Chapter 3

Employment relation in the presence of self-esteem motivations

> People probably differ as a function of their background and personal situation in the degree to which they are likely to become involved in their job. However, it is also probably true that other things being equal, more people will become involved in a job that allow them control and a chance to use their ability than will become involved in jobs lacking these characteristics.
> Lawler and Hall (1970, p. 311)

When questioned on their human resources management practices, managers tend to spontaneously put the emphasis on the necessity to fairly recognize the quality and the importance of their employees' work.[1] This recognizing can be purely verbal, having no influence on material individual situation, and still having a part in the efficiency of the employment relation. What does this part consist in? How can individual behavior be influenced by such symbolic dimensions of human resources management? This chapter provides an answer to these question. This answer is further theoretical echo to the empirical issues raised in chapter 1: the way pTWO obtain workers involvement.

Our analysis is based on the observation that people are in search of self-esteem: some of their actions respond to the need to have an enhanced self-image. This widely document result of social psychology has been taken up by Akerlof and Kranton (2000) to motivate the introduction of identity into economic analysis.[2] They show that taking this motivation into account allows a better understanding of some behaviors embedded into the social context, without departing from the individualistic paradigm. Employment relations are good example of the kind of social situation the understanding of which can be improved by such an approach.[3] Indeed, it is quite sensible to deem that the exchange of labor for wages should not be reduced to a purely economic transaction. From a working person's point of view, a job can embody much more than a simple source of income: it can be a significant channel for self-esteem.[4]

The present chapter relies on this observation to provide a new analysis of the em-

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[1] For example, Bewley reports the following statement by a manager of an enterprise of 80 employees:

> "If people are paid well, that fact is lost on them after a while. People are paid well to attract them. It is necessary to pay competitively, but they can be motivated in other ways. The best way to motivate people is to give them important work to do and to recognize them for that. Their morale is good if they feel they are contributing." Bewley (1999, p. 43)

[2] It is worth noting that reference to identity concerns is not such a recent trend in the economic literature. McCrate (1988) recalls Sen's and Hirschman's observation that people have tastes not just about external objects or other people, but also about themselves: in other words, about their identities. Identity is what these authors have called a "metapreference" or "value." McCrate insists that we do struggle regularly with ourselves over who we are and who we want to be: we have second order preferences, for instance, concerning such fundamental issues as manhood or womanhood.

[3] For some accounts about the limits of standard analyses of employment relations, see Bewley (1999).

[4] For a review of the socio-psychologique experiments supporting this assertion, see Haslam (2001).

ployment relation: the point is to put forward the endogenous nature of work motivation. We thus invoke self-esteem motivations as a source of intrinsic motivation and discuss the conditions for such a motivation to emerge.

In the following, we basically look at a Principal-Agent model in which we introduce self-esteem motives through identity building. Let us display the main characteristics of our approach in more detail. Our analysis of the employment relation comes within the framework of a standard Principal-Agent model with limited liability. Following Akerlof and Kranton (2000), we tackle issues of self-esteem through identity building. Let us recall the broad outlines of their modelling. Self-esteem derives from the assertion of an identity. Each agent declares himself as belonging to some abstract social category. Possible categories are associated with different ideal attributes and prescribed behaviors. Exhibiting individual traits close to the ideal attributes associated with one's category facilitates a sense of belonging (and hence access to self-esteem); following corresponding behavioral prescriptions affirms one's self-image i.e. increases self-esteem, while violating them evokes anxiety and discomfort in oneself.

What are the trade-offs that feed our results? In our analysis, beyond their decision to expend effort, agents choose between achieving self-esteem through their job or through other activities outside the workplace. In terms of identity, they choose between a workplace identity and an out-of-the-workplace identity.[5] When holding the workplace identity, agents have an intrinsic motivation to make an effort at work to the extent that it conditions their self-esteem (workplace identity involves an effort prescription). Employers have an obvious interest in this choice: an intrinsic motivation to make an effort may allow them to reduce the required extrinsic incentives. The identity decision of an agent is assumed to depend on the characteristics of the job offered by the principal but also on pay. Hence, the principal can influence the agent's choice by offering wage

[5] Among the four facts documented by Akerlof and Kranton (2000), we then mostly focus on two: 1) that people have identity-based payoffs derived from their own actions; 2) that some people may choose their identity. This latter point is carefully documented in their paper. Yet further a reference deserve attention. Surveying the findings of the Social Identity Theory, Ashforth and Mael (1989) mention studies asserting that an individual (consciously or not) identifies with a social category to enhance self-esteem. In her analysis of the domestic sexual division of labor, McCrate (1988) focuses on individuals' choice of identity. She states that: "women [...] choose to learn to prefer mothering over auto mechanics [because] the expected payoff is higher."

amounts which meet the standards of the workplace identity (social status concern).

As we have seen above, Akerlof and Kranton (2005) already tackle the issue of work incentives. They consider workers who think of themselves either as part of the …rm or as outsiders. When identifying with the …rm, employees experience a loss in utility when not following its interests. So their main focus is on organizations' ability to motivate their employees through identi…cation. Our approach di¤ers from theirs in two respects. First, we assume the organization is not able to change agents' identity except through a change in its compensation schedule: aspects of corporate culture are not considered. To this extent, we do not separate the aspects of work incentive from those of identity management. Second, contrary to their rather radical approach to the identities available to workers (insider identity or outsider identity) which departs from strict individualism, we take up identities picked out by contemporary psychologists which preserve the integrity of employees' preferences.[6] Hence, our speci…cation of identities, although stylised, is not arbitrary.

Our speci…cation also have the advantage to be consistent with numerous observations related to the issue of work satisfaction. In particular, it echoes a voluminous socio-psychological literature assessing the variability of workers' sensitivity to their employment conditions. Here, one can mentioned Gruendberg who writes:

> Dispositional explanations for high levels of job satisfaction among workers at the lower end of the occupational hierarchy are usually based on an assertion that such workers are not concerned about the intrinsic rewards of work. [...] Members of the working class are sometimes characterized as not having developed a need for rewarding work - Blauner (1964). Sometimes, they are said not to be interested in their work as a source of intrinsic rewards either because they have central life interests that revolve around family interaction or consumption - Dublin (1956) - or because they have di¤erent value vis-à-vis work, stressing activity instead of self-expression on the job - Morse and Weiss (1955). Gruendberg (1980, p. 248)

[6] In our approach, employees do not identify with the …rm.

Our approach makes explicit the trade-o¤ at the basis of this heterogeneity as regards how individuals see their job. This trade-o¤, and the in‡uence of the employer on its outcome, is the source of the answer we posit to the opening question. The symbolic dimensions of human resources management contribute to maintain employees in the holding of the workplace identity i.e. to sustain an intrinsic motivation to e¤ort. As far the e¢ ciency of pTWO is considered, our model suggests that practices such as leaving a large discretion to frontline employees give rise to an intrinsic motivation by moving identity from an out-of-the-workplace to a workplace identity. By developing the chance of grati…cation at work, empowerment practices may involve a reorientation of self-esteem achievement strategies in favor of the employer.

This chapter is composed of three sections. First section is devoted to the presentation of our model. Beyond the empirical justi…cations of its psychological bases, we introduces the terms in which our results as regards employment relation pro…tability are expressed. This occasions us to introduce a typology of jobs (strongly ful…lling, weakly ful…lling, and unful…lling) based on their capacity to give rise to an intrinsic motivation. We then successively consider cases with complete information about e¤ort (jobs whose monitoring is costless), and with moral hazard (jobs whose monitoring is not cost-e¤ective). In the third section, we study the implication of our assumptions as regards the e¢ ciency of the employment relation. The point is about the impact of moral hazard according to the job under consideration.

3.1 Identity building, and the employment relation

In this section, we display the framework of our analysis.

3.1.1 E¤ort and production

Let us consider an agent (he) identifying with c 2 C.[7] He can exert an e¤ort e 2 f0, 1g. Exerting e¤ort e implies a disutility[8] equal to $\psi(e)$ with normalisation $\psi(0) = 0$ and

[7] The identity held by the agent is an endogenous of our model.

[8] In the sequel, we will always take it as characterizing the job rather than as a subjective parameter.

$\psi(1) = \psi > 0$. The utility of the agent is assumed to be separable between: the utility he derives from his wage, the disutility of his effort, and his neutral self-esteem, that is the personal gratification he derives from his job for a neutral 0 transfer - which is actually the reservation transfer. If he receives a transfer w from the principal (she) and experiences the neutral self-esteem $I_c(e)$, his global utility is given by

$$U_c(w, e) = u_c(w) - \psi(e) + I_c(e)$$

where $u_c(.)$ is an increasing function such that $u_c(0) = 0$. We clarify in what follows how self-esteem concerns may influence the utility derived from a given wage.

Production is stochastic, and the effort of the agent affects the production level as follows: the stochastic production level $\tilde{q}$ can only take two values $\{\underline{q}, \overline{q}\}$ with $\overline{q} - \underline{q} = \Delta q > 0$. We will denote $\mathbf{q} = (\underline{q}, \overline{q})$. The stochastic influence of effort on production is characterized by the probabilities $\Pr(\tilde{q} = \overline{q} | e = 0) = \pi_0$ and $\Pr(\tilde{q} = \overline{q} | e = 1) = \pi_1$ such that $\pi_1 > \pi_0$. We will denote $\boldsymbol{\pi} = (\pi_0, \pi_1)$, and $\Delta\pi = \pi_1 - \pi_0$.

3.1.2 Self-esteem and identity in the workplace

Let us fully specify the agent's preferences.

Two identities. The agent has the choice between two identities: $C = \{A, B\}$. Identity A corresponds to the workplace identity while identity B corresponds to the out-of-the-workplace identity.[9] An agent considering himself as an A extracts his self-esteem from:

- the non-wage gratification opportunities $\phi \in \mathbb{R}^+$ provided by his job. Industrial psychology brings information as regards the content of ϕ. Non-wage gratification opportunities[10] notably depends on the discretion the agent enjoys on his job, on the more or

[9] Although clear-cut, Gecas and Seff (1990) show that this distinction was relevant (they regard work and home as two meaningful contexts of self-evaluation) and fruitful. They found that when work was a central aspect of men's self-concept, occupational variables (occupational prestige, control at work) were more strongly related to self-esteem than when they were not; similarly, when home was important, home variables (control and satisfaction at home) were strongly related to self-esteem.

[10] For some references about the "motivational" properties of the scope associated with a job, see Dodd and Gangster (1996) who give the main conclusions of the Job Characteristics Approach. For the link

less stimulating nature of this job, etc. - see chapter 1, section 2.

² the fact of complying his e¤ort e to the prescription de…ning category A (that we also …x to 1),[11]

² the appropriateness of his wage to the exogenous standard w_A prevailing among A agents. As we said above, this latter assumption aims to capture the idea that social status - which we suppose to be revealed (at least partially) through the amount of w - fuels self-esteem. For individuals holding the workplace identity, w_A is what they proudly consider as the worth of their productive contribution. They experience the case $w < w_A$ as insulting (a negative signal). More generally, the part played by w_A can be view as conveying Lambert's observation who note:

> Certain levels of extrinsic rewards and comforts are necessary for a job to achieve its motivating potential, but in and of themselves extrinsic job characteristics are not su¢cient to determine intrinsic motivation. Lambert (1991, p. 343)

An agent whose identity is B extracts his self-esteem from activities outside the organization. As a consequence, we will consider this level $I_B > 0$ as exogenous. The point is that an agent holding the identity B is insensitive to the non-wage grati…cations provided by his job. Since these opportunities only play in terms of self-esteem, they do not matter for an individual relying on out-of-the-workplace …elds to achieve self-esteem.[12]

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between scope at work and self-esteem, see Gecas and Se¤ (1990). Falk and Kosfeld (2004) provide some behavioral …ndings.

[11] Lobel and St. Clair (1992) show that individuals with salient career identities were willing to expend extra e¤ort at work. Less speci…cally, they provide evidence on how identity salience motivates attitudes and behavior in support of an identity.

[12] As far this aspect is considered, let us quote Blauner who writes:

> Self-estranged workers are dissatis…ed only when they have developed needs for control, initiative and meaning in work. The average manual worker and many white-collar employees may be satis…ed with fairly steady jobs which are largely instrumental and non-involving, because they have not the need for responsibility in work. They are, therefore, relatively content with work which is simply a means to the larger end or providing the paychecks for lives organized around leisure, family and consumption. Blauner (1964, p. 29)

The form of the agent's preferences according to his identity. Assuming the agent is risk-neutral, the material utility derived from a transfer w will simply amount to w. This material utility is obviously a component of $u_c(w)$ whatever $c \in \{A, B\}$. However, it may not encompass the whole utility derived from a transfer w. Indeed, taking into account self-esteem concerns, we assume

$$u_c(w) + I_c(e) = \begin{cases} w + \phi - \gamma_w (w_A - w) - \gamma_e (1 - e) & \text{if } c = A \\ w + I_B & \text{if } c = B \end{cases}$$

where γ_w and γ_e are positive parameters. As a consequence, for all $w > 0$: $u_A(w) = (1 + \gamma_w) w > u_B(w) = w$ while

$$I_A(e) = \phi - \gamma_w w_A - \gamma_e (1 - e)$$

which involves a perfect substitutability between the various ways to fit into the workplace identity.

What if the agent is an outsider? The reservation wage is fixed to 0 so that an outsider's only source of utility consists in his self-esteem. It amounts to $I_B > 0$ for an identity B holder. The self-esteem of an outsider holding identity A amounts to $-\gamma_w w_A - \gamma_e < 0$. Indeed, the agent is then deprived of the main factor making identity A: a job.

