent characteristic of the dependent variable (*Produc\**) into account, as we cannot observe all the realisations of this random event.<sup>14</sup>

If the second equation is estimated directly:

$$produc^* = X\beta + \rho\lambda + \tilde{\mathcal{G}} \quad (18)$$

one gets  $E(\tilde{\mathcal{G}}/\varepsilon < D'\gamma) = 0$ , but also  $Var(\tilde{\mathcal{G}}/\varepsilon < D'\gamma) = 1 - \rho^2\lambda(D'\gamma - \lambda) = \tau^2$ . Thus a consistent estimation of  $\beta$  and  $\rho$  implies that we render  $Var(\tilde{\mathcal{G}}/\varepsilon < D'\gamma)$  constant. The method then consists in dividing the equation by  $\tau$ <sup>15</sup> (See Van de Ven and Van Praag 1981). The following model provides a consistent estimation:

$$\begin{cases} produc = 1 & \text{if } \left(\frac{X}{\hat{\tau}}\right) \beta + \rho \left(\frac{\hat{\lambda}}{\hat{\tau}}\right) + \mathcal{G} > 0 \\ produc = 0 & \text{if } \left(\frac{X}{\hat{\tau}}\right) \beta + \rho \left(\frac{\hat{\lambda}}{\hat{\tau}}\right) + \mathcal{G} \leq 0 \end{cases} \quad (19)$$

with  $E(\mathcal{G}/\varepsilon < D\gamma) = 0$  and  $Var(\mathcal{G}/\varepsilon < D\gamma) = 1$ .  $\hat{\lambda}$  is a consistent estimator of  $\lambda$  given by the selection equation.  $\hat{\tau}$  is computed through the consistent estimation of  $\rho$ ,  $\hat{\rho}$  obtained by OLS.

## 5.2. Results

This section is organised as follows. We first present the results of the estimations on the employer's perception of the social climate in the firm. We then estimate the impact this perception produces on the employer's probability to offer rent-sharing agreements. Finally we evaluate the probability for the employees to react

<sup>14</sup> Through the observation of *Produc*, we only observe whether  $Produc^* > 0$  or  $Produc^* < 0$ .

<sup>15</sup> An alternative method would simply consist in estimating the conditional probability through a bivariate Probit model. Both methods have been used and produced qualitatively similar results.

positively to the introduction of rent-sharing agreements by way of productivity increases.

### 5.2.1 *Determinants of the employer's perception of the employee's fairness*

The results of the estimations of the employer's perception of the employee's degree of fairness are reported in the Appendices. They show that the size of the firm negatively influences the employer's perception. A plausible explanation is that the size effect leads to a partial loss of control and observation of the employees' actions, favouring, from the employer's point of view, the adoption of non-cooperative behaviours. Likewise, the age of the firm alters the perception of the social climate. Young firms are likely to be free of many of those unwritten rules that constitute the so-called *equity norm*, which may frustrate managers in their human resources policies and contribute in giving them a bad feeling about their employees.

The variables related to the economic environment faced by the firm (CROISS, STABLE, VARIAT) show that the stability or increase of the volume of activity improves the perception while unexpected changes produce the reverse effect. Likewise, the adoption of a *total quality* policy (QUALTOT) leads to a better perception of the social climate. Through the variables PRIMI and PRIMCO, one can see that the employer believes in the potential positive effect of the introduction of individualized premiums. Concerning the variables related to the beliefs of what determines the employee's motivation, the employer reckons that the lack of recognition is damaging for the perception of the social climate. The negative sign obtained for NCMANREC shows that the employer's perception of the employee's fairness is degraded when the non-white collar workers suffer from a lack of recognition inside the firm.

Given the estimated probabilities for the employer, we now have to demonstrate that these perceptions lead to actual behavioural consequences and are susceptible to alter the employer's decision to offer rent-sharing agreements.

### 5.2.2 *Probability to offer rent-sharing agreements*

We seek for the elements determining the choice to introduce profit sharing in the employee's remuneration package. This decision is taken according to the objective and subjective elements at the employer's disposal. The explanatory variables then stem from the employer's database. We introduce the characteristics of the firm, its economic environment, variables related to the human resource management practices in use and the subjective variables related to the employer's belief on the employees' fairness and on the determinants of their motivation. The following table presents the results obtained for the selection equation.

**Table 1: Estimation of the probability to introduce profit sharing agreements**

Dependent variable: INTERE, "In 1998, you adopted a general agreement introducing profit sharing in the remuneration package".

