Becoming "We" Instead of "I", Identity Management and Incentives in the Workplace

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Identity Management and Incentives in the Workplace*

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Abstract

This paper studies how a firm fosters formal and informal interactions among its employees to create a collective identity and positively influence effort. We develop a model where employees have both a personal and a social ideal for effort, and where the firm can make its workforce more sensitive to this social ideal by allocating part of the work time to social interactions. We show that by investing in social capital, the firm can increase the power of peer pressure, make screening among heterogeneous employees less costly and, finally, augment the effectiveness of monetary incentives.

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"Our offices and cafes are designed to encourage interactions between Googlers within and across teams, and to spark conversation about work as well as play."

(Google website, 2012)

"I call it the 'pronoun test', I ask frontline workers a few general questions about the company. If the answers I get back describe the company in terms like 'they' and 'them,' then I know it's one kind of company. If the answers are put in terms like 'we' or 'us,' then I know it's a different kind of company."

(Former U.S. Secretary of Labor, Robert B. Reich, when visiting a company for the first time)

1 Introduction

United Parcel Service (thereafter UPS) is known as a company constantly striving to improve its efficiency: packages are sorted by computers to optimize the order of delivery; delivery routes are designed to avoid left turns, so that there is no time wasted on waiting for a gap in oncoming traffic; drivers are required to carry key rings on a finger to avoid looking for them, and they have to keep a fast pace when walking. In this company that is continuously looking to save seconds along the supply chain, a somewhat unexpected practice takes place: several minutes are granted to drivers and loaders for a "pre-work huddle", a team gathering before the drivers leave the distribution center. According to UPS management, the objective of this practice is to engender a team spirit between loaders and drivers. Favoring a certain amount of social bonding among employees is not specific to UPS. Over the past few decades, many firms have introduced new practices to make it easier for employees to develop formal and informal interactions (Cohen and Prusak, 2001). New physical spaces like open-plan offices, places to relax, and meeting points have been designed to promote an environment of communication and information sharing among colleagues. Workshops and brainstorming sessions have aimed at generating collective creativity and mutual understanding. Information technologies such as emails, intranet and chats have favored exchanges. Team building activities, defined as a variety of practices ranging from simple bonding exercises to complex simulations and multi-day retreats, have been designed to develop a sense of cohesiveness among employees.

Why do firms allocate time and space resources to foster interactions between their employees? Besides creating a great atmosphere and facilitating the appearance of new ideas, the literature on organizational identification, a subfield in the management literature, has suggested that by promoting formal and informal interactions among employees a firm may be seeking to induce its workforce to identify as part of a collective (the group or the organization) and behave in ways that are normative for the collective identity (e.g. Pratt, 2000; Ellemers, De Gilder and Haslam, 2004; Van Dick, 2004; Cohen and Prusak, 2001).[1] According to these authors, shifting the employees' identity from being personal ("I") to collective ("we") has two positive consequences. First, the group-based expectations, goals, or outcomes become a source of implicit incentives for workers, coming to supplement or even replace other explicit and implicit incentives. Second, by promoting the collective identity, the firm can hold possibly heterogeneous employees together and secure their involvement in the working environment.[2]

In this context, the rise of practices aimed at encouraging employees' interaction and building collective identities could be interpreted as an attempt by firms to counter increased "external and internal volatility" caused by higher employee turnover, reduced workforce loyalty, new partnerships or mergers and acquisitions (Cohen and Prusak, 2001; Casey, 1996). Casey (1996) notes for example that "the devices of workplace family and team manifest a corporate effort to provide emotional gratifications at work to counter the attractions of rampant individualism".

In this paper we develop an agency model with social norms to formalize the idea that a firm

[1]Cohen and Prusak give numerous examples of firms providing "space and time" to allow their employees to interact. Among other examples, they describe how Alcoa, the world's leading producer of aluminum, moved to a new headquarter in 1998 in which glass-walled conference rooms, meeting places, kitchens, and escalators occupy the center of each floor of offices and are designed to encourage workers to meet, mix, and chat. According to the CEO of Alcoa, Paul O'Neill, the ultimate goal was to promote "a sense of connection" among employees. In the opposite way, Cohen and Prusak quote the following extract of a book by Robin Dunbar ("grooming gossip and the evolution of language"), in which the author explains why a TV production unit had productivity and morale problems after being moved to a new workplace: "It turned out that when the architects were designing the new building, they decided that the coffee room where everyone ate their sandwiches at lunch time was an unnecessary luxury and so dispensed with it ... If people were encouraged to eat their sandwiches at their desks, then they were more likely to get on with their work and less likely to idle time away. And with that, *they inadvertently destroyed the intimate social networks that empowered the whole organization*" (italics added).