We will denote $\gamma = (\gamma_w, \gamma_e)$ and refer to (I_B, w_A, γ) as an agent's self-esteem concerns. Although it enters agents' utility, ϕ and ψ must be understood as objective measures characterizing a job rather than an agent. ϕ stands for the non-wage gratifications attached to the job while ψ measures how demanding this job is. In the remaining sections, we will refer to the pair (ϕ, ψ) as some job characteristics.

3.1.3 The contracting game

Let us indicate the structure of the interaction.

Timing of decisions and information. The timing of the contracting game is the following: 1) the principal offers a contract; 2) the agent accepts or refuses the contract, chooses his identity, and exerts an effort or not; 3) the outcome $\tilde{q}$ is realized; 4) the contract is executed.

With moral hazard, the agent's level of effort is not directly observable by the principal (a fortiori non-verifiable). The principal can only offer a contract based on verifiable variables. We assume identities are non-verifiable. Hence, with moral hazard, contracts are functions $w(\tilde{q})$ linking an agent's compensation to the random output $\tilde{q}$. With two possible outcomes $\underline{q}$ and $\overline{q}$, the contract can be defined by a pair of transfers $(\underline{w}, \overline{w})$.[13]

Principal's set of actions, and payoffs under limited liability. The risk-neutral (with respect to transfers) principal's expected utility is written as

$$V_e = \pi_e \left(S(\overline{q}) - \overline{w}\right) + (1 - \pi_e)\left(S\left(\underline{q}\right) - \underline{w}\right) \qquad \text{with } e \in \{0,1\}$$

where $S(.)$ is assumed to be a strictly increasing function. We denote $\Delta S = S(\overline{q}) - S\left(\underline{q}\right)$. In the sequel, when talking about job technology, we will refer to the triplet $(\pi, \mathbf{q}, S(.))$ characterizing this job. If the principal does not induce the participation of the agent, we assume that she gets 0.

The assumption that the agent's liability is limited is written: $\overline{w} \geq 0$ and $\underline{w} \geq 0$.[14] In the remaining, we will denote $\mathbf{w} = (\underline{w}, \overline{w})$.

Agent's set of actions. Let a denote the agent's answer to the contract $\mathbf{w}$ offered by the principal: $a \in \{in, out\}$, $a = out$ meaning remaining an outsider, $a = in$ meaning taking the offer and becoming an insider.[15] An action of the agent is a vector $(a, c, e) \in \mathcal{A}$ where[16]

$$\mathcal{A} = \{(out, B, 0), (out, A, 0), (in, B, 0), (in, A, 0), (in, B, 1), (in, A, 1)\}$$

[13] Under complete information, since e is verifiable, it can be included into a contract enforced by a benevolent court of law. We will denote $\underline{w}_e$ and $\overline{w}_e$, $e \in \{0,1\}$, the transfers under complete information.

[14] Under complete information, limited liability states that $\forall e \in \{0,1\}, \overline{w}_e \geq 0$, and $\underline{w}_e \geq 0$.

[15] Do not confuse the "out-of-the-workplace" identity with the fact of being an outsider nor the "workplace" identity with the situation of being an insider.

[16] For example, $(a, c, e) = (in, B, 0)$ stands for "accepting the contract, becoming a B without exerting effort".

Given the agent's payoff, it is straightforward to observe that strategy $(out, A, 0)$ is strictly dominated by $(out, B, 0)$ whatever **w**: an outsider will always hold identity B obtaining a utility $I_B > 0$.

Principal's problem with moral hazard. Assuming that it is a best choice for the principal to induce effort $e = 1$, with obvious writings, her problem is written as

$$\max_{\mathbf{w}} \pi_1 \left(S\left(\overline{q}\right) - \overline{w}\right) + (1 - \pi_1)\left(S\left(\underline{q}\right) - \underline{w}\right)$$

subject to

$$\begin{cases} EU_A(\mathbf{w}, 1) \geq EU_A(\mathbf{w}, 0) & (IC_A) \\ EU_A(\mathbf{w}, 1) \geq EU_B(\mathbf{w}, 0) & \left(IC_{A/B}\right) \\ EU_A(\mathbf{w}, 1) \geq I_B & (PC_A) \end{cases}$$

OR

$$\begin{cases} EU_B(\mathbf{w}, 1) \geq EU_B(\mathbf{w}, 0) & (IC_B) \\ EU_B(\mathbf{w}, 1) \geq EU_A(\mathbf{w}, 0) & \left(IC_{B/A}\right) \\ EU_B(\mathbf{w}, 1) \geq I_B & (PC_B) \end{cases}$$

AND

$$\mathbf{w} \geq \mathbf{0} \quad (LL)$$

Among previous constraints, one will immediately recognize the standard moral incentive and participation constraints. The only supplement compared with the standard case comes from the necessity for the contract to meet a crossed incentive constraint. This latter constraint aims at preventing the agent from possibly changing his identity (and thereby his preferences) with the intention of exerting $e = 0$. This requirement is particularly stringent when the principal is to maintain the workplace identity (A), and we will see that the corresponding constraint, denoted $\left(IC_{A/B}\right)$, plays a crucial part in our results.

3.2 Self-esteem motivations and the profitability of employment relation

We successively consider the case of a job costlessly monitored (complete information on effort) and that of a job involving moral hazard.

3.2.1 The profitability of the employment relation under complete information

This section is both the first step of our analysis and the presentation of the benchmark when we will consider the case of moral hazard. We raise the question of the consequences of self-esteem concerns on the employment relation.

Notation Let us denote $\Delta I(\phi) = I_B - I_A(0) = I_B - \phi + \gamma_w w_A + \gamma_e \gtrless 0$.

ΔI is the relative (neutral) self-esteem of an identity B holder compared with that of an A exerting effort $e = 0$. It is the relevant variable in all the results that follow.[17] Indeed, as regards self-esteem concerns, ΔI will capture the relative reservation utilities of the identities A and B facing the contract offered by the principal. The higher ΔI, the stronger A holder's (relative) reservation, and the weaker B's (relative) reservation.

In the sequel, as far as ΔI is concerned, we will focus successively on the roles of ϕ and θ.

3.2.2 Job characteristics, self-esteem concerns, and the profitability of effort

In the following claim we describe the equilibrium of the contracting game under complete information. We denote $E_1 w_1^*$ the lowest expected transfer inducing $e = 1$ when effort is verifiable. It is useful to have in mind what prevails in the standard case: in the absence of a workplace identity, the lowest expected transfer ensuring effort $e = 1$ is ψ.

[17] This echoes our dichotomic approach to identity as far as working life is considered.

Proposition 1 Let (ϕ, ψ) characterize a job (whose monitoring is costless) which the principal might like to be filled, and (I_B, w_A, γ) an agent's self-esteem concerns. Under complete information, with limited liability,

$$E_1 w_1^* = \begin{cases} \max\left\{\frac{\psi - \gamma_e}{1+\gamma_w}; 0\right\} & \text{if } \Delta I(\phi) \leq 0 \\ \max\left\{\frac{\psi - \gamma_e + \Delta I(\phi)}{1+\gamma_w}; 0\right\} & \text{if } 0 < \Delta I(\phi) \leq \gamma_w \psi + \gamma_e \\ \psi > 0 & \text{otherwise} \end{cases}$$

and effort $e = 1$ is induced if and only if $E_1 w_1^* \leq \Delta\pi\Delta S$. When effort is not induced by the principal ($e = 0$), participation requires a transfer of 0, and she keeps inducing it if and only if $E_0 S \geq 0$. Otherwise, the job is left unfilled.

Proof. See the appendix. ■

Under complete information, the principal can punish the agent for exerting $e = 0$. However, the limited liability constraint prevents her from reducing transfers below 0. This implies that incentive constraints can be active, although effort is verifiable. To give an intuitive commentary on the previous claim, let us distinguish three types of jobs from the expression of the minimal transfers they require.

A typology of jobs. Definitions Given (I_B, w_A, γ), an agent's self-esteem concerns, a job will be said to be:

- strongly fulfilling if its characteristics (ϕ, ψ) are such that the crossed incentive constraint $(IC_{A/B})$ is relaxed in the optimum;
- weakly fulfilling if its characteristics (ϕ, ψ) are such that the crossed incentive constraint $(IC_{A/B})$ is binding in the optimum;
- unfulfilling if its characteristics (ϕ, ψ) are such that the crossed incentive constraint $(IC_{A/B})$ is violated in the optimum.

The more fulfilling a job, the lower the workplace identity (A) relative reservation. We comment on the claim in terms of decreasing identity A relative reservation (decreasing ΔI) starting from $\Delta I > \gamma_w \psi + \gamma_e$.[18] Jobs under consideration are then unfulfilling and

[18] Assuming $\gamma_e < \psi$, but also that it is profitable for the principal to induce effort $e = 1$.

it would require a relatively high compensation from the principal to induce the agent to develop an intrinsic motivation. Since these jobs are not that demanding, it is a best choice for her not to seek stimulating such added motivation i.e. to let the agent hold the out-of-the-workplace identity: the latter receives a full compensation for the "objective" disutility ψ attached to the job.

Example By minimizing the discretion of frontline workers in their method, Taylorism led to an increase in the number of unful…lling jobs.[19] Although associated with assembly lines, it underlies the design of many jobs throughout the economy. Examples include McDonald's hamburger ‡ippers, data entry clerks in banks where computers monitor output, and textile workers paid piece rates for sewing high-fashion blue jeans. In all of these cases, managers design the work, while employees with little opportunity for being creative or improving their jobs perform the task.

Such is no longer the case once the job becomes weakly ful…lling. Indeed, it is then demanding enough for it be pro…table for the principal to stimulate intrinsic motivation. But this intrinsic motivation is paradoxically strongly dependent upon transfers: the self-esteem provided by the job mostly responds to the social status concerns it meets. When strongly ful…lling, beyond its compensation, the job is then appealing in itself, for the self-esteem its characteristics feed. Social status concerns are now dominated by "pure" intrinsic motivation responding to the (relatively) high scope the agent bene…ts from in his work.

Example In France, teachers are often left a large discretion as regards their method... but receive moderate pays relatively to their education.

Motivation-based gains in pro…tability. Here we would like to contrast the results of our model involving a workplace identity, with those of the standard model (in which agents can only hold identity B) in terms of pro…tability. It turns out that e¤ort profitability is not necessarily improved by workplace self-esteem concerns. Recall that, in the standard model, e¤ort $e = 1$ is induced if and only if ψ · ¢π¢S.

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[19] See Levine (1995, p. 10).

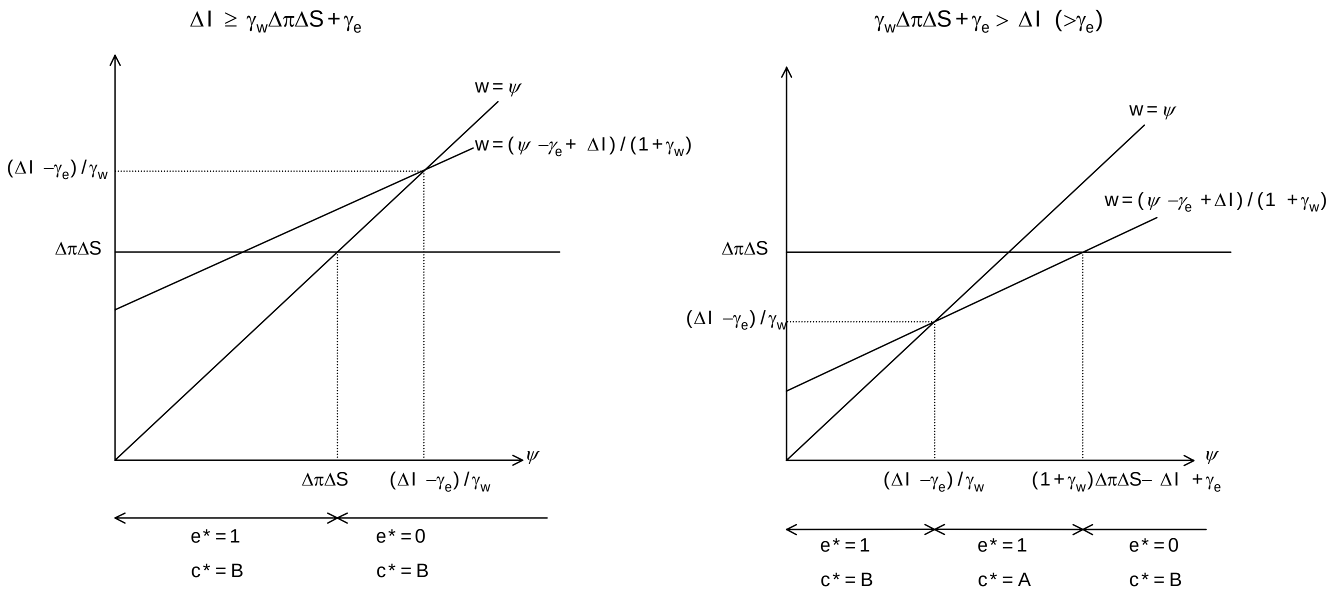


Figure 3-1: E¤ort pro…tability and self-esteem concerns (for jobs whose monitoring is costless).

Implication 1 Self-esteem concerns extend the pro…tability of e¤ort if and only if $¢I(\phi) < \gamma_w ¢\pi ¢S + \gamma_e$.

Figure 3-1 illustrates this implication.