	Variable	Designation	Coefficient	std	Marginal effects	std	
Variable related to the economic environment and characteristics of the firm	PRIVE	<i>The firm belongs to the private sector</i>	<b>0.4565</b> <sup>***</sup>	0.169	<b>0.1711</b> <sup>***</sup>	0.058	
	FEMMES	<i>Percentage of women in the firm</i>	<b>-0.0023</b> <sup>*</sup>	0.001	<b>-0.0009</b>	0.001	
	LOGSALET	<i>Logarithm of the number of employees in the firm</i>	<b>0.0971</b> <sup>**</sup>	0.038	<b>0.0384</b> <sup>**</sup>	0.015	
	LOGAGE	<i>Logarithm of the age of the firm</i>	<b>0.1645</b> <sup>**</sup>	0.081	<b>0.0651</b> <sup>**</sup>	0.032	
	MULTI	<i>The firm has multiple establishments</i>	<b>0.1961</b> <sup>***</sup>	0.072	<b>0.0773</b> <sup>***</sup>	0.028	
	SOUTRAI	<i>During the past 3 years, you greatly developed subcontracting and externalisations</i>	<b>0.3470</b> <sup>***</sup>	0.082	<b>0.1376</b> <sup>***</sup>	0.033	
	QUALTOT	<i>The firm has adopted a total quality policy.</i>	<b>0.1408</b> <sup>*</sup>	0.076	<b>0.0556</b> <sup>**</sup>	0.030	
	CLIENT	<i>In 1998, the main client represented at least 25% of the firm's activity.</i>	<b>-0.1088</b> <sup>ns</sup>	0.074	<b>-0.0431</b> <sup>ns</sup>	0.029	
	STRATPRI	<i>In order to compete with other firms did you set a strategy based on price competition in your main activity?</i>	<b>0.1593</b> <sup>*</sup>	0.086	<b>0.0633</b> <sup>*</sup>	0.034	
	DIFRECR	<i>In 1998, The employer had difficulties to hire some categories of employees</i>	<b>-0.2068</b> <sup>***</sup>	0.073	<b>-0.0819</b> <sup>***</sup>	0.029	
Compensation policies inside the firm	EVCOUVR	<i>The number of workers has increased during the last 3 years</i>	<b>-0.0924</b> <sup>ns</sup>	0.088	<b>-0.0365</b> <sup>ns</sup>	0.035	
	OBJCOUT	<i>In 1998, detailed and quantified goals have been drawn in terms of wage costs</i>	<b>0.2055</b> <sup>**</sup>	0.095	<b>0.0803</b> <sup>**</sup>	0.037	
	RESFI	<i>Your main criteria to decide for wage raises is the financial result of the firm</i>	<b>0.2603</b> <sup>***</sup>	0.102	<b>0.1014</b> <sup>***</sup>	0.039	
	PRIMI	<i>In 1998, all the employees benefited from premiums based on their individual performance</i>	<b>0.2427</b> <sup>***</sup>	0.083	<b>0.0954</b> <sup>***</sup>	0.032	
	PRIMCO	<i>In 1998, all the employees benefited from premiums based on collective performance</i>	<b>0.6085</b> <sup>***</sup>	0.072	<b>0.2379</b> <sup>***</sup>	0.027	
	NAUGMI	<i>In 1998, the blue collars benefited from individualized raises others than premiums</i>	<b>0.1699</b> <sup>*</sup>	0.089	<b>0.0668</b> <sup>*</sup>	0.035	
	Belief on the employee's kindness	INDPROD	<i>The employer considers the productivity level as the main criteria to judge the social climate in the firm</i>	<b>-0.2118</b> <sup>*</sup>	0.128	<b>-0.0824</b> <sup>*</sup>	0.049
		PEMPLC	<b>Employer's estimated probability: Probability to perceive a good social climate.</b> <i>It's the hope of getting promoted that determines the implication of the blue collars in their work (according to the employer)</i>	<b>0.7813</b> <sup>**</sup>	0.347	<b>0.3092</b> <sup>**</sup>	0.137
	Determinants of the employee's motivation	NCESPROM	<i>It's the lack of recognition that demobilizes the blue collars (according to the employer)</i>	<b>0.2635</b> <sup>**</sup>	0.114	<b>0.1048</b> <sup>**</sup>	0.045
		NCMANREC	<i>Information on the evolution of the employment perspectives are given to the employees of the firm</i>	<b>0.1249</b> <sup>ns</sup>	0.102	<b>0.0496</b> <sup>ns</sup>	0.041
Variables of information and negotiation	EVEMP	<i>In 1998 negotiations about the wage level were held with the employees' representatives about the wage level</i>	<b>0.1813</b> <sup>**</sup>	0.074	<b>0.0714</b> <sup>**</sup>	0.029	
	NEGSL99	<i>During the 3 last years, there's been a conflict taking the form of extra hours refusals</i>	<b>0.3385</b> <sup>***</sup>	0.083	<b>0.1327</b> <sup>***</sup>	0.032	
	HSUP	<i>Constant</i>	<b>-0.3261</b> <sup>*</sup>	0.176	<b>-0.1247</b> <sup>*</sup>	0.064	
	ONE	<i>Constant</i>	<b>-3.1204</b> <sup>***</sup>	0.505	<b>-1.235</b> <sup>***</sup>	0.199	
Number of observations:	1546	% of correctly predicted:	69.92%	LR <sub>H</sub> test statistic:	69.31		
Log Likelihood:	-883.50	LR test statistic (restricted vs. Non restricted model):	367.08	Significance:	0.0000016		
Restricted (Log L <sub>R</sub> ):	-1067.40	Significance:	0.0000000	LM test statistic:	415.95		
Pseudo R <sup>2</sup> (Mc Fadden):	17.23%	Log Likelihood with heteroskedasticity correction:	-848.84	Significance:	0.0000000		
<b>Model without expected employee's fairness against model with PEMPLC:</b>	Log Likelihood (without PEMPLC):	-892.34	$\chi^2(22)$ stat:	17.676	Significance:	0,774819	