[2]The literature on organizational identification is based upon insights from social identity theory (Tajfel, 1972; Tajfel and Turner 1979). Social identity theory suggests that a person's identity is composed of two different facets. Personal identity corresponds to individual attributes that are not to be shared with other people. Social identity corresponds to the person's internal definition that results from him or her being member of a social group. The literature on organization identification goes a step further by suggesting that an organization can reinforce its employees' social identity through social bonding or training in order to create implicit group incentives.

may find it profitable to allocate time for its employees to interact, develop social ties and create a collective identity. An employee's identity is modelled as an ideal for effort, which is a weighted combination of a personal ideal and a shared social ideal. Personal ideals might differ across employees and are not observed by the firm. This gives rise to an adverse selection problem. Employees perform independent production tasks which means that the only externalities among workers are social and not technological. We are then able to obtain three main results. First, we reason for a given employees' sensitivity to the social ideal and determine the optimal payment scheme. We show that the more employees are sensitive to the social norm, the higher will be the power of monetary incentives chosen by the firm and its profits. This result is due to an effect known in the economic literature as the social multiplier effect which, when applied to an agency context, means that the existence of the social norm reinforces the effectiveness of monetary incentives (see for example Fischer and Huddart, 2008). Second, we allow the firm to alter the employees' sensitivity to the social norm by choosing the part of the work time allocated to social interactions. For the firm there is a cost of investing in social capital because less time is left for production. There is also a benefit: by favoring social bonding the firm makes its workforce more sensitive to the social ideal. We show that the firm allocates more time for social interactions when employees have low personal ideals for effort. Motivating employees through the collective identity is used as a substitute to low individual work ethics. Third, we show that investing in social capital allows the firm to alleviate the informational problem due to adverse selection. By promoting the shared social ideal, the firm is able to limit the effect of heterogeneity on individual behaviors and therefore to diminish the contractual distortions due to incomplete information. The consequence is that the firm gives employees more time to develop social ties when the workforce is heterogeneous. Note that the last two results are consistent with the findings from the literature on organizational identification.

There is a burgeoning theoretical literature that suggests that social norms have important effects on workers' behavior in the workplace. Kandel and Lazear (1992) assume that members of a team suffer a utility loss when their own effort level falls short of that of their co-workers. The consequence is that workers exert more effort than if peer effects were absent. In an agency context, Fischer and Huddart (2008) show how the existence of social norms fosters the effectiveness of monetary incentives. Although they do not solve for the optimal contract, they derive some implications regarding the organizational boundaries of firms by distinguishing between a desirable and an undesirable action, each with its own norm. Hück, Kübler and Weibull (2012) show that a particular norm can be output-increasing, neutral, or output-decreasing depending on the incentive scheme offered by a firm. They further show that low-effort equilibria (where anyone exerts low effort because others do the same) can coexist with high-effort equilibria (where anyone exerts high effort because others do the same). On the empirical side, Bandiera, Barankay and Rasul (2010) study whether the productivity of fruit pickers is affected by the presence of coworkers with whom they share social ties. They consider a framework in which there are no externalities among workers in production or compensation. They find that compared to the situation without social ties, a given worker's productivity is significantly higher when working with more able friends, but significantly lower when working with less able friends. In the present paper, we rely on the model of Fischer and Huddart (2008) to introduce a social norm for effort in the employees' preferences. Compared to the theoretical papers quoted above, we add two new elements into the model. First we assume that the firm is able to affect the sensitivity of employees to the shared social ideal by providing them with time and space to interact and develop social ties. We show that a first motive for the firm to invest in social capital is to complement the monetary incentives. We characterize the precise circumstances under which this investment is rewarding. Second we allow for heterogeneity among employees with regard to their personal ideals for work. The firm does not observe the personal ideals which gives rise to a problem of adverse selection. This gives another motive to invest in social capital, namely creating a shared identity in order to attenuate the effect of individual differences. Akerlof and Kranton (2008) also consider an organization that is able to affect its workers' identity (ideal for effort) through the style of management. There is moral hazard on workers' effort and the organization can either decide to monitor its workforce tightly or choose loose supervision. They assume that monitoring workers allows to detect shirking more easily but at the same time reduces workers' ideal for effort as there is less identification with the workgroup. They characterize the circumstances under which the organization prefers loose supervision. In this article, we endogenize workers' collective identity and describe more fully the way the firm is able to regulate this identity.[3]

The paper proceeds as follows. In section 2 we present the theoretical model. In section 3 we

[3]Rotemberg (1994) and Dur and Sol (2010) consider models without social norms but in which two workers are endowed with altruistic preferences they can affect by their choices. In Rotemberg, worker i decides the degree to which he internalizes the utility of worker j. In Dur and Sol, worker i is able, by engaging social interactions with worker j, to increase j's degree of altruism. Both papers show that it is rational for workers to invest in altruistic activities to some extent. In turn the efficiency of the equilibrium is enhanced.

derive the optimal linear contract. In section 4 we analyze how the firm can regulate the social norm among the employees. Section 5 offers some conclusions.