These graphs give the threshold in the level of demands over which it is no longer pro…table for the principal to induce e¤ort 1 (self-esteem concerns may extend e¤ort pro…tability in the sense that they may move this threshold to the right). Implication 1 says that employment relations pro…tability is constrained by the characteristics of the job which needs to be carried out. When the condition in implication 1 holds, $e = 1$ is induced for jobs whose "objective" disutility exceeds the expected added surplus which e¤ort provides: that is what we mean when talking of extended pro…tability. When it does not, the principal renounces inducing $e = 1$ before it is pro…table for her to arouse intrinsic motivation. The job under consideration is then de…nitely unful…lling.

The graph on the right of …gure 3-1 deserves further attention, it shows another particularity of the model. One should observe the link between the degree to which a job is demanding, ψ, and the marginal cost of e¤ort: this marginal cost turns out to be locally decreasing in ψ. Indeed, when the degree of demands exceeds $\frac{\Delta I - \gamma_e}{\gamma_w}$ the job switches from unfulfilling to fulfilling and hence a reduced marginal cost of effort.

Beyond technologies, job characteristics and workers' self-esteem concerns interplay in the determining of the profitability of employment relations. This comes from the potential stimulation of an intrinsic motivation.

3.2.3 The profitability of the employment relation for jobs with moral hazard

Let us consider the same problem with moral hazard.

Optimal contracts with moral hazard

As a preamble, recall that, as holds under complete information, the contract $\mathbf{w} = \mathbf{0}$ is necessary and sufficient to induce the participation of a non-zealous agent (agent exerting $e = 0$) with moral hazard. In the next claim, we describe the equilibrium of the contracting game with moral hazard. It will be seen that ΔI, the relative reservation utility of identities A and B, keeps playing a crucial role. We denote $\mathbf{w}_1^\star$ the contract minimizing the expected transfer while inducing effort $e = 1$ with moral hazard, and $E_1 w^\star$ the corresponding expected transfer.

Proposition 2 Let (ϕ, ψ) characterize a job (whose monitoring is not cost-effective) which the principal might like to be carried out, and (I_B, w_A, γ) an agent's self-esteem concerns. With moral hazard and limited liability, the contract minimizing expected transfer while inducing effort is written

$$\mathbf{w}_1^\star = \begin{cases} \left(0, \max\left\{\frac{\psi - \gamma_e}{(1+\gamma_w)\Delta\pi}; 0\right\}\right) & \text{if } \Delta I(\phi) \leq \frac{\gamma_w}{1+\gamma_w}\frac{\pi_0}{\Delta\pi}(\psi - \gamma_e) \\ \left(0, \max\left\{\frac{\psi - \gamma_e + \Delta I(\phi)}{(1+\gamma_w)\pi_1 - \pi_0}; 0\right\}\right) & \text{if } \frac{\gamma_w}{1+\gamma_w}\frac{\pi_0}{\Delta\pi}(\psi - \gamma_e) < \Delta I(\phi) \leq \gamma_w \frac{\pi_1}{\Delta\pi}\psi + \gamma_e \\ \left(0, \frac{\psi}{\Delta\pi}\right) & \text{otherwise} \end{cases}$$

and effort $e = 1$ is induced if and only if $E_1 w^\star \leq \Delta\pi\Delta S$. When effort is not induced by the principal ($e = 0$), participation requires a transfer of 0, and she keeps inducing it if and only if $E_0 S \geq 0$. Otherwise, the job is left unfilled.

Proof. See the appendix. ■

With moral hazard, the principal can no longer punish a shirking agent: the contract is only contingent upon the realization of $\tilde{q}$. Hence, inducing effort $e = 1$ requires making the gap between the expected payoffs for a zealous agent and a shirker as large as possible.

In the following, we will focus on the comparison with what we obtained for jobs whose monitoring is costless as well as with the standard case (absence of a workplace identity). To make clearer the connection to our previous results, let us make explicit the expected transfers corresponding to the contracts of the latter claim:

$$E_1 w^{\star} = \begin{cases} \max\left\{ \frac{\pi_1}{\Delta\pi} \frac{\psi - \gamma_e}{1+\gamma_w}; 0 \right\} & \text{if } \Delta I(\phi) \leq \frac{\gamma_w}{1+\gamma_w} \frac{\pi_0}{\Delta\pi} (\psi - \gamma_e) \\ \max\left\{ \frac{\pi_1}{\Delta\pi} \left(\frac{(1+\gamma_w)\Delta\pi}{(1+\gamma_w)\pi_1 - \pi_0} \frac{\psi + \Delta I(\phi) - \gamma_e}{1+\gamma_w} \right); 0 \right\} & \text{if } \frac{\gamma_w}{1+\gamma_w} \frac{\pi_0}{\Delta\pi} (\psi - \gamma_e) < \Delta I(\phi) \leq \gamma_w \frac{\pi_1}{\Delta\pi} \psi + \gamma_e \\ \frac{\pi_1}{\Delta\pi} \psi & \text{otherwise} \end{cases}$$

In this form, the connection to the standard case may seem clear. As one considers strongly fulfilling or unfulfilling jobs, the impact of the unobservability of effort is exactly what one usually obtains: from what agents get under complete information, required transfers rise by a factor $\frac{\pi_1}{\Delta\pi} > 1$ which corresponds to standard limited liability rent. This is not the case for weakly fulfilling jobs for which a factor $\frac{(1+\gamma_w)\Delta\pi}{(1+\gamma_w)\pi_1 - \pi_0} < 1$ emerges that curbs the impact of the unobservability of effort. This difference echoes the fact that only for weakly fulfilling jobs (by definition) is the crossed incentive constraint binding: but (as we will see in detail in the sequel) the unobservability of effort induces a relative relaxing of $\left(IC_{A/B}\right)$ compared to $\left(IC_{B/A}\right)$ which curbs the increase of required expected transfer.

In fact, things are not that simple. Indeed, in the previous interpretation, we considered jobs that kept the same type under complete and incomplete information about effort: this may not be the case as we will see below.[20]

[20] The analysis of the impact of the unobservability of effort in terms of efficiency is available upon request.

As for the implications of the latter claim, the forces we described under complete information still operate. As a result, many di¤erences from the previous analysis are only quantitative, leaving our generic results unchanged. One can check that this is true regarding implication 1 in particular. This results from the fact that moral hazard does not a¤ect an agent's self-esteem concerns. Hence, the wage threshold over which the agent prefers to hold the workplace identity is the same whether e¤ort is observable or not.

But moral hazard also leads to qualitative di¤erences from the case of jobs whose monitoring is costless.

Ful…lling and unful…lling jobs with moral hazard

Formally, the main di¤erences come from the fact that, with moral hazard, the level of demands ψ enters the condition that de…nes a job as strongly ful…lling: for $\psi > \gamma_e$, a job can be strongly ful…lling although ¢$I > 0$, $I_B > I_A(0)$. The recognition of one's workplace identity through $E_0 w > 0$ leaves an A shirker relatively better o¤ with moral hazard than under complete information about e¤ort.

Proposition 3 Moral hazard extends the class of ful…lling jobs.

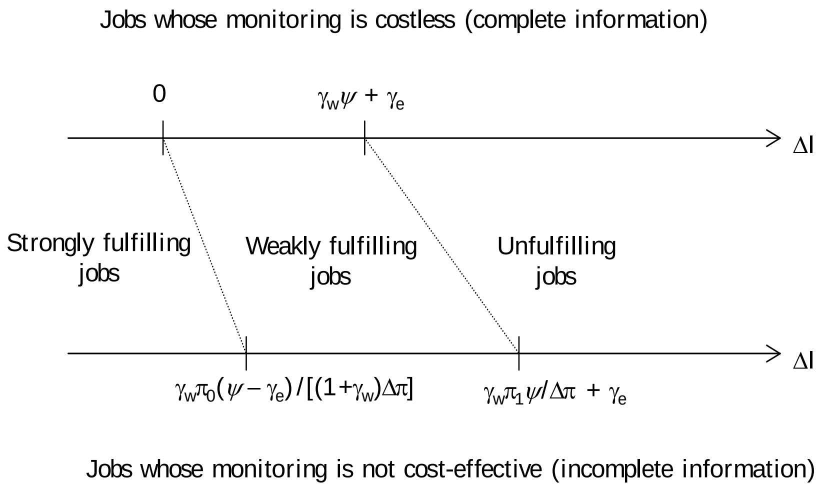
Proof. Consider the technology (¼, **q**, $S(.)$) of a job whose characteristics are given by (ϕ, ψ), and an agent's self-esteem concerns ($I_B, w_A,$ °) such that ¢$I = \gamma_w \psi + \gamma_e + \varepsilon$ with $0 < \varepsilon < \gamma_w \frac{\pi_0}{¢\pi} \psi$. Since ¢$I > \gamma_w \psi + \gamma_e$, the job belongs to the class of unful…lling jobs under complete information while since ¢$I < \gamma_w \psi + \gamma_e + \gamma_w \frac{\pi_0}{¢\pi} \psi = \gamma_w \frac{\pi_1}{¢\pi} \psi + \gamma_e$ it belongs to the class of ful…lling jobs with moral hazard.

Furthermore, if a job is ful…lling under complete information then it is also ful…lling with moral hazard. Suppose it does not hold. Then, there would exist a technology (¼, **q**, $S(.)$), job characteristics (ϕ, ψ), and an agent's self-esteem concerns ($I_B, w_A,$ °) such that

$$¢I \cdot \gamma_w \psi + \gamma_e \text{ and } ¢I > \gamma_w \frac{\pi_1}{¢\pi} \psi + \gamma_e$$

which is impossible since $\pi_1 > \pi_0$ ¸ 0. ■

The next …gure illustrates the latter proposition.



Note that for $\Delta I \in \left[\gamma_w \psi + \gamma_e; \gamma_w \frac{\pi_1}{\Delta\pi}\psi + \gamma_e\right]$, an unfulfilling job under complete information becomes a fulfilling one with moral hazard. This is an important point for the remaining section.

Proposition 3 suggests that moral hazard tends to make employers "enrich" (in fulfilment capacity) the jobs they offer, that is to extend recourse to intrinsic motivation. What forces support this consequence of moral hazard? The idea is the following. Moral hazard allows the agent to benefit from a rent: whatever the identity that the principal finally arouses, she will have to concede this rent. Therefore, we are dealing with better-paid jobs (for a given level of demands) as moral hazard holds. Principals are then closer to the wage threshold making it profitable to induce intrinsic motivation (arouse the workplace identity).[21] In fact, the extension of the class of fulfilling jobs is an echo of the shrinking of the class of jobs for which effort $e = 1$ is induced (through the limited liability rent).

[21] To put it in more detail, we saw that the caring of identity A holders about the meaning of their wage (social status) leads to a possible extra-valuation of a given wage (through parameter γ_w). To clarify the source of the latter result, this must be related to the fact that, with moral hazard, the expected transfer of a shirker is strictly positive - which was not the case under complete information. Hence, whereas the crossed incentive constraint $\left(IC_{A/B}\right)$ corresponding increase is curbed by the extra-valuation of $E_1 w$, $\left(IC_{B/A}\right)$ corresponding increase is amplified by this extra-valuation (which plays over $E_0 w$): $\left(IC_{B/A}\right)$ becomes relatively more restrictive than $\left(IC_{A/B}\right)$.

We now have all the elements to address the impact of self-esteem concerns on the e¢ciency of the employment relation. As Akerlof and Kranton (2005) we consider this impact to the extent to which self-esteem motivations change the ine¢ciency linked to moral hazard.

3.3 E¢ciency and self-esteem motivations

All the jobs involve moral hazard. It is a source of ine¢ciency to the extent that moral hazard can lead the employer to renounce inducing high performance. A job such that $E_1 w_1^{¤} <$ ¢π¢$S < E_1 w^{\star}$ would be "actively" hold (e¤ort exerted would be e = 1) if e¤ort was observable but moral hazard dissuades the principal from obtaining e¤ort. As a matter of facts, the expected return to e¤ort e = 1, ¢π¢S is below the cost involved by information asymmetry. Low return of e¤ort for this class of jobs is a direct consequence of moral hazard.

Let ¤ denote the resulting loss in e¢ciency. This loss corresponds to the gap between the expected transfer inducing e = 1 whether e¤ort is observable or not: ¤ = $E_1 w^{\star}$ ¡ $E_1 w_1^{¤}$. The detailed analysis of the impact of self-esteem motivations on ¤ is provided in the appendix. In this section, we mainly study the role of ¢I (= I_B ¡ I_A (0)). To …x ideas, an increase in ¢I can be due to: an increase in grati…cation opportunities outside ones work - an increase in I_B; a decrease in non-wage grati…cation opportunities at work - a decrease in ϕ; a decrease in the grati…cation conveyed by wage - an increase in w_A.