The results show that the employer's belief on the employee's kindness greatly influences her probability to offer profit sharing agreements. Indeed, the test of the restricted model without the perception (without PEMPLC) against the model incorporating this variable gives a large superiority to the latter. One can notice that the coefficient associated to this belief is positive, confirming that the more the employee is considered fair, the more likely the profit sharing agreement is adopted. Accordingly to our assumptions this result enables us to conclude that the perception of the employee's kindness plays a major role in the employer's decision to set up a profit sharing scheme. The results show that the economic environment faced by the firm as well as the wage policies already in use greatly influence her decision.

The age and size of the firm favour the adoption of profit sharing. This kind of incentive scheme is more typical for large firms since this type of agreement (at least in France) is meant to restore equity among the employees in terms of participation in the firm's growth. Beside the gift practice in itself, adopting an agreement on profit sharing is also a means for the employer to signal and ensure transparency in the gift practice. This is a non-negligible aspect since the employees are generally perfectly informed on their colleagues' earnings<sup>16</sup> and might develop an aversion not to be equally treated as compared to the other members of their group<sup>17</sup>, as suggested in numerous theoretical contributions on inequality aversion (e.g., Fehr and Schmidt 1999; Bolton and Ockenfels 2000). The introduction of a profit sharing scheme stemming from a negotiation enables to avoid the potential troubles linked to a less formal gift practice (perception of favouritism, etc.). These side effects would be exacerbated in the context of older and larger firms where many different categories of employees, in terms of age and qualification, interact. The effect of the variable MULTI relies on the same principle.

Moreover, if the firm has greatly externalised some of her activities through subcontracting, profit sharing is more likely to be adopted. Here, the willingness

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<sup>16</sup> For instance, Krueger and Rouse (1998) notice that the employees are fully aware of their colleagues' compensation. They are able to estimate it with an average error of 21%.

<sup>17</sup> In the definition of the equity norm we can suppose that some horizontal comparisons among employees also exist.

to focus on the core activities yielding the highest added value for the firm may be accompanied by a concern for conserving the skills and know-how needed for these activities. The coefficient obtained for QUALTOT confirms this idea. On the contrary, if the firm develops some exclusive relations with one unique client (the variable CLIENT may be considered as indicating that the firm is more like a subcontractor for this client), the probability to adopt profit sharing is reduced. In that case, we can imagine that the firm tries to cut down the costs in order to provide the most competitive service and remain in business with this main client.

The coefficient obtained for DIFRECR is relatively counter-intuitive. Indeed, it seems to show that difficulties for recruiting some employees incurred by the firm lead to a smaller probability to propose profit sharing. It seems more accurate to invert the causality in this case, assuming that it is because no profit sharing scheme has been adopted that the firm had difficulties to hire some categories of personnel. However, nothing in the estimations enables us to favour one direction of causality more than the other.

Given the results obtained for the variables related to the wage policies already in use in the firm, it seems that the rent sharing can be considered as representing a more elaborate form of gift. Although good financial results are prerequisites for implementing rent sharing agreements (RESFI), the probability is increased if alternative incentive schemes were previously tested in the workplace (PRIMCO, NAUGMI). Rent sharing then appears to be introduced once the efficiency of various, less formal, incentives have been assessed. Rent-sharing practices are not incompatible with the existence of individualized premium policies. On the contrary if the latter already exists, the probability is increased. The two schemes are complementary in the sense that, being inciting, they limit the variance of the remuneration. A large earnings heterogeneity might create some tensions between employees, some of them feeling unfairly treated. Collective agreements on the adoption of rent sharing generally stem from a negotiation starting with the employees' claim to define a formal, more equitable framework for the collective premiums. Therefore, it is not contradictory to have both rent-sharing practices and the definition of detailed and quantified goals in terms of labour costs

(variable OBJCOUT). This result actually reinforces the idea that both parties understand the cost minimizing aspects of the rent sharing incentive.

In her decision, the employer incorporates her belief on the determinants of the employee's motivation in her work. The coefficients associated to NCESPROM and NCMANREC indicate that the employer may find in the rent sharing a solution to the employees' recognition need, especially for the blue-collar workers.

The results highlight that the probability to adopt rent sharing also depends on the variables related to the previous negotiations and conflict that occurred in the firm. The existence of previous negotiations on the wage level favours the introduction of rent sharing while conflicts taking the form of refusals to work extra hours produce the opposite effect. The latter event may convey a negative signal leading the employer to question the expected positive effect on productivity of the introduction of rent sharing.

The estimation then enables to corroborate the assumption that the anticipation of the employee's kindness greatly determines the adoption of rent sharing. Moreover, this form of gift is used in addition to other incentives; there is no substitution between collective and individual policies.

### 5.2.3 *Does rent sharing lead to productivity increases?*

For one to conclude that reciprocity considerations actually influence the employees of our database, the results must show that productivity gains are direct consequences of the employer's gift. Moreover, the variable related to the employee's observation of the employer's kindness should be significant and have a positive coefficient. Indeed, under such conditions productivity increases constitute an actual reaction to both the perception of the employer's fairness and the observation of her action.

**Table 2: Estimation of the probability to obtain productivity increases after setting up rent-sharing agreements.**

Dependent variable: **PRODUC**, "Have you observed productivity increases after the introduction of profit sharing?".

	VARIABLE	DESIGNATION	Coef	std	Marginal effects	std	
Individual characteristics	CDON	<i>Inverse of the Mill's ratio</i>	<b>2,7138***</b>	0,320	<b>0.1433***</b>	0.0359	
	CLOGMWAG	<i>Logarithm of the employee's age (mean of the employees in the firm)</i>	<b>0,2566</b>	0,419	<b>0.0135</b>	0.0219	
	CDIPLO	<i>Highest diploma: 1 for: autodidact, 2 for: certificat d'études, 3 for: BEPC (TAFE) 4 for: CAP- BEP (TAFE, higher level) 5 for: Baccalauréat,(HSC) 6 for: Bac +2 (undergraduate) 7 for: Bac +3 ou +4(Bachelor or Masters) 8 for: greater than Bac +4 (Honours and more)</i>		<b>0,0264</b>	0,056	<b>0.0014</b>	0.003
		CFEMMES	<i>Percentage of women in the firm</i>	<b>-0,0019</b>	0,002	<b>-0.0001</b>	0.0001
		CSTRATP	<i>In order to compete with the other firms price competition has been introduced in the main activity</i>	<b>0,2577**</b>	0,124	<b>0.0136*</b>	0.0081
		CECOENT	<i>Information about the economic situation of the firm is directly given to the employees</i>	<b>0,5439***</b>	0,173	<b>0.0287**</b>	0.0131
		CEVEMP	<i>Information on the evolution of the employment perspectives are given to the employees of the firm</i>	<b>0,3975***</b>	0,139	<b>0.021**</b>	0.0102
		CFORMPR	<i>Information on the possibilities of training in the firm are given to the employees</i>	<b>-0,2760**</b>	0,114	<b>-0.0146*</b>	0.0078
Variables of information diffusion inside the firm	CLOGPRIM	<i>Logarithm of the annual premiums received by the employee</i>	<b>0,0023</b>	0,030	<b>0.0001</b>	0.0016	
	CLOGSALAI	<i>Logarithm of the annual wage</i>	<b>0,2246</b>	0,192	<b>0.0119</b>	0.0104	
	CMWNEG98	<i>In 1998, there's been a negotiation with the representatives about the wages</i>	<b>0,1548</b>	0,147	<b>0.0082</b>	0.0084	
Employer's fairness	CMWCLIMAT	<i>The employee considers the social climate as good:</i>	<b>0,2808**</b>	0,120	<b>0.0148*</b>	0.0081	
Variables related to the determinants of motivation	CMWGAMB	<i>It's the work atmosphere that demobilizes the employee</i>	<b>-1,0443*</b>	0,606	<b>-0.0551</b>	0.0369	
	CMWGAUTO	<i>It's the lack of autonomy that demobilizes the employee</i>	<b>-0,9788</b>	0,673	<b>-0.0517</b>	0.0395	
	CMWPROM	<i>It's the hope of being promoted that conditions the employee's implication in her work</i>	<b>0,7847***</b>	0,265	<b>0.0414**</b>	0.0191	
	CMWRISK	<i>Subjective risk to be laid off: 1 for: the employee thinks he has a great chance to be laid off in the near future. 0 for: otherwise.</i>		<b>-0,3198</b>	0,201	<b>-0.0169</b>	0.0119
		ONE	<i>Constant</i>	<b>-5,5982***</b>	0,761	<b>-0.2955***</b>	0.0765
Number of observations:		1460	% of correctly predicted:	82,05%	LR <sub>H</sub> test statistic:	38,0882	
Log Likelihood:		-447,0704	LR test statistic (restricted vs. Non restricted model):	512,7837	Significance:	0,0014701	
Restricted (Log L <sub>R</sub> ):		-703,4622	Significance:	0,0000000	LM test statistic:	960,9313	
Pseudo R <sup>2</sup> (Mc Fadden):		36,45%	Log Likelihood with heteroskedasticity correction:	-428,0263	Significance:	0,0000000	

The major result of this estimation is that individual characteristics and compensation variables do not significantly influence the probability to observe productivity increases following the gift practice. Thus, it is impossible to identify either a particular category of employee, a type of job, a diploma level or even an age category more likely to increase the productivity level facing the implementation of rent-sharing agreements. Moreover, it appears that material considerations (in terms of volume) don't impact on the probability, as shown by the compensation variables.