3.3.1 E¢ciency gains due to the intrinsic motivation accompanying the workplace identity

Relying on the principle that information incompleteness is the standard case of employment relation rather than the exception, we propose to isolate the role of self-esteem motivations in the moderation of the negative e¤ects of moral hazard. We will thus talk of the gain in e¢ciency due to the intrinsic motivation generate by self-esteem concerns. This gain is given by ¡ (¢I) = $\frac{\pi_0}{¢\pi}\psi$ ¡ ¤ (¢I), that is the gap between the loss in ef…ciency whether a workplace identity exists or not. The graphs below represent this

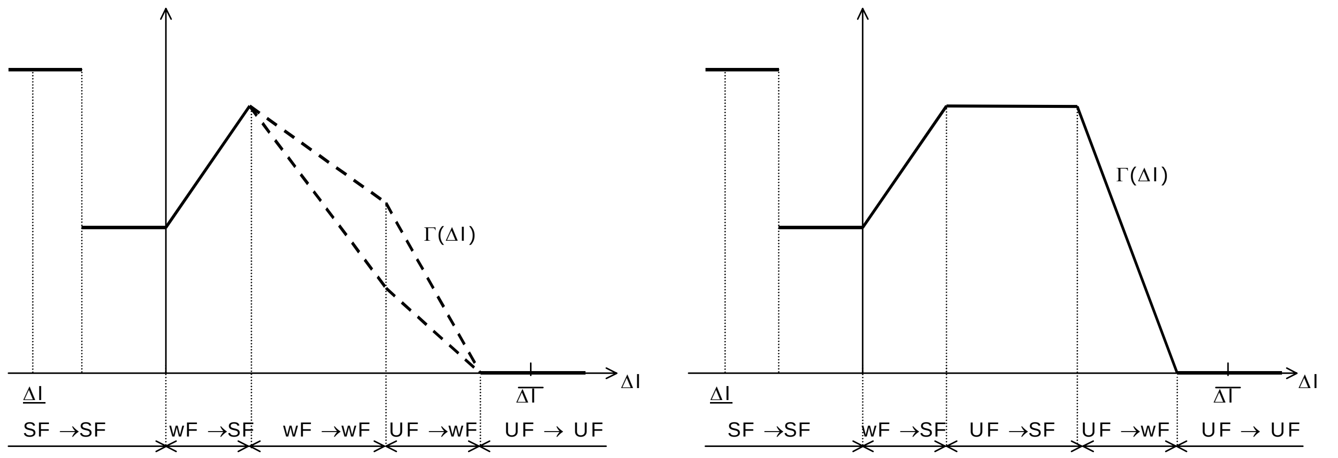


Figure 3-2: The gain in e¢ciency due to self-esteem motivations as a function of the relative attraction of the out-of-the-workplace identity.

gain in e¢ciency as a function of ¢I for intermediate (left graph) or low (right graph) intensity of the e¤ort prescription.[22]

We focus on these con…gurations to avoid overestimating the impact of an intrinsic motivation in jobs which are objectively demanding.

3.3.2 Relative attraction of the out-of-the-workplace identity and e¢ciency

Here, we are reasoning with a given technology (¼, **q**, S (.)) and a given degree of demands ψ. If the gain in e¢ciency us globally decreasing in ¢I, an interesting point is that the relation is not monotonous when one considers the case $\gamma_e < \psi$. As a matter of facts, this gain is the higher the more moral hazard enrich given jobs in opportunities of grati…cation through the social status conveyed by higher compensations. Previous graphs can be viewed under di¤erent perspectives according to the parameters one chooses to …x. For given self-esteem motivations ($I_B, w_A,$ °), one can examine the gains in e¢ciency due to the possibility of inducing the workplace identity as a function of non-wage grati…cation

[22] See the analysis of the loss in e¢ciency resulting from asymmetric information in appendix.

opportunities ϕ attached to a job. It turns out that it is not among the jobs providing the highest non-wage grati…cation opportunities that the gain in e¢ciency is the highest: this gain meets a ceiling for jobs deriving their entire ful…lment properties from moral hazard!

Let us reason now for given job characteristics (ϕ, ψ). To discuss the role of parameters $(I_B, w_A, °)$, it might be more enlightening to view them as re‡ecting self-esteem motivations common to a whole pool of working persons: the point is not, thus, to take advantage of some heterogeneities of labor supply. It is obvious that an increase in I_B still represents an increased labor cost (it is a reservation utility). To understand what previous graph depict, let us put it as a question: in what kind of society, is the option to stimulate self-esteem motivations of working persons the more precious? These graphs show that it is not within the societies characterized by a "work ethic" (low I_B) that this option brings the highest gain in e¢ciency. This is for intermediate levels of I_B (all other things equal) that self-esteem motivations are expected to play the larger part. As for "leisure societies" (I_B high all other things equal), this option can simply not exist. A analogous comment can be made as regards the role of w_A. Within a society where self-esteem brought by work mostly relies on economic achievement (w_A high), e¢ciency gains due to the workplace identity are low. Their highest value correspond to intermediary cases.

Let us now turn to the link between the gain in e¢ciency due to the option to induce the workplace identity and the degree of demands of the jobs.

3.3.3 The gain in e¢ciency as a function of the degree of demands of jobs under consideration

The degree of demands of a job plays a critical part in the level to which is set its compensation: all other things equal, the more demanding a job, the higher its compensation. As a consequence, considering the link between e¢ciency and the degree of demands (all other parameters remaining constant) amounts to examine the extent of the gain in e¢ciency as a function of the wage class under consideration.

We reason for …xed self-esteem concerns $(I_B, w_A, °)$. We consider a class of jobs characterized by π as well as by a common degree of demands ψ, but which offer variable non-wage gratification opportunities ϕ. We would like to quantify the gain in efficiency according to the degree of demands of the jobs under consideration. This evaluation obviously depends on the distribution of jobs on the support of ϕ. The cumulated gain in efficiency will be the higher the more concentrated jobs will be on those value of ϕ for which moral hazard turns unfulfilling or weakly fulfilling jobs into strongly fulfilling jobs $(UF, wF \rightarrow SF)$.

However, as a reference, we posit a uniform distribution of jobs on the interval $\left[0, \hat{\phi}\right]$ with $I_B + \hat{\psi} + \gamma_w w_A < \hat{\phi}$ where $\hat{\psi} < \frac{\Delta\pi}{\gamma_w \pi_1}(I_B + \gamma_w w A)$ characterizes the class of the most demanding jobs. For a given degree of demands ψ, our measure of the gain in efficiency $G(\psi)$ is simply

$$G(\psi) = \int_{\underline{\Delta I}}^{\overline{\Delta I}} \Gamma(\Delta I)\, d\Delta I$$

where $\underline{\Delta I} = I_B - \hat{\phi} + \gamma_w w_A$ and $\overline{\Delta I} = I_B + \gamma_w w_A$, that is, the area between the curve depicting $\Gamma(.)$ and the abscissa axis on an segment $\left[\underline{\Delta I}, \overline{\Delta I}\right]$ comprising all the parts of the function $\Gamma(.)$. We will describe it as the potential gain in efficiency to emphasize the restrictive nature of these assumptions.

We favor the case of an intermediate relative intensity of the effort prescription[23] which allow us to illustrate the main implications in terms of efficiency of self-esteem motivations. The gain in efficiency due to self-esteem motivations is then[24]

$$G(\psi) = a(\pi, \gamma) + b(\pi, \gamma; \underline{\Delta I})\,\psi + c(\pi, \gamma_w)\,\psi^2$$

where $a(\pi, \gamma)$ and $b(\pi, \gamma; \underline{\Delta I})$ are strictly positive and $c(\pi, \gamma_w) \geq 0$ if $\frac{\pi_1}{\Delta\pi} \geq \frac{(1+\gamma_w)\left(2-\gamma_w^2\right)}{(2+\gamma_w)\gamma_w^2}$. One can see that the potential gain in efficiency G is strictly increasing in ψ for all $\psi \in \left[\gamma_e, \hat{\psi}\right]$.

Implication 2 Self-esteem motivations all the more improve potential efficiency of

---

[23] $\gamma_w \frac{\pi_0 - (1+\gamma_w)\Delta\pi}{(1+\gamma_w)\pi_1 - \pi_0} < \frac{\gamma_e}{\psi} \leq 1$.

[24] One finds: $a(\pi, \gamma) = \frac{1}{2}\frac{\pi_0}{\Delta\pi}\frac{(3+\gamma_w)\Delta\pi + \gamma_w\pi_1}{(\gamma_w+1)^2\Delta\pi}\gamma_e^2$, $b(\pi, \gamma; \underline{\Delta I}) = \frac{1}{2}\frac{\pi_0}{\Delta\pi}\left(\frac{2(\gamma_w+2)\gamma_w}{(\gamma_w+1)^2}\gamma_e - 2\underline{\Delta I}\right)$ and $c(\pi, \gamma_w) = \frac{1}{2}\frac{\pi_0}{\Delta\pi}\frac{(1+\gamma_w)\left(\gamma_w^2-2\right)\Delta\pi + (2+\gamma_w)\pi_1\gamma_w^2}{\Delta\pi(1+\gamma_w)^2}$.

the employment relation that one considers more demanding jobs (which are, all other things equal, the better paid).

One can also consider the joint role of parameters π and γ_w. The term $\frac{\pi_1}{\Delta\pi}$ represents a measure of the additional cost due to moral hazard (see the standard case): the higher $\frac{\pi_1}{\Delta\pi}$ the more information incompleteness threats the employment relation. For $\gamma_w > 0$, the term $\frac{(1+\gamma_w)\left(2-\gamma_w^2\right)}{(2+\gamma_w)\gamma_w^2}$ is strictly decreasing in γ_w. The relative position of these terms conditions the curvature of $G(.)$. For fixed $\gamma_w < \sqrt{2}$, the increase of G with the degree of demands is the faster, one considers employment relations to which moral hazard is a more sensitive problem. When considering a class of jobs identically exposed to moral hazard, the increase of G with the degree of demands is the faster, the more intense the pay prescription is for employees holding the workplace identity. Generally, $c(\pi, .)$ is strictly increasing in γ_w: for $\gamma_w \geq \sqrt{2}$, the curve depicting G is strictly convex.

Implication 3 The strengthening of the pay prescription (a rise in γ_w) increases the sensitivity of the potential gain in efficiency to the degree of demands of jobs ψ.

On the whole, self-esteem motivations appear as playing a important part in moderating the loss in efficiency due to information incompleteness. Non-wage gratification opportunities provided by a job are likely to affect its profitability as well as its efficiency. This constitutes a posterior justification to a specific analysis of the interaction between standard incentives and intrinsic motivation.

Summary and conclusion

In the spirit of what social psychology has taught us, we consider agents whose actions are partially motivated by self-esteem concerns. Following Akerlof and Kranton (2000), we address this issue in terms of identity building: agents choose between achieving self-esteem through their job (workplace identity) or through outside-work activities (out-of-the-workplace identity). Relying on studies in psychology, we specify the behavioral prescriptions (notably in terms of effort) defining the workplace identity as well as the agent's preferences according to his choice as regards his identity.

We then explore the consequences of our hypotheses within the framework of a moral hazard model where a principal, willing to induce an agent's e¤ort, seeks the optimal contract. The principal is aware of the in‡uence of her wage o¤er on her employee's choice of identity. The o¤ered contract depends on the type of job the principal wants to …ll. We actually de…ne three types of jobs: strongly ful…lling jobs, weakly ful…lling jobs, and unful…lling jobs. Strongly ful…lling jobs description is such that it arouses the workplace identity for modest wage amount (relatively to the degree of demands of these jobs). Weakly ful…lling jobs description only arouses the workplace identity when wage amounts are large enough. Finally, arousing the workplace identity from agents having an unful…lling jobs would be too costly so that the principal o¤ers wage amounts arousing the out-of-the-workplace identity. Thus, non-wage characteristics of jobs in‡uence both the pro…tability and the e¢ciency of employment relations.

In the beginning of this chapter, we raise the following question: Why are employers so concerned about signalling recognition to their employees? How such a practice, which is not necessarily accompanied by any monetary reward, can in‡uence employees' behaviors? Our model provides an answer to these questions. The point would be for the employers to make their employees keep holding a workplace identity i.e. to allow an intrinsic motivation to develop. As regards pTWO e¢ciency, our model makes explicit a mechanism that could explain how empowerment could be achieved without increase in employees opportunism.

Beyond these answers, here are the main results of our analysis:

² we provide a condition for which the possibility to arouse the workplace identity increases the pro…tability of the employment relation: this condition mobilizes in particular non-wage grati…cation opportunities associated to the job under consideration, the reference wage of working persons holding the workplace identity. This condition remains the same whether there is moral hazard or not.

² (weakly or strongly) ful…lling jobs should be more pro…table than unful…lling jobs; all other things equal, …rms whose technology and organization are intensive in ful…lling jobs should make a higher pro…t than …rms whose technology and organization are intensive in unful…lling jobs.

² For certain strongly ful…lling jobs, high e¤ort is induced from agents paid the minimum wage (reservation wage). The marginal cost of e¤ort is locally decreasing in the degree

of demands associated to a job.

² The unobservability of e¤ort extends the class of ful…lling jobs.

² In the presence of moral hazard, self-esteem motivations of working persons allow a gain in e¢ciency. The link between the extent of this gain and the relative attraction of the out-of-the-workplace identity is usually non-monotonous.

² Self-esteem motivations all the more improve the e¢ciency of the employment relation that on considers more demanding jobs (which are also the better paid).

Let us stress on the possibility of empirical test of our model.

Our model assumptions refutation test. If a worker seek self-esteem through his job, our model assumes that this self-esteem be conditioned by: (a) the non-wage grati…cation opportunities his job o¤ers (his autonomy, the stimulating properties of the tasks he carries out, the non-pecuniary rewards he enjoys, etc.); (b) the relative level of his pay; (c) his degree of involvement in his work (overrunning the schedule, voluntary participation to training sessions, etc.). If this self-esteem is achieved through extra-occupational activities, it should be independent from previous variables. Our distinction as regards alternative strategies to achieve self-esteem (workplace or out-of-the-workplace identity) will be invalidated if the correlation coe¢cients between measures or (a), (b), and (c) on the one hand, and our measure of self-esteem are not signi…cantly di¤erent when calculated over the population of workers holding the workplace identity and workers holding the out-of-the-workplace identity.