The coefficient obtained for the inverse of the Mill's ratio confirms the existence of a selection bias related to the introduction of the rent-sharing agreements. A direct link may then be drawn between the introduction of rent-sharing and productivity gains. However, as suggested by the theory, the employee is concerned with the employer being fair in her gift offer (CMWCLIMAT). This latter result is compatible with the experimental results above-mentioned, showing that obvious strategic cooperation is usually less rewarded than actually sincere actions. The decision to increase productivity is then mainly determined by a reaction toward the employer's very choice to introduce rent-sharing agreements, which is compatible with the predictions. Thus, it seems that reciprocity considerations are strong enough to induce costly reward actions from the employees in return to the gift offered by the employer.

The variables related to the non-material determinants of the employee's implication in his work enable to account for the behavioural consequences of the employees' heterogeneity in terms of motivation, i.e. of their type. The employee who bases her motivation on a search for promotions intrinsically incorporates the positive relation between wage and effort in her arbitration. Even though the rent sharing is based on collective performances, it produces enough incentives for that kind of employee as shown by the coefficient of CMWPROM. However, the fact that some other variables related to the employee's motivation are not significant involves that the rent-sharing does not represent an adequate response for some kind of employees to have them raise their productivity. For example, the collective aspect of this incentive scheme might frustrate those who found their implication on a recognition need. Likewise, those who suffer from too much

pressure on the workplace or from a lack of autonomy seem to be indifferent to that kind of measure (variables CMWGAMB and CMWGAUTO).

## **6. Conclusion**

The direct estimations of gift exchange practices in the employment relationship leave room for the expression of reciprocity concerns exhibited by both the employer and the employee as suggested by the theoretical predictions. These concerns appear to be strong enough to produce behavioural consequences compatible with the agent's perception of how fair they are being treated in the firm. Indeed, the employer is more likely to decide to set up rent-sharing agreements if her belief on the employee's kindness is favourable and the employee also determines her decision to cooperate according to her observation of the employer's kindness. Thus our central assumption stating that reciprocity considerations would be the catalyst of the agents' cooperation in the employment relationship is corroborated by the estimations on the REPOSE 98 survey. The observed positive relationship between rent-sharing and productivity raises can actually be attributed to the reciprocity considerations exhibited by the agents. This gives indication that agents are more focused on the compliance to the norms established in the firm rather than on the level of the variables of interest, notably the wage. Altogether, the observation that elements peculiar to the firm's environment conditions both the perception of fairness and the choice to implement rent-sharing schemes make Akerlof and Yellen's fair-wage effort hypothesis a suitable explanation of the persistence of non-compensating wage differentials among industries and firms. Since the norms considered fair are not only defined at the level of the firm (according to its age, size, employee's seniority, etc.) but also condition reward behaviours, two similar employees belonging to different firms may rationally receive a rather different compensation without inducing voluntary mobility between firms.

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## Appendix 1. Employer's utility function when coupled with a reciprocity motivated employee: demonstration

For  $Y_L > \frac{2C(\bar{e})}{\bar{e}(q-\bar{w})(\bar{w}-\underline{w}-\rho C(\bar{e}))}$ , that is when paired with an unambiguously fair employee.

In that case, the employer can give at least  $\underline{w}$  and a maximum of  $\bar{w} - C(\bar{e})$  to a reciprocity motivated the employee. The *equitable payoff* is then defined by  $\pi_L^{eq} = \frac{1}{2}(\bar{w} - \underline{w} - C(\bar{e}))$ , and the employer's kindness of proposing  $\bar{w}$  is :  $\kappa_{EL}^{\bar{w}} = \frac{1}{2}(\bar{w} - \underline{w} - C(\bar{e}))$  and his kindness (or unkindness) of proposing a low wage offer is :  $\kappa_{EL}^{\underline{w}} = -\frac{1}{2}(\bar{w} - \underline{w} - C(\bar{e}))$ .

As in the investigation of the employee's behaviour, one needs to give an expression of the employer's belief on employee's kindness to write his utility function. For that purpose one need the employer's belief on worker's belief on his choice. Let's call  $\varepsilon$  this second order belief of proposing  $\bar{w}$ . In this case, the employer thinks that the worker gives him  $\varepsilon'' \bar{e}(q-\bar{w}) + (1-\varepsilon'') 0$  choosing her equilibrium strategy  $\{(\bar{w}, \bar{e}), (\underline{w}, \underline{e})\}$ . If the worker always chooses the high effort level whatever the offer, the employer can get a material payoff of  $\varepsilon'' \bar{e}(q-\bar{w}) + (1-\varepsilon'') \bar{e}(q-\underline{w})$  and on the contrary, if the worker always shirks, he gets a zero material payoff. The *equitable payoff* is then  $\pi_E^{eq} = \frac{1}{2}(\varepsilon'' \bar{e}(q-\bar{w}) + (1-\varepsilon'') \bar{e}(q-\underline{w}) + 0)$ .

The employer's belief on the employee's kindness towards him when she shirks when proposed  $\underline{w}$  and selects  $\bar{e}$  when proposed  $\bar{w}$  ( $\lambda_{ELE}^{\{(\bar{w}, \bar{e}), (\underline{w}, \underline{e})\}}$ ) can be expressed as the employer's material payoff when his opponent is reciprocity motivated minus the *equitable payoff* from the employer's point of view, provided that we are now on the first nod of the game tree.  $\lambda_{ELE}^{\{(\bar{w}, \bar{e}), (\underline{w}, \underline{e})\}}$  can be expressed as follows :

$$\lambda_{ELE}^{\{(\bar{w}, \bar{e}), (\underline{w}, \underline{e})\}} = \frac{1}{2} \varepsilon'' \bar{e}(q-\bar{w}) - \frac{1}{2} (1-\varepsilon'') \bar{e}(q-\underline{w})^{18}$$

Given  $\kappa_{EL}^{a_i}$ ,  $a_i \in \{\bar{w}, \underline{w}\}$  and  $\lambda_{ELE}^{\{(\bar{w}, \bar{e}), (\underline{w}, \underline{e})\}}$ , the employer's modified utility function can be expressed as follows :

- if he proposes  $\bar{w}$  :

$$U_E^{\bar{w}} = \pi_E(\bar{w}, \bar{e}) + Y_E \kappa_{EL}^{\bar{w}} \lambda_{ELE}^{\{(\bar{w}, \bar{e}), (\underline{w}, \underline{e})\}}, \text{ which yields :}$$

$$U_E^{\bar{w}} = \varepsilon'' \bar{e}(q-\bar{w}) + \frac{1}{4} Y_E (\bar{w} - \underline{w} - C(\bar{e})) (\varepsilon'' \bar{e}(q-\bar{w}) - (1-\varepsilon'') \bar{e}(q-\underline{w}))$$

- if he proposes  $\underline{w}$  :

$$U_E^{\underline{w}} = \pi_E(\underline{w}, \underline{e}) + Y_E \kappa_{EL}^{\underline{w}} \lambda_{ELE}^{\{(\bar{w}, \bar{e}), (\underline{w}, \underline{e})\}}, \text{ which yields :}$$

$$U_E^{\underline{w}} = -\frac{1}{4} Y_E (\bar{w} - \underline{w} - C(\bar{e})) (\varepsilon'' \bar{e}(q-\bar{w}) - (1-\varepsilon'') \bar{e}(q-\underline{w}))$$

<sup>18</sup>  $\lambda_{ELE}$  is unique because a reciprocity motivated employee plays only one equilibrium strategy.  $\{(\underline{w}, \underline{e}); (\bar{w}, \bar{e})\}$

## Appendix 2. Estimation of the employer's perception of the employee's degree of fairness

Binomial PROBIT model:	
Dependent variable: CLIMAT, "The social climate in the firm is rather good".	
Estimation by maximum likelihood	
Number of observations:	1761
Log Likelihood (Log L):	-652,9314
Restricted Log Likelihood (Log L <sub>R</sub> ):	-721,1902
Pseudo R <sup>2</sup> :	9,46%
Percentage of correctly predicted variables	85,92%
Degrees of freedom	17
LR test statistic (restricted model against non restricted)	136,5177
Significance	0,000000
Log likelihood with correction of heteroskedasticity	-636,8143
LR <sub>H</sub> test statistic	32,2342
Significance	0,0014
LM test statistic	103,9354
Significance	0,000000

Variable	Designation	Coef	Std	t	P[ Z >z]
ONE	Constant	<b>1,179***</b>	0,285	4,140	<b>0,0000</b>
PRIVE	The firm belongs to the private sector :1 for: yes	<b>0,251</b>	0,162	1,549	<b>0,1213</b>
LOGAGE	Logarithm of the firm's age	<b>-0,208**</b>	0,096	-2,157	<b>0,0310</b>
LOGSALET	Logarithm of the number of employees	<b>-0,140***</b>	0,038	-3,739	<b>0,0002</b>
CAPAMOB	It's the capacity of the employees to mobilize themselves that determines the credibility of their representatives 1 for: yes	<b>-0,448**</b>	0,196	-2,286	<b>0,0223</b>
EVCOUVR	During the last 3 years, the number of workers (blue collar) has increased: 1 for: yes	<b>0,340***</b>	0,105	3,241	<b>0,0012</b>
EVCADRR	During the last 3 years, the number of white collars has increased: 1 for: yes	<b>-0,216**</b>	0,087	-2,473	<b>0,0134</b>
CROISS	During the last 3 years, the firm's activity has greatly increased: 1 for: yes	<b>0,580***</b>	0,110	5,290	<b>0,0000</b>
STABLE	During the last 3 years, the firm's activity has remained stable: 1 for: yes	<b>0,418***</b>	0,115	3,636	<b>0,0003</b>
VARIAT	In 1998, there's been an unusual variation in the firm's activity: 1 for: yes	<b>-0,250***</b>	0,082	-3,053	<b>0,0023</b>
CHPSAL	During the last 3 years, there's been radical compensation policy changes: 1 for: yes	<b>-0,244**</b>	0,110	-2,211	<b>0,0270</b>
PRIMI	In 1998, all the employees have been offered individual performance related premiums: 1 for: yes	<b>0,168**</b>	0,083	2,017	<b>0,0437</b>
CSALAIR	In 1998, the white collar have received a general raise: 1 for: yes	<b>0,132*</b>	0,080	1,651	<b>0,0988</b>
ECVSAL	The firm spreads information on the wages evolutions: 1 for: yes	<b>0,228***</b>	0,079	2,884	<b>0,0039</b>
INDTURN	The employer considers the level of employment turnover in the firm as the main indicator of the social climate: 1 for: yes	<b>0,419**</b>	0,205	2,044	<b>0,0410</b>
CRAINEMP	It's the threat of being laid off that motivates the employee in her work:	<b>0,187<sup>ns</sup></b>	0,128	1,463	<b>0,1434</b>
NCMANREC	It's the lack of recognition that demobilizes the employees:	<b>-0,235**</b>	0,105	-2,233	<b>0,0255</b>
QUALTOT	The firm is involved into a total quality policy.	<b>0,121<sup>ns</sup></b>	0,083	1,446	<b>0,1482</b>