Our model predictions refutation test. In our model, a job is ful…lling depending on the degree of discretion of its holder as regards method. This discretion implies a certain control over output. The types of job represented in a …rm should be related to the distribution of the productive control between workers. If control is very segmented, one could suspect an organization intensive in unful…lling jobs. A little segmented productive control will rather suggest an organization intensive in ful…lling jobs. The model predicts that, all other things equal, …rms of the …rst type should be more pro…table (in the average) than the …rms of the second type. If one can characterize …rms with organizations intensive in ful…lling jobs and show that, all other things equal, such …rms do not bene…t higher pro…t than those intensive in unful…lling jobs then the main predictions of our model would be refuted.

Our model predictions as regards pro…tability and e¢ciency appear to be consistent with the results of the literature on work organization - see chapter 1, Levine (1995), Ichniowski et al. (1997): developing non-wage grati…cation opportunities (notably by granting frontline workers with more discretion as regards their method) seem to actually lead to gains in productivity. As a consequence, to raise prescriptive issues, our line would be that of the literature on "job designing" - see for instance, Taber and Alliger (1995). If our model considers job characteristics as exogenous, the bene…ts from an adequate designing of a job look clear. Besides, the stress psychologists put on autonomy in stimulating an intrinsic motivation suggests that the principal faces a trade-o¤ which is not considered above: the decision to delegate productive power. This should provide a new angle perspective on the issue of empowerment.

In the next chapter, we start applying our model to the special issue of socio-demographic disparities in the labor market.

Appendix

Whether the e¤ort is veri…able or not, the contract o¤ered by the principal can be written as a quadruplet $(\underline{w}_0, \overline{w}_0; \underline{w}_1, \overline{w}_1)$, w_e referring to the ex post transfer when observing $q \in \{\underline{q}, \overline{q}\}$ and $e \in \{0, 1\}$. With moral hazard, possible contracts are restricted to the class of the previous quadruplet such that $\underline{w}_0 = \underline{w}_1$ and $\overline{w}_0 = \overline{w}_1$. Let $\mathbf{w}$ denote a contract o¤ered by the principal. Facing this o¤er, the agent with characteristic h plays

$$(a^*, e^*, c^*) \in \arg\max_{(a,e,c)\in \mathcal{A}} EU_c^a(\mathbf{w}, e)$$

Denote $\mathbf{W}_c^{in}(e)$ the set of contracts implementing (in, e) at least from an agent holding the identity c.

Suppose …rst that $\Delta\pi\Delta S < E_1 w$ so that the principal decides not to induce e¤ort $e = 1$. The question of participation remains raised. Let us bring to light conditions such that the principal induces the agent participation. The agent at least participates if $\mathbf{w} \in \mathbf{W}_c^{in}(0)$ for $c = A$ or $c = B$. Since the level of e¤ort is not at stake, the contract is simply contingent upon q i.e. it is a couple $(\underline{w}, \overline{w})$, and $\mathbf{W}_c^{in}(0) \subset \mathbb{R}^2$.

$\mathbf{w} \in \mathbf{W}_A^{in}(0; h)$ if and only if

$$EU_A^{in}(\mathbf{w}, 0) \geq EU_B^{out}(0) \quad \Leftrightarrow \quad (1 + \gamma_w) E_0 w + I_A(0) \geq I_B$$

$\mathbf{w} \in \mathbf{W}_B^{in}(0)$ if and only if

$$EU_B^{in}(\mathbf{w}, 0) \geq EU_B^{out}(0) \quad \Leftrightarrow \quad E_0 w + I_B \geq I_B$$

Proposition 0 Let (ϕ, ψ) describes a job the principal may like to be carried out, and (I_B, w_A, γ) an agent's identity concerns. With limited liability, the contract transferring 0 to the agent whatever the realization of $\tilde{q}$, induces his participation for a zero-effort. Furthermore

$$c^* = \begin{cases} A \text{ if } \Delta I(\phi) \leq 0 \\ B \text{ otherwise} \end{cases}$$

Proof. Since liability is limited, the principal chooses the contract $\mathbf{w}$ that solves

$$\min_{\mathbf{w}} E_0 w$$
$$\text{s.t. } \mathbf{w} \in (\mathbf{W}_A^{in}(0) \cup \mathbf{W}_B^{in}(0)) \cap \mathbb{R}_+^2$$

It is straightforward to see that for $E_0 w = 0$ that is when limited liability constraints are binding, an agent with identity B participates. When $I_A(0) \geq I_B$ ($\Leftrightarrow \Delta I \leq 0$), identity concerns lead the agent to hold the identity A that involves a higher self-esteem than the B. ■

Notice that the problem of inducing the agent participation arises in exactly similar terms under complete or incomplete information. Hence, in both cases, assuming that inducing the effort is too costly for the principal, participation will nonetheless be induced if and only if $E_0 S \geq 0$.

3.4 Optimal contracts under complete information

In this subsection, effort is supposed to be observable and verifiable.

Contrary to what previously holds, suppose that the principal tries to induce $e = 1$. We successively define the sets of incentive feasible contracts inducing effort from agent with the identity A and B.

$\mathbf{w} \in \mathbf{W}_A^{in}(1) \subset \mathbb{R}^4$ if and only if

$$
\begin{aligned}
EU_A^{in}(\mathbf{w},1) \geq EU_A^{in}(\mathbf{w},0) \quad &\Leftrightarrow \quad (1+\gamma_w) E_1 w_1 - \psi + I_A(1) \geq (1+\gamma_w) E_0 w_0 + I_A(0) \\
EU_A^{in}(\mathbf{w},1) \geq EU_B^{in}(\mathbf{w},0) \quad &\Leftrightarrow \quad (1+\gamma_w) E_1 w_1 - \psi + I_A(1) \geq E_0 w_0 + I_B \\
EU_A^{in}(\mathbf{w},1) \geq EU_B^{out}(\mathbf{w},0) \quad &\Leftrightarrow \quad (1+\gamma_w) E_1 w_1 - \psi + I_A(1) \geq I_B
\end{aligned}
$$

We denote (IC_A), $\left(IC_{A/B}\right)$ and (PC_A), respectively, these three constraints.

$\mathbf{w} \in \mathbf{W}_B^{in}(1) \subset \mathbb{R}^4$ if and only if

$$
\begin{aligned}
EU_B^{in}(\mathbf{w},1) \geq EU_B^{in}(\mathbf{w},0) \quad &\Leftrightarrow \quad E_1 w_1 - \psi + I_B \geq E_0 w_0 + I_B \\
EU_B^{in}(\mathbf{w},1) \geq EU_A^{in}(\mathbf{w},0) \quad &\Leftrightarrow \quad E_1 w_1 - \psi + I_B \geq (1+\gamma_w) E_0 w_0 + I_A(0) \\
EU_B^{in}(\mathbf{w},1) \geq EU_B^{out}(\mathbf{w},0) \quad &\Leftrightarrow \quad E_1 w_1 - \psi + I_B \geq I_B
\end{aligned}
$$

We denote (IC_B), $\left(IC_{B/A}\right)$, and (PC_B), respectively, these three constraints.

Since liability is limited, the principal chooses the contract $\mathbf{w}$ that solves

$$
\begin{gathered}
\min_{\mathbf{w}} E_1 w_1 \\
\text{s.t. } \mathbf{w} \in \left(\mathbf{W}_A^{in}(1) \cup \mathbf{W}_B^{in}(1)\right) \cap \mathbb{R}_+^4
\end{gathered}
$$

Proposition 1 *Under complete information, with limited liability,*

$$
E_1 w_1^* = \begin{cases}
\max\left\{\frac{\psi - \gamma_e}{1+\gamma_w}; 0\right\} & \text{if } \Delta I(\phi) \leq 0 \\
\max\left\{\frac{\psi - \gamma_e + \Delta I(\phi)}{1+\gamma_w}; 0\right\} & \text{if } 0 < \Delta I(\phi) \leq \gamma_w \psi + \gamma_e \\
\psi \text{ otherwise}
\end{cases}
$$

and effort $e = 1$ is induced if and only if $E_1 w_1^* \leq \Delta\pi\Delta S$. When effort is not induced by the principal ($e = 0$), participation requires a transfer of 0, and she keeps inducing it if and only if $E_0 S \geq 0$. Otherwise, the job is left closed.

Proof. Notice first that, since both the agent and the principal are risk-neutral, only expected transfers matter i.e. we are looking for a couple of expected transfers $(E_0 w_0, E_1 w_1)$ solving the latter program. Since the contract can be contingent upon e, a first step for the principal is to make the outside options (options that involve $e = 0$) as unrewarding as possible. Limited liability constraints prevent her from pushing corresponding transfers below 0. Hence, the strongest possible punishment entails $E_0 w_0^* = 0$ so that

$$\mathbf{w} \in \mathbf{W}_A^{in}(1) \Leftrightarrow (1+\gamma_w) E_1 w_1 - \psi + I_A(1) \geq \max\{I_A(0), I_B\}$$

and

$$\mathbf{w} \in \mathbf{W}_B^{in}(1) \Leftrightarrow E_1 w_1 - \psi + I_B \geq \max\{I_B, I_A(0)\}$$

The most demanding constraint is obviously binding in the optimum. Taking into account limited liability constraints, the lowest expected transfer inducing effort writes

$$E_1 w_1^* = \max\left\{\min\left\{\frac{\psi + \max\{I_A(0), I_B\} - I_A(1)}{1+\gamma_w}; \psi + \max\{I_B, I_A(0)\} - I_B\right\}; 0\right\}$$

Hence, if $I_A(0) \geq I_B\ (>0)$ (that is $\Delta I \leq 0$), since $I_A(1) = I_A(0) + \gamma_e$,

$$E_1 w_1^* = \max\left\{\min\left\{\frac{\psi - \gamma_e}{1+\gamma_w}; \psi + I_A(0) - I_B\right\}; 0\right\} = \max\left\{\frac{\psi - \gamma_e}{1+\gamma_w}; 0\right\}$$

while for $I_A(0) < I_B$ that is $\Delta I > 0$, we get

$$E_1 w_1^* = \max\left\{\min\left\{\frac{\psi + I_B - I_A(1)}{1+\gamma_w}; \psi\right\}; 0\right\} = \begin{cases} \max\left\{\frac{\psi + \Delta I - \gamma_e}{1+\gamma_w}; 0\right\} & \text{if } \gamma_w \psi + \gamma_e > \Delta I \\ \psi & \text{otherwise} \end{cases}$$

The remaining derives from claim 0. ■

3.5 Optimal contracts with moral hazard

Effort is now assumed not to be observable nor verifiable. We have already seen what was the optimal strategy of the principal when inducing $e = 1$ was too costly. Hereafter, we suppose that the principal wants to implement the positive effort level, and determine the optimal contracts under this assumptions.

With moral hazard, the principal can no longer make transfers depending on e: $\underline{w}_0 =$

$\underline{w}_1 = \underline{w}$ and $\overline{w}_0 = \overline{w}_1 = \overline{w}$. This affects the set of incentive feasible contracts in the following way:

$\mathbf{w} \in \mathbf{W}_A^{in}(1) \subset \mathbb{R}^2$ if and only if

$$\begin{array}{ll} (1+\gamma_w) E_1 w - \psi + I_A(1) \geq (1+\gamma_w) E_0 w + I_A(0) & (IC_A) \\ (1+\gamma_w) E_1 w - \psi + I_A(1) \geq E_0 w + I_B & \left(IC_{A/B}\right) \\ (1+\gamma_w) E_1 w - \psi + I_A(1) \geq I_B & (PC_A) \end{array}$$

$\mathbf{w} \in \mathbf{W}_B^{in}(1) \subset \mathbb{R}^2$ if and only if

$$\begin{array}{ll} E_1 w - \psi + I_B \geq E_0 w + I_B & (IC_B) \\ E_1 w - \psi + I_B \geq (1+\gamma_w) E_0 w + I_A(0) & \left(IC_{B/A}\right) \\ E_1 w - \psi + I_B \geq I_B & (PC_B) \end{array}$$

and the problem writes

$$\begin{array}{c} \min_{\mathbf{w}} E_1 w \\ \text{s.t. } \mathbf{w} \in \left(\mathbf{W}_A^{in}(1) \cup \mathbf{W}_B^{in}(1)\right) \cap \mathbb{R}_+^2 \end{array}$$

The solutions of this program can no more be reduced to a couple of expected transfers. As a consequence, it is more convenient to work with variables $\underline{w}$ and $\Delta w = \overline{w} - \underline{w}$. A reformulation of incentives feasible sets is then required that we propose in the remaining. We will solve this program in three steps: (1) assuming that the solution involves the arousing of the identity A; (2) assuming that the solution involves the arousing of the identity B; (3) on the ground of the previous steps, making explicit conditions such that one identity is actually aroused in the optimum.

3.5.1 The lowest expected transfer inducing $e = 1$ and identity A

Here, we tackle the first step of our resolution. As was just announced, we start by reformulating the problem using $\underline{w}$ and Δw:

$\mathbf{w} \in \mathbf{W}_A^{in}(1) \cap \mathbb{R}_+^2$ if and only if

$$\Delta w \geq \frac{\psi - \gamma_e}{(1+\gamma_w)\Delta\pi} \qquad (IC_A)$$

$$\underline{w} + \frac{(1+\gamma_w)\pi_1 - \pi_0}{\gamma_w}\Delta w \geq \frac{\psi + \Delta I - \gamma_e}{\gamma_w} \qquad \left(IC_{A/B}\right)$$

$$\underline{w} + \pi_1 \Delta w \geq \frac{\psi + \Delta I - \gamma_e}{1+\gamma_w} \qquad (PC_A)$$

$$\underline{w} \geq 0 \text{ and } \underline{w} + \Delta w \geq 0 \qquad (LLC)$$

and the problem writes

$$\min_{(\underline{w},\Delta w)} \underline{w} + \pi_1 \Delta w \text{ s.t. } (IC_A), \left(IC_{A/B}\right), (PC_A), (LLC)$$

Lemma 1 The contract solving the previous problem is such that $\Delta w \geq 0$.

Proof. We prove it by contradiction.

Suppose there exists an optimum such that $\Delta w < 0$ (and $\underline{w} > 0$ since (LLC) is satisfied). In that case, (PC_A) would be relaxed. Indeed, if $\psi + \Delta I - \gamma_e \geq 0$, $\Delta w < 0$ implies

$$\underline{w} + \pi_1 \Delta w > \underline{w} + \frac{(1+\gamma_w)\pi_1 - \pi_0}{\gamma_w}\Delta w \geq \frac{\psi + \Delta I - \gamma_e}{\gamma_w} \geq \frac{\psi + \Delta I - \gamma_e}{1+\gamma_w}$$

i.e. $\left(IC_{A/B}\right) \Rightarrow (PC_A)$, while if $\psi + \Delta I - \gamma_e < 0$, $\Delta w < 0$ implies

$$\underline{w} + \pi_1 \Delta w > \underline{w} + \Delta w \geq 0 \geq \frac{\psi + \Delta I - \gamma_e}{1+\gamma_w}$$

i.e. $(LLC) \Rightarrow (PC_A)$. Hence, consider the variation $d\Delta w \in]0; -\Delta w[$ and $d\underline{w}$ such that

$$d\underline{w} = -\min\left\{\min\left\{\frac{(1+\gamma_w)\pi_1 - \pi_0}{\gamma_w}; 1\right\} d\Delta w; \underline{w}\right\}$$

If $\min\left\{\frac{(1+\gamma_w)\pi_1 - \pi_0}{\gamma_w}; 1\right\} d\Delta w \leq \underline{w}$, one obtains

$$d\left(\underline{w} + \frac{(1+\gamma_w)\pi_1 - \pi_0}{\gamma_w}\Delta w\right) = \left(\frac{(1+\gamma_w)\pi_1 - \pi_0}{\gamma_w} - \min\left\{\frac{(1+\gamma_w)\pi_1 - \pi_0}{\gamma_w}; 1\right\}\right) d\Delta w \geq 0$$

and

$$d\left(\underline{w}+\Delta w\right)=\left(1-\min\left\{\frac{(1+\gamma_w)\pi_1-\pi_0}{\gamma_w};1\right\}\right)d\Delta w\geq 0$$

so that the couple of variations $(d\Delta w, dw)$ does not involve any violation of $\left(IC_{A/B}\right)$ or (LLC) while it relaxes (IC_A). Nevertheless,

$$d\left(\underline{w}+\pi_1\Delta w\right)=\left(\pi_1-\min\left\{\frac{(1+\gamma_w)\pi_1-\pi_0}{\gamma_w};1\right\}\right)d\Delta w<0$$

that is, the expected transfer is reduced which contradicts our initial assumption.

If $\min\left\{\frac{(1+\gamma_w)\pi_1-\pi_0}{\gamma_w};1\right\}d\Delta w>\underline{w}$, the couple of variations $(\underline{w},-\underline{w})$ leaves all the constraints non violated. However,

$$d\left(\underline{w}+\pi_1\Delta w\right)=-\underline{w}+\pi_1\underline{w}<0$$

which contradicts our initial assumption. ■

The previous lemma implies that the solution to our problem also solves

$$\min_{(\underline{w},\Delta w)}\underline{w}+\pi_1\Delta w\text{ s.t. }(IC_A),\left(IC_{A/B}\right),(PC_A),\underline{w}\geq 0\text{ and }\Delta w\geq 0$$

As a preamble to what follows, notice that for $\Delta w\geq 0$, since $\gamma_w>0$ and $\pi_1>\Delta\pi>0$, if $\left(IC_{A/B}\right)$ is satisfied then (PC_A) is satisfied. Let $\mathbf{w_1^A}=\left(\underline{w}_1^A,\overline{w}_1^A\right)$ denotes the contract implementing effort $e=1$ that arouses A, and minimizes the expected transfer.

Claim With moral hazard and limited liability, the contract minimizing the expected transfer inducing identity A, and effort $e=1$ entails:

$$\mathbf{w}_1^A=\begin{cases}\left(0,\max\left\{\frac{\psi-\gamma_e}{(1+\gamma_w)\Delta\pi};0\right\}\right) & \text{if }\Delta I\leq\frac{\gamma_w}{1+\gamma_w}\frac{\pi_0}{\Delta\pi}(\psi-\gamma_e)\\ \left(0,\max\left\{\frac{\psi-\gamma_e+\Delta I}{(1+\gamma_w)\pi_1-\pi_0};0\right\}\right) & \text{otherwise}\end{cases}$$

Proof. The case $\gamma_e<\psi$.

First suppose that $\frac{\psi-\gamma_e}{(1+\gamma_w)\Delta\pi}\geq\frac{\psi-\gamma_e+\Delta I}{(1+\gamma_w)\pi_1-\pi_0}$. We conjecture that (LLC) and (IC_A) are the only relevant constraints. Of course, since the principal is willing to minimize the payments made to the agent, both constraints must be binding. Hence, $\underline{w}_1^A = 0$ and $\overline{w}_1^A = \frac{\psi - \gamma_e}{(1+\gamma_w)\Delta\pi}$. We check that $\left(IC_{A/B}\right)$ is satisfied since:

$$\frac{(1+\gamma_w)\pi_1 - \pi_0}{\gamma_w}\frac{\psi - \gamma_e}{(1+\gamma_w)\Delta\pi} \geq \frac{(1+\gamma_w)\pi_1 - \pi_0}{\gamma_w}\frac{\psi - \gamma_e + \Delta I}{(1+\gamma_w)\pi_1 - \pi_0} = \frac{\psi - \gamma_e + \Delta I}{\gamma_w}$$

For $\frac{\psi - \gamma_e}{(1+\gamma_w)\Delta\pi} < \frac{\psi - \gamma_e + \Delta I}{(1+\gamma_w)\pi_1 - \pi_0}$, we conjecture that (LLC) and $\left(IC_{A/B}\right)$ are the only relevant constraints. Both these constraints must be binding in the optimum so that $\underline{w}_1^A = 0$ and $\overline{w}_1^A = \frac{\psi - \gamma_e + \Delta I}{(1+\gamma_w)\pi_1 - \pi_0}$. Constraint (PC_A) is then satisfied since

$$\pi_1 \Delta w = \frac{\psi + \Delta I - \gamma_e}{1 + \gamma_w - \frac{\pi_0}{\pi_1}} > \frac{\psi + \Delta I - \gamma_e}{1 + \gamma_w}$$

In the case $\gamma_e \geq \psi$, $\Delta w \geq 0 \Rightarrow (IC_A)$. We minimize the expected transfer subject to $\left(IC_{A/B}\right)$, (LLC) and $\Delta w \geq 0$. It is then clear that, in the optimum, $\underline{w} = 0$, which leads to

$$\overline{w}_1^A = \Delta w = \max\left\{\frac{\psi + \Delta I - \gamma_e}{(1+\gamma_w)\pi_1 - \pi_0}; 0\right\}$$

■

We can now move on to the next step.

3.5.2 The lowest expected transfers inducing $e = 1$ and the identity B

The limited liability condition $\mathbf{w} \geq \mathbf{0} \Rightarrow E_0 w \geq 0$ so that (IC_B) implies (PC_B). Hence, the set $\mathbf{W}_B^{in}(1,h) \cap \mathbb{R}_+^2$ can be restricted to (and reformulated as) contracts $(\underline{w}, \Delta w)$ that satisfy

$$\begin{aligned} \Delta w &\geq \tfrac{\psi}{\Delta\pi}\,(>0) && (IC_B) \\ \underline{w} - \tfrac{\pi_1 - (1+\gamma_w)\pi_0}{\gamma_w}\Delta w &\leq \tfrac{\Delta I - \psi}{\gamma_w} && \left(IC_{B/A}\right) \\ \underline{w} &\geq 0 && (LLC) \end{aligned}$$

and the problem writes

$$\min_{(\underline{w},\Delta w)} \underline{w} + \pi_1 \Delta w \text{ s.t. } (IC_B)\,, \left(IC_{B/A}\right), (LLC)$$

As a preamble, we must state conditions guarantying $\mathbf{W}_B^{in}(1) \cap \mathbb{R}^2_+$ non-emptiness.

Lemma 2

$$W_B^{in}(1) \cap \mathbb{R}^2_+ \neq \emptyset \;\Leftrightarrow\; \left\{ \text{either } \gamma_w \frac{\pi_0}{\Delta \pi}\psi \le \Delta I \text{ or } \pi_1 > (1+\gamma_w)\,\pi_0 \right\}$$

We denote C this condition.

Proof. Necessary and sufficient conditions so that $\mathbf{W}_B^{in}(1) \cap \mathbb{R}^2_+ \neq \emptyset$.

i) Suppose $\pi_1 > (1+\gamma_w)\,\pi_0$.

If $-\frac{\pi_1-(1+\gamma_w)\pi_0}{\gamma_w}\frac{\psi}{\Delta\pi} \le \frac{\Delta I-\psi}{\gamma_w}$ then $\left(0,\frac{\psi}{\Delta\pi}\right)$ obviously satisfies (LLC), $\left(IC_{B/A}\right)$ and (IC_B). Hence $\left(0,\frac{\psi}{\Delta\pi}\right) \in \mathbf{W}_B^{in}(1) \cap \mathbb{R}^2_+ \neq \emptyset$.

If $-\frac{\pi_1-(1+\gamma_w)\pi_0}{\gamma_w}\frac{\psi}{\Delta\pi} > \frac{\Delta I-\psi}{\gamma_w} \Leftrightarrow \frac{\psi-\Delta I}{\pi_1-(1+\gamma_w)\pi_0} > \frac{\psi}{\Delta\pi}$ then $\left(0,\frac{\psi-\Delta I}{\pi_1-(1+\gamma_w)\pi_0}\right) \in \mathbf{W}_B^{in}(1) \cap \mathbb{R}^2_+$. Indeed, (LLC) and (IC_B) are obviously satisfied and

$$-\frac{\pi_1-(1+\gamma_w)\,\pi_0}{\gamma_w}\,\frac{\psi-\Delta I}{\pi_1-(1+\gamma_w)\,\pi_0} = \frac{\Delta I-\psi}{\gamma_w} \le \frac{\Delta I-\psi}{\gamma_w}$$

so that $\left(IC_{B/A}\right)$ is satisfied.

ii) Suppose $\pi_1 \le (1+\gamma_w)\,\pi_0$.

Then, $\mathbf{w} \in \mathbf{W}_B^{in}(1) \cap \mathbb{R}^2_+ \Rightarrow \underline{w} + \frac{(1+\gamma_w)\pi_0-\pi_1}{\gamma_w}\Delta w \le \frac{\Delta I-\psi}{\gamma_w}$. Furthermore, $\underline{w} \ge 0$ and $\Delta w \ge \frac{\psi}{\Delta\pi}$ imply

$$\underline{w} + \frac{(1+\gamma_w)\,\pi_0-\pi_1}{\gamma_w}\Delta w \ge \frac{(1+\gamma_w)\,\pi_0-\pi_1}{\gamma_w}\frac{\psi}{\Delta\pi}$$

hence

$$\frac{(1+\gamma_w)\,\pi_0-\pi_1}{\gamma_w}\frac{\psi}{\Delta\pi} \le \frac{\Delta I-\psi}{\gamma_w} \;\Leftrightarrow\; \gamma_w\frac{\pi_0}{\Delta\pi}\psi \le \Delta I$$

If $\gamma_w\frac{\pi_0}{\Delta\pi}\psi \le \Delta I$ then $\left(0,\frac{\psi}{\Delta\pi}\right) \in \mathbf{W}_B^{in}(1) \cap \mathbb{R}^2_+ \neq \emptyset$. ■

Let $\mathbf{w_1}^B = \left(\underline{w}_1^B, \overline{w}_1^B\right)$ denotes the contract inducing effort that arouses the identity B, and minimizes the expected transfer.

Claim Assuming that C holds, with moral hazard and limited liability, the contract minimizing the expected transfer inducing identity B, and effort $e = 1$ entails:

$$\mathbf{w}_1^B = \begin{cases} \left(0, \frac{\psi - \Delta I}{\pi_1 - (1+\gamma_w)\pi_0}\right) & \text{if } \Delta I < \gamma_w \frac{\pi_0}{\Delta\pi}\psi \\ \left(0, \frac{\psi}{\Delta\pi}\right) & \text{otherwise} \end{cases}$$

Proof. We easily prove that $\underline{w}_1^B = 0$. Indeed, if $\underline{w}_1^B$ was strictly positive then, by reducing it we could relax constraints $\left(IC_{B/A}\right)$, and still reduce the expected transfer.

For $\gamma_w \frac{\pi_0}{\Delta\pi}\psi \leq \Delta I \Leftrightarrow \frac{\psi - \Delta I}{\pi_1 - (1+\gamma_w)\pi_0} \leq \frac{\psi}{\Delta\pi}$, since $\underline{w}_1^B = 0$, $(IC_B) \Rightarrow (IC_{B/A})$. Since in the optimum (IC_B) is binding, $\mathbf{w_1}^B = \left(0, \frac{\psi}{\Delta\pi}\right)$.