Actual	Predicted		Total
	0	1	
0	7	244	251
1	4	1506	1510
<b>Total</b>	11	1750	1761

### Appendix 3. Descriptive statistics, variables used in the estimation of the employer's perception of the social climate

Variable	Designation	mean	Std	min	max	nb obs
PRIVE	<i>The firm belongs to the private sector : 1 for: yes</i>	0,947	0,223	0	1	1786
LOGAGE	<i>Logarithm of the firm's age</i>	1,158	0,451	0	1,609	1782
LOGSALET	<i>Logarithm of the number of employees</i>	4,803	1,112	2,996	9,210	1792
CAPAMOB	<i>It's the capacity of the employees to mobilize themselves that determines the credibility of their representatives 1 for: yes</i>	0,030	0,171	0	1	1792
EVCOUVR	<i>During the last 3 years, the number of workers (blue collar) has increased: 1 for: yes</i>	0,245	0,430	0	1	1792
EVCADRR	<i>During the last 3 years, the number of white collars has increased: 1 for: yes</i>	0,317	0,465	0	1	1792
CROISS	<i>During the last 3 years, the firm's activity has greatly increased: 1 for: yes</i>	0,538	0,499	0	1	1778
STABLE	<i>During the last 3 years, the firm's activity has remained stable: 1 for: yes</i>	0,323	0,468	0	1	1778
VARIAT	<i>In 1998, there's been an unusual variation in the firm's activity: 1 for: yes</i>	0,410	0,492	0	1	1792
CHPSAL	<i>During the last 3 years, there's been radical compensation policy changes: 1 for: yes</i>	0,130	0,336	0	1	1792
PRIMI	<i>In 1998, all the employees have been offered individual performance related premiums: 1 for: yes</i>	0,643	0,479	0	1	1792
CSALAIR	<i>In 1998, the white collar have received a general raise: 1 for: yes</i>	0,502	0,500	0	1	1792
ECVSAL	<i>The firm spreads information on the wages evolutions: 1 for: yes</i>	0,547	0,498	0	1	1792
INDTURN	<i>The employer considers the level of employment turnover in the firm as the main indicator of the social climate: 1 for: yes</i>	0,058	0,234	0	1	1792
CRAINEMP	<i>It's the threat of being laid off that motivates the employee in her work: 1 for: yes</i>	0,119	0,324	0	1	1792
NCMANREC	<i>It's the lack of recognition that demobilizes the employees: 1 for: yes.</i>	0,148	0,355	0	1	1792
QUALTOT	<i>The firm is involved into a total quality policy: 1 for: yes.</i>	0,590	0,492	0	1	1792

#### Appendix 4. Descriptive statistics, variables used in the estimation of the probability to introduce the rent-sharing