For $\gamma_w \frac{\pi_0}{\Delta\pi}\psi > \Delta I \Leftrightarrow \frac{\psi - \Delta I}{\pi_1 - (1+\gamma_w)\pi_0} > \frac{\psi}{\Delta\pi} \Leftrightarrow \mathbf{W}_B^{in}(1) \cap \mathbb{R}_+^2 \neq \emptyset \Leftrightarrow \pi_1 > (1+\gamma_w)\pi_0$ (see the lemma 2). If this latter condition holds, since $\underline{w}_1^B = 0$, $(IC_{B/A}) \Rightarrow (IC_B)$. Of course, in the optimum, $(IC_{B/A})$ is binding so that $\mathbf{w_1}^B = \left(0, \frac{\psi - \Delta I}{\pi_1 - (1+\gamma_w)\pi_0}\right)$. ■

We can move on to our last step leading to optimal contract.

3.5.3 The principal's choice

The principal arouses the identity that minimizes expected transfer implementing effort $e = 1$. We denote $\mathbf{w_1}^\star = (\underline{w}_1^\star, \overline{w}_1^\star)$ the contract inducing effort that minimizes the expected transfer. Whatever the aroused identity, the wage in the bad state of nature $(\tilde{q} = \underline{q})$ is 0 - the limited liability constraint is binding. In the good state of nature, the principal arouses the identity that requires the least transfer

$$\overline{w}_1^\star = \begin{cases} \min\left\{\overline{w}_1^A, \overline{w}_1^B\right\} & \text{whenever } \mathbf{W}_B^{in}(1) \cap \mathbb{R}_+^2 \neq \emptyset \\ \overline{w}_1^A & \text{otherwise} \end{cases}$$

Proposition 2 With moral hazard and limited liability, the contract minimizing expected transfer while inducing $e = 1$ is

$$\mathbf{w}_1^\star = \begin{cases} \left(0; \max\left\{\frac{\psi-\gamma_e}{(1+\gamma_w)\Delta\pi}; 0\right\}\right) & \text{if } \Delta I \le \frac{\gamma_w}{1+\gamma_w}\frac{\pi_0}{\Delta\pi}(\psi-\gamma_e) \\ \left(0; \max\left\{\frac{\psi+\Delta I-\gamma_e}{(1+\gamma_w)\pi_1-\pi_0}; 0\right\}\right) & \text{if } \frac{\gamma_w}{1+\gamma_w}\frac{\pi_0}{\Delta\pi}(\psi-\gamma_e) < \Delta I \le \gamma_w\frac{\pi_1}{\Delta\pi}\psi+\gamma_e \\ \left(0; \frac{\psi}{\Delta\pi}\right) & \text{otherwise}\end{cases}$$

and effort $e = 1$ is induced if and only if $E_1 w^\star \le \Delta\pi\Delta S$. When effort is not induced by the principal ($e = 0$), participation requires a transfer of 0, and she keeps inducing it if and only if $E_0 S \ge 0$. Otherwise, the job is left closed.

Proof. We have already shown that $\overline{w}_1^A = \max\left\{\frac{\psi+\Delta I-\gamma_e}{(1+\gamma_w)\pi_1-\pi_0}, \frac{\psi-\gamma_e}{(1+\gamma_w)\Delta\pi}, 0\right\}$.

• Suppose first that $(1+\gamma_w)\pi_0 < \pi_1$ so that $\mathbf{W}_B^{in}(1,h)\cap\mathbb{R}^2_+ \neq \emptyset$.

For $\gamma_w\frac{\pi_0}{\Delta\pi}\psi \le \Delta I$, $\overline{w}_1^B = \frac{\psi}{\Delta\pi}$ and $\frac{\gamma_w}{1+\gamma_w}\frac{\pi_0}{\Delta\pi}(\psi-\gamma_e) < \Delta I$ so that $\overline{w}_1^A = \frac{\psi+\Delta I-\gamma_e}{(1+\gamma_w)\pi_1-\pi_0}$. Hence, $\overline{w}_1^\star = \min\left\{\frac{\psi+\Delta I-\gamma_e}{(1+\gamma_w)\pi_1-\pi_0}, \frac{\psi}{\Delta\pi}\right\}$. $\frac{\psi+\Delta I-\gamma_e}{(1+\gamma_w)\pi_1-\pi_0} > \frac{\psi}{\Delta\pi} \Leftrightarrow \Delta I > \gamma_w\frac{\pi_1}{\Delta\pi}\psi+\gamma_e$. Then

$$\overline{w}_1^\star = \begin{cases}\frac{\psi+\Delta I-\gamma_e}{(1+\gamma_w)\pi_1-\pi_0} & \text{if } \Delta I \le \gamma_w\frac{\pi_1}{\Delta\pi}\psi+\gamma_e\\ \frac{\psi}{\Delta\pi} & \text{otherwise}\end{cases}$$

For $\gamma_w\frac{\pi_0}{\Delta\pi}\psi > \Delta I$, $\overline{w}_1^B = \frac{\psi-\Delta I}{\pi_1-(1+\gamma_w)\pi_0}$.

If $\frac{\gamma_w}{1+\gamma_w}\frac{\pi_0}{\Delta\pi}(\psi-\gamma_e) \ge \Delta I$ then $\overline{w}_1^A = \frac{\psi-\gamma_e}{(1+\gamma_w)\Delta\pi}$. Hence, $\overline{w}_1^\star = \min\left\{\frac{\psi-\gamma_e}{(1+\gamma_w)\Delta\pi}, \frac{\psi-\Delta I}{\pi_1-(1+\gamma_w)\pi_0}\right\}$ .wit $\frac{\psi-\gamma_e}{(1+\gamma_w)\Delta\pi} \le \frac{\psi-\Delta I}{\pi_1-(1+\gamma_w)\pi_0} \Leftrightarrow \frac{\pi_1}{\Delta\pi}(\psi-\gamma_e) \ge \frac{1+\gamma_w}{\gamma_w}(\Delta I-\gamma_e)$. Moreover, since $\pi_0 < \pi_1$, $\frac{\pi_0}{\Delta\pi}(\psi-\gamma_e) \ge \frac{1+\gamma_w}{\gamma_w}\Delta I \Rightarrow \frac{\pi_1}{\Delta\pi}(\psi-\gamma_e) \ge \frac{1+\gamma_w}{\gamma_w}(\Delta I-\gamma_e)$ so that $\overline{w}_1^\star = \frac{\psi-\gamma_e}{(1+\gamma_w)\Delta\pi}$.

If $\frac{\gamma_w}{1+\gamma_w}\frac{\pi_0}{\Delta\pi}(\psi-\gamma_e) < \Delta I$ then $\overline{w}_1^A = \frac{\psi+\Delta I-\gamma_e}{(1+\gamma_w)\pi_1-\pi_0}$. Hence, $\overline{w}_1^\star = \min\left\{\frac{\psi+\Delta I-\gamma_e}{(1+\gamma_w)\pi_1-\pi_0}, \frac{\psi-\Delta I}{\pi_1-(1+\gamma_w)\pi_0}\right.$ $\frac{\psi+\Delta I-\gamma_e}{(1+\gamma_w)\pi_1-\pi_0} \ge \frac{\psi-\Delta I}{\pi_1-(1+\gamma_w)\pi_0} \Leftrightarrow \left(2\frac{\pi_0}{\Delta\pi}+1\right)\psi \le \left(2\frac{1}{\gamma_w}+1\right)\Delta I + \left(\frac{\pi_0}{\Delta\pi}-\frac{1}{\gamma_w}\right)\gamma_e$. But,

first: $(1+\gamma_w)\pi_0 < \pi_1$ and $\gamma_e > 0 \Rightarrow \left(\frac{\pi_0}{\Delta\pi}-\frac{1}{\gamma_w}\right)\gamma_e < 0$

second: $\gamma_w\frac{\pi_0}{\Delta\pi}\psi > \Delta I \Rightarrow 2\frac{\pi_0}{\Delta\pi}\psi > 2\frac{\Delta I}{\gamma_w}$

third: $\gamma_w\frac{\pi_0}{\Delta\pi}\psi > \Delta I$ and $(1+\gamma_w)\pi_0 < \pi_1 \Rightarrow \psi > \Delta I$.

So that $\left(2\frac{\pi_0}{\Delta\pi}+1\right)\psi > \left(2\frac{1}{\gamma_w}+1\right)\Delta I + \left(\frac{\pi_0}{\Delta\pi}-\frac{1}{\gamma_w}\right)\gamma_e$, and $\overline{w}_1^\star = \frac{\psi+\Delta I-\gamma_e}{(1+\gamma_w)\pi_1-\pi_0}$.

• Suppose now that $(1+\gamma_w)\pi_0 \le \pi_1$ so that $\mathbf{W}_B^{in}(1,h)\cap\mathbb{R}^2_+$ can be empty.

For $\gamma_w \frac{\pi_0}{\Delta\pi}\psi < \Delta I$, $\overline{w}_1^B = \frac{\psi}{\Delta\pi}$ and $\frac{\pi_0}{\Delta\pi}(\psi - \gamma_e) < \frac{1+\gamma_w}{\gamma_w}\Delta I$ so that $\overline{w}_1^A = \frac{\psi+\Delta I - \gamma_e}{(1+\gamma_w)\pi_1 - \pi_0}$. Hence, $\overline{w}_1^\star = \min\left\{\frac{\psi+\Delta I - \gamma_e}{(1+\gamma_w)\pi_1 - \pi_0}, \frac{\psi}{\Delta\pi}\right\}$ a case we have already consider.

For $\gamma_w \frac{\pi_0}{\Delta\pi}\psi \geq \Delta I$, $\mathbf{W}_B^{in}(1,h) \cap \mathrm{R}_+^2 = \emptyset$. Hence $\overline{w}_1^\star = \overline{w}_1^A$.

2 The remaining derives from claim 0.

■

3.6 The analysis of the loss in efficiency resulting from moral hazard

In the standard model (where only the identity B is available), the loss in efficiency is simply $\Lambda = \frac{\pi_0}{\Delta\pi}\psi$. This will constitute the benchmark of our analysis of the impact of self-esteem motivations on the efficiency of the employment relation. We will see that self-esteem motivations often imply $\Lambda < \frac{\pi_0}{\Delta\pi}\psi$. Hence, for $\Lambda < \Delta\pi\Delta S - E_1 w_1^* < \frac{\pi_0}{\Delta\pi}\psi$, effort $e = 1$ is induced in a job which would not have been actively hold in the absence of a workplace identity.

The variability of the loss in efficiency due to moral hazard may reflect two possibilities. When leaving the type of a job unchanged, differences to the standard case can result from the fact that, as we have seen, transfers are affected by agents' self-esteem motivations. The second possibility results from the capacity of moral hazard to change the type of a job. The coming analysis stress on this second possibility - which represents a qualitative difference to standard case.

The key variables of our analysis are: the degree of demands ψ and the intensity of the effort prescription γ_e defining the workplace identity. The ratio $\frac{\gamma_e}{\psi}$ represents the relative intensity of the effort prescription.

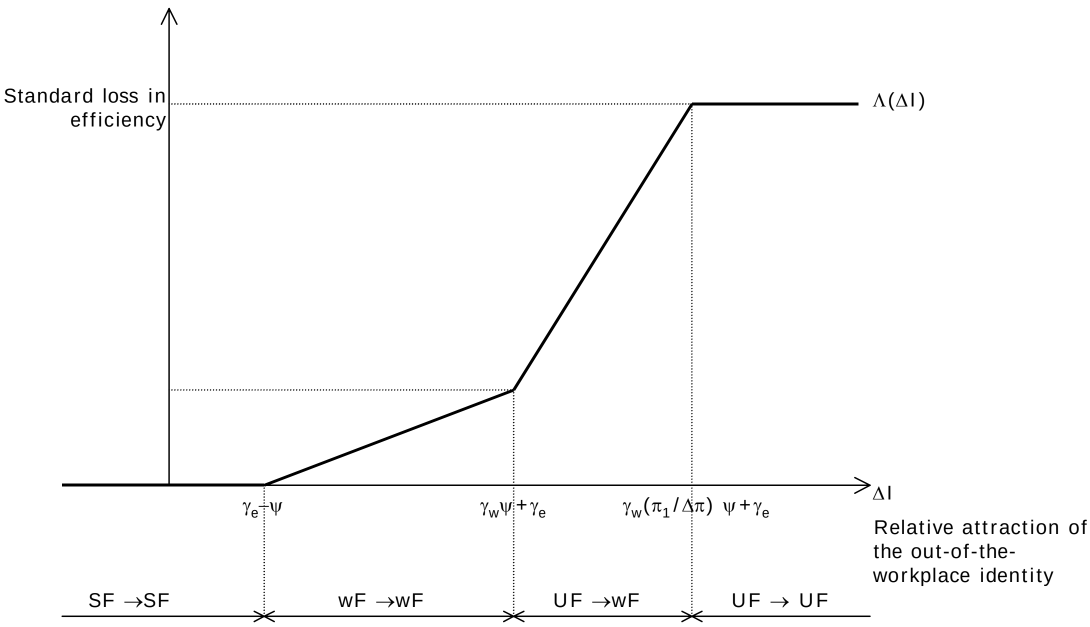


Figure 3-3: Inefficiency due to moral hazard as a function of the relative attraction of outside-work - high intensity.

3.6.1 The case of a high relative intensity of the effort prescription

For $1 < \frac{\gamma_e}{\psi}$, holding the identity A makes opportunism (e = 0) so costly (in terms of self-esteem) that the effort prescription overcompensates its disutility. The next figure[25] depicts the form of the relation between the relative attraction of outside-work and the loss in efficiency due to the unobservability of effort.