Variable	Signification	mean	Std	min	max	nb obs
PRIVE	<i>The firm belongs to the private sector</i>	0,947	0,223	0	1	1786
FEMMES	<i>Percentage of women in the firm</i>	37,272	28,575	0	100	1669
LOGSALET	<i>Logarithm of the number of employees in the firm</i>	4,803	1,112	2,996	9,210	1792
LOGAGE	<i>Logarithm of the age of the firm</i>	1,158	0,451	0	1,609	1782
MULTI	<i>The firm has multiple firms</i>	0,592	0,492	0	1	1792
SOUTRAI	<i>During the past 3 years, you greatly developed subcontracting and externalization: 1 for : yes</i>	0,243	0,429	0	1	1792
QUALTOT	<i>The firm has adopted a total quality policy.</i>	0,590	0,492	0	1	1792
CLIENT	<i>In 1998, the main client represented at least 25% of the firm's activity: 1 for :yes.</i>	0,598	0,490	0	1	1685
STRATPRI	<i>In order to compete with the other firms did you set a strategy based on price competition for your main activity ?: 1 for : yes</i>	0,195	0,397	0	1	1792
DIFRECR	<i>In 1998, The employer had difficulties to hire some categories of employees : 1 for: yes.</i>	0,603	0,489	0	1	1792
EVCOUVR	<i>During the last 3 years, the number of workers has increased: 1 for :yes</i>	0,245	0,430	0	1	1792
OBJCOUT	<i>In 1998, precise and quantified goals have been drawn in terms of wage costs: 1 for :yes</i>	0,821	0,384	0	1	1792
RESFI	<i>Your main criteria to decide for wage raises is the financial result of the firm : 1 for : yes</i>	0,794	0,405	0	1	1792
PRIMI	<i>In 1998, all the employes benefited from premiums related to their individual performance : 1 for : yes</i>	0,643	0,479	0	1	1792
PRIMCO	<i>In 1998, all the employes benefited from premiums related to collective performance : 1 for : yes</i>	0,448	0,497	0	1	1792
NAUGMI	<i>In 1998, the blue collars benefited from individualized raises others than premiums : 1 for : yes</i>	0,737	0,440	0	1	1792
INDPROD	<i>The employer considers the productivity level as the main criteria to judge the social climate in the firm : 1 for :yes</i>	0,079	0,270	0	1	1792
PEMPLC	<i>Employer's estimated probability: Probability to perceive a good social climate.</i>	0,858	0,102	0,291	0,993	1761
NCESPROM	<i>It's the hope of getting promoted that determines the implication of the blue collars in their work : 1 for : yes</i>	0,097	0,296	0	1	1792
NCMANREC	<i>It's the lack of recognition that demobilizes the blue collars: 1 for : yes.</i>	0,148	0,355	0	1	1792
EVEMP	<i>Informations on the evolution of the employment perspectives are given to the employees of the firm</i>	0,646	0,478	0	1	1792
NEGSL99	<i>In 1998, there's been a negotiation with the representatives about the wages : 1 for : yes</i>	0,591	0,492	0	1	1792
HSUP	<i>During the 3 last years, there's been a conflict taking the form of extra hours refusals : 1 for : yes</i>	0,040	0,195	0	1	1792

**Appendix 5. Descriptive statistics, variables used in the estimation of the probability to observe productivity gains after the rent-sharing**

Variable	Signification	moy	Ecart-type	min	max	nb obs
CLOGMWAG	<i>Logarithm of the employee's age (mean of the employees in the firm)</i>	3,407	0,489	1,585	4,254	1544
CDIPLO	<i>Highest diploma: 1 pour : autodidact, 2 pour : certificat d'études, 3 pour : BEPC (TAFE) 4 pour : CAP- BEP(TAFE, higher level) 5 pour : Baccalauréat,(HSC) 6 pour : Bac +2 (undergraduate) 7 pour : Bac +3 ou +4(Bachelor or Masters' degree) 8 pour : supérieur à Bac +4 (more than Master's degree)</i>	4,099	1,299	0,816	8,414	1542
CFEMMES	<i>Percentage of women in the firm</i>	35,306	28,241	0	105,102	1546
CSTRATP	<i>In order to compete with the other firms did you set a strategy based on price competition for your main activity ?: 1 for : yes</i>	0,186	0,374	0	1,052	1546
CECOENT	<i>Information about the economic situation of the firm is directly given to the employees</i>	0,686	0,420	0	1,052	1546
CEVEMP	<i>Information on the evolution of the employment perspectives are given to the employees of the firm</i>	0,590	0,456	0	1,052	1546
CFORMPR	<i>Information on the possibilities of training in the firm are given to the employees</i>	0,561	0,466	0	1,052	1478
CLOGPRIM	<i>Logarithm of the annual premiums received by the employee</i>	7,067	2,853	0	11,251	1546
CLOGSALAI	<i>Logarithm of the annual wage</i>	8,405	1,158	4,131	10,893	1530
CMWNEG98	<i>In 1998, there's been a negotiation with the representatives about the wages : 1 for : yes</i>	0,656	0,428	0	1,052	1478
CMWCLIMAT	<i>The employee considers the social climate as good: 1 for : yes</i>	0,627	0,447	0	1,052	1546
CMWGAMB	<i>It's the work atmosphere that demobilizes the employee: 1 for :yes</i>	0,020	0,136	0	1,052	1546
CMWGAUTO	<i>It's the lack of autonomy that demobilizes the employee: 1 for : yes</i>	0,007	0,077	0	1,048	1546
CMWPROM	<i>It's the hope of being promoted that conditions the employee's implication in her work: 1 for : yes</i>	0,033	0,174	0	1,052	1546
CMWRISK	<i>Subjective risk to be laid off : 1 for : the employee thinks he has a great chance to be laid off in the near future. 0 for : otherwise.</i>	0,089	0,275	0	1,052	1546

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