For a low relative attraction of outside work activities $\Delta I \leq \gamma_e - \psi$, jobs are strongly fulfilling whether or not information is complete ($SF \to SF$). These jobs are further paid the reservation wage in both cases. Moral hazard does not entail any inefficiency. When $\gamma_e - \psi < \Delta I \leq \gamma_w \psi + \gamma_e$ the job is weakly fulfilling both under complete and incomplete information ($wF \to wF$). In this case, the expected transfers inducing effort, $E_1 w_1^*$ and $E_1 w^\star$, are both increasing in ΔI. It turns out that $E_1 w^\star$ rises more quickly

[25] Where we assumed $\frac{\gamma_w}{1+\gamma_w}\frac{\pi_0}{\Delta\pi} < 1$. This assumption is limited to this case, we give it up in the remaining.

than $E_1 w_1^*$ so that the inefficiency associated to moral hazard is itself increasing in ΔI. When $\gamma_w \psi + \gamma_e < \Delta I < \gamma_w \frac{\pi_1}{\Delta\pi}\psi + \gamma_e$, jobs under consideration are unfulfilling under complete information but weakly fulfilling with moral hazard ($UF \to wF$): this involves an inefficiency which, although increasing a higher pace, remains below what standard analysis predicts. This is no longer the case when the relative attraction of outside work becomes strong, $\gamma_w \frac{\pi_1}{\Delta\pi}\psi + \gamma_e \leq \Delta I$, to the extent that one is actually dealing with unfulfilling jobs whether effort is observable or not ($UF \to UF$): we are back to the standard case.

3.6.2 The case of an intermediate relative intensity of the effort prescription

This case $\left(\gamma_w \frac{\pi_0 - (1+\gamma_w)\Delta\pi}{(1+\gamma_w)\pi_1 - \pi_0} < \frac{\gamma_e}{\psi} \leq 1\right)$ actually reflects a condition on $\frac{\gamma_e}{\psi}$ as well as a condition on parameters π and γ_w. It prevails in particular when $\pi_0 - (1+\gamma_w)\Delta\pi \leq 0 \Leftrightarrow \left(1 + \frac{1}{1+\gamma_w}\right)\pi_0 \leq \pi_1$ that is for technologies leading to a (relatively) strong impact of effort $e = 1$.

The principal cannot rely solely on the intensity of the effort prescription to obtain the agent holding the identity A involvement. The relation between the relative attraction of outside-work and the inefficiency resulting from moral hazard[26] can have two profiles which we depict in broken lines in the next figure.

In the commentary of this figure, we focus on the configuration which did not occur in the previous case. For $\psi - \gamma_e < \Delta I \leq 0$, the job is strongly fulfilling under the assumption of complete information as well as under incomplete information ($SF \to SF$).

[26] For $\gamma_w \frac{\pi_0 - (1+\gamma_w)\Delta\pi}{(1+\gamma_w)\pi_1 - \pi_0} < \frac{\gamma_e}{\psi} \leq 1$:

$$*(\Delta I) = \begin{cases} 0 & \text{si } \Delta I \leq \gamma_e - \psi \\ \frac{\pi_0}{\Delta\pi}\frac{\psi - \gamma_e}{1+\gamma_w} & \text{si } \gamma_e - \psi < \Delta I \leq 0 \\ -\frac{1}{1+\gamma_w}\Delta I + \frac{\pi_0}{\Delta\pi}\frac{\psi - \gamma_e}{1+\gamma_w} & \text{si } 0 < \Delta I \leq \frac{\gamma_w}{1+\gamma_w}\frac{\pi_0}{\Delta\pi}(\psi - \gamma_e) \\ \left(\frac{\pi_0}{((1+\gamma_w)\pi_1 - \pi_0)(1+\gamma_w)}\right)\Delta I + \frac{\pi_0}{(1+\gamma_w)\pi_1 - \pi_0}\frac{\psi - \gamma_e}{1+\gamma_w}, & \text{si } \frac{\gamma_w}{1+\gamma_w}\frac{\pi_0}{\Delta\pi}(\psi - \gamma_e) < \Delta I \leq \gamma_w \psi + \gamma_e \\ \frac{\pi_1}{(1+\gamma_w)\pi_1 - \pi_0}\Delta I + \frac{\pi_1}{\Delta\pi}\frac{(1+\gamma_w)\Delta\pi}{(1+\gamma_w)\pi_1 - \pi_0}\frac{\psi - \gamma_e}{1+\gamma_w} - \psi & \text{si } \gamma_w \psi + \gamma_e < \Delta I \leq \gamma_w \frac{\pi_1}{\Delta\pi}\psi + \gamma_e \\ \frac{\pi_0}{\Delta\pi}\psi & \text{si } \gamma_w \frac{\pi_1}{\Delta\pi}\psi + \gamma_e < \Delta I \end{cases}$$

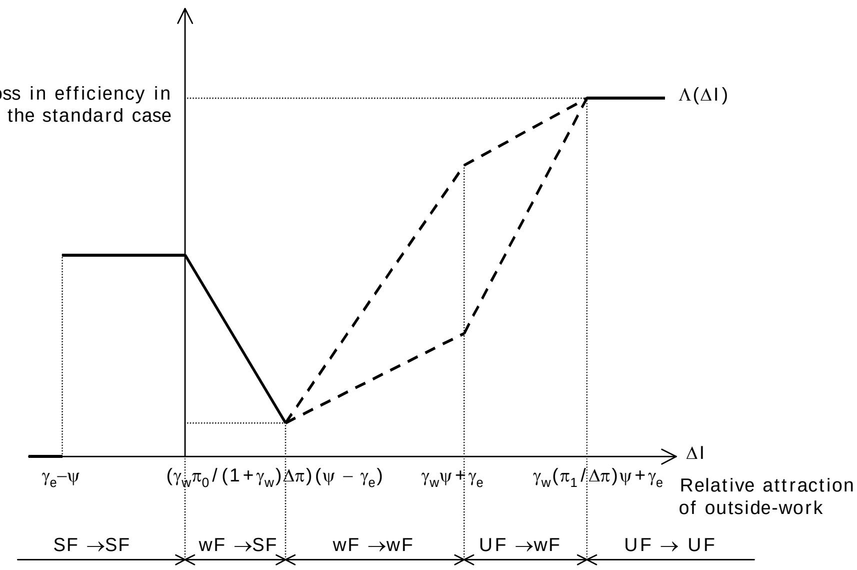


Figure 3-4: Inefficiency due to moral hazard as a function of the relative attraction of outside-work - intermediate intensity.

One notices that the relative loss in efficiency $\frac{*}{E_1 w_1^*} = \frac{\pi_0}{\Delta\pi}$ is exactly what prevail in the standard case. Hence, differences in terms of efficiency only echo differences in required promised transfers: self-esteem motivations do not radically change the impact of moral hazard on the employment relation. This is no longer true when $0 < \Delta I \leq \gamma_w \frac{\pi_1}{\Delta\pi}\psi - \gamma_e$. Let us consider the case $0 < \Delta I \leq \frac{\gamma_w}{1+\gamma_w}\frac{\pi_0}{\Delta\pi}(\psi - \gamma_e)$: corresponding jobs are then weakly fulfilling under complete information but strongly fulfilling under incomplete information ($wF \rightarrow SF$). As shown by the figure, self-esteem motivations play in absolute as well as relative terms on the inefficiency associated to asymmetric information: although this loss remains positive, it can decrease below what prevails in the standard case. Furthermore, in a quite counter-intuitive way, this loss is decreasing in ΔI. Finally, for $\frac{\gamma_w}{1+\gamma_w}\frac{\pi_0}{\Delta\pi}(\psi - \gamma_e) < \Delta I \leq \gamma_w\psi - \gamma_e$, we face jobs which are weakly fulfilling under incomplete as well as complete information ($wF \rightarrow wF$), the loss in efficiency becomes increasing in ΔI. This trend persists as one considers unfulfilling jobs under complete information by weakly fulfilling jobs under incomplete information ($UF \rightarrow wF$) - i.e. for $\gamma_w\psi + \gamma_e < \Delta I \leq \gamma_w \frac{\pi_1}{\Delta\pi}\psi + \gamma_e$.

3.6.3 The case of a low relative intensity of the effort prescription

Contrary to previous case, a necessary condition to be in this case $\left(\frac{\gamma_e}{\psi}\le\min\left\{\gamma_w\frac{\pi_0-(1+\gamma_w)\Delta\pi}{(1+\gamma_w)\pi_1-\pi_0};1\right\}\right)$ is $\left(1+\frac{1}{1+\gamma_w}\right)\pi_0>\pi_1$ i.e. that technologies involve a low (relative) impact of effort $e=1$. The profile of the loss in efficiency is then slightly different from what we get in the previous case.[27]

The new point results from the fact that, for $\gamma_w\psi+\gamma_e<\Delta I\le\frac{\gamma_w}{1+\gamma_w}\frac{\pi_0}{\Delta\pi}(\psi-\gamma_e)$, an unfulfilling job under complete information may become strongly fulfilling under incomplete information ($UF\to SF$). It is the strongest impact moral hazard could have.

[27] For $\frac{\gamma_e}{\psi}\le\min\left\{\gamma_w\frac{\pi_0-(1+\gamma_w)\Delta\pi}{(1+\gamma_w)\pi_1-\pi_0};1\right\}$:

$$\Omega(\Delta I)=\begin{cases}0 & \text{si } \Delta I\le\gamma_e-\psi\\ \frac{\pi_0}{\Delta\pi}\frac{\psi-\gamma_e}{1+\gamma_w} & \text{si } \gamma_e-\psi<\Delta I\le 0\\ -\frac{1}{1+\gamma_w}\Delta I+\frac{\pi_0}{\Delta\pi}\frac{\psi-\gamma_e}{1+\gamma_w} & \text{si } 0<\Delta I\le\gamma_w\psi+\gamma_e\\ \frac{((1+\gamma_w)\pi_0-\gamma_w\pi_1)\psi-\pi_1\gamma_e}{(1+\gamma_w)\Delta\pi} & \text{si } \gamma_w\psi+\gamma_e<\Delta I\le\frac{\gamma_w}{1+\gamma_w}\frac{\pi_0}{\Delta\pi}(\psi-\gamma_e)\\ \frac{\pi_1}{(1+\gamma_w)\pi_1-\pi_0}\Delta I+\left(\frac{\pi_1}{\Delta\pi}\frac{(1+\gamma_w)\Delta\pi}{(1+\gamma_w)\pi_1-\pi_0}\frac{\psi-\gamma_e}{1+\gamma_w}-\psi\right) & \text{si } \frac{\gamma_w}{1+\gamma_w}\frac{\pi_0}{\Delta\pi}(\psi-\gamma_e)<\Delta I\le\gamma_w\frac{\pi_1}{\Delta\pi}\psi+\gamma_e\\ \frac{\pi_0}{\Delta\pi}\psi & \text{si } \gamma_w\frac{\pi_1}{\Delta\pi}\psi+\gamma_e<\Delta I\end{cases}$$

Remark:

$$\frac{\gamma_e}{\psi}\le\min\left\{\gamma_w\frac{\pi_0-(1+\gamma_w)\Delta\pi}{(1+\gamma_w)\pi_1-\pi_0};1\right\}\Rightarrow\frac{((1+\gamma_w)\pi_0-\gamma_w\pi_1)\psi-\pi_1\gamma_e}{(1+\gamma_w)\Delta\pi}>0$$

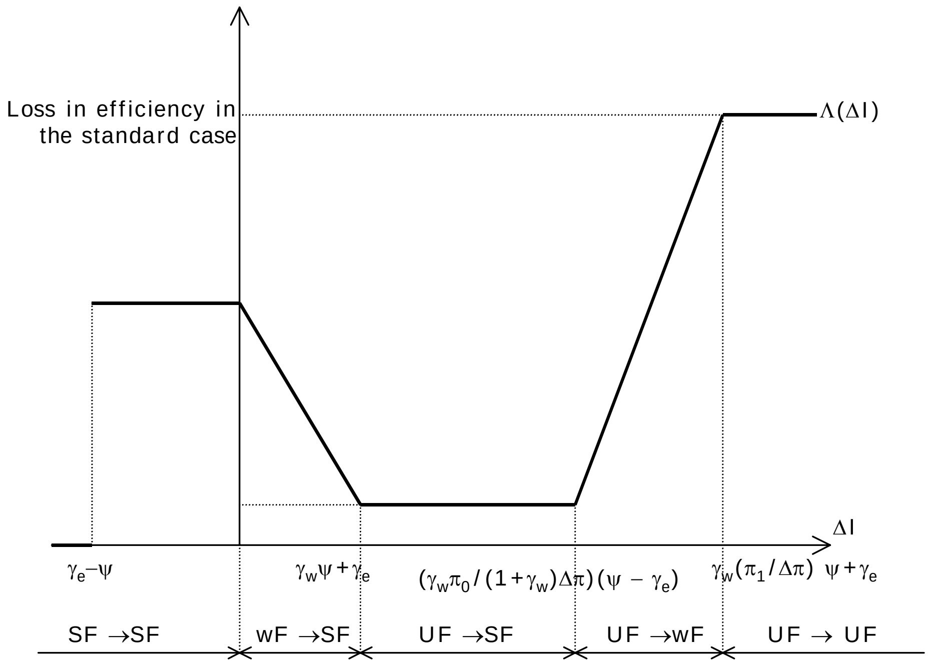


Figure 3-5: Ine¢ciency due to moral hazard as a function of the relative attraction of outside-work - low intensity.