2 Modeling personal and social ideals

We take a framework *à la* Holmström and Milgrom (1987) and extend it to include a social ideal for effort and some heterogeneity in the workforce.

Agents. A risk neutral firm employs a continuum of employees of size one to perform similar, but independent tasks. Each employee is characterized by his personal ideal for effort, t. Personal ideals are distributed according to the probability distribution function $f(t)$ defined on a set $T = \left[\underline{t}, \bar{t}\right]$. Let $F(t)$ denote the cumulative distribution function associated with $f(t)$. Each employee exerts a level of effort e, not observed by the firm, and produces a publicly observable output $y = e + \varepsilon$. The term ε is an idiosyncratic unobservable noise following a centered normal with variance σ^2. The noise terms are independent across employees.

Contracts. As employees are heterogeneous, the firm may find it optimal to offer different contracts to different employees. We denote the menu of contracts by $\{w(t)\}_{t\in T}$ where $w(t)$ is the compensation paid by the firm to an employee with personal ideal t. As is common in the contracting literature, we restrict attention to linear contracts of the shape $w(t) = \alpha(t)y(t) + \beta(t)$ where $\alpha(t)$ is the proportional share and $\beta(t)$ is the fixed salary. We will refer to $\alpha(t)$ as the power of incentives for employee of personal ideal t.

Payoffs. The CARA utility function of an employee of personal ideal t choosing the contract $w(t)$ and the effort $e(t)$ is given by

$$U(w(t), e(t), n(t)) = -exp\left[-\eta\left(w(t) - C(e(t), n(t)\right)\right] \tag{1}$$

where η represents the employee's constant absolute risk aversion, and $C(e(t), n(t)) = \frac{1}{2}c\left(e(t) - n(t)\right)^2$ represents the extended cost function of the employee. We assume that it is costly for employee t to choose an effort level that deviates from an ideal level of effort, $n(t)$. This ideal corresponds to the effort that the employee exerts when the variable rate of the compensation is zero but the base salary is sufficiently high to make the participation constraint we define below satisfied. The cost of effort is decreasing up to the point where the ideal is reached and increasing beyond this point. Following Fischer and Huddart (2008), the ideal $n(t)$ is a weighted average of two elements: the personal ideal of the employee equal to t and a shared social ideal which we take equal to the average effort across employees, $E[e]$.[4] We write

$$n(t) = \lambda t + (1-\lambda)E[e] \tag{2}$$

where $\lambda \in (0,1]$ and

$$E[e] = \int_{\underline{t}}^{\bar{t}} e(t)f(t)dt \tag{3}$$

The term $1-\lambda$ of expression (2) reflects the employees' sensitivity to the social ideal. The standard cost function is obtained by taking $\lambda = 1$ and $t = 0$. Note that in our framework, production tasks are independent across employees and payment schemes are based on individual performances. This means that the only externalities among workers are social and not technological or monetary.

We assume that employees have the same reservation utility level, denoted $U(w_0)$. The term w_0 is the certain monetary equivalent of the employees' compensation contract.

The risk-neutral firm's expected profit is equal to the part of the expected production accruing to firm net of the fixed salaries paid to the employees:

$$\int_{\underline{t}}^{\bar{t}} \left((1-\alpha(t))e(t) - \beta(t)\right) f(t)dt \tag{4}$$

Timing of the game

- First, the firm chooses the amount of the work time left for employees to interact. This amount alters the employees' sensitivity to the social ideal in a way we will make precise in section 4.
- Second, the firm proposes a menu of contracts $\{w(t)\}_{t\in T}$.
- Third, employees choose one contract or exert their outside option.
- Fourth, employees exert effort and productions and payoffs are realized.

[4] Hence, the social norm is associated to a unique reference group which is the entire workforce.

3 The optimal linear contract

In this section, we assume that the sensitivity of employees to the social norm is given. First, we derive the optimal level of effort for employees. Second, we solve the problem of the firm and derive the optimal menu of linear contracts.

3.1 Problem of an employee

Suppose an employee of personal ideal t has chosen the contract $w(t)$. He chooses his effort level by maximizing his certainty equivalent payoff

$$\alpha(t)e(t) + \beta(t) - \frac{1}{2}\eta\sigma^2\alpha^2(t) - \frac{1}{2}c\left(e(t) - n(t)\right)^2 \tag{5}$$

The first order condition is $\alpha(t) - c(e(t) - n(t)) = 0$, so that

$$e(t) = n(t) + \frac{\alpha(t)}{c} \tag{6}$$

where $n(t)$ is given by (2). Expression (6) characterizes the effort exerted by the employee *given* the work ideal, $n(t)$. If the firm does not provide any monetary incentive at all (that is, if $\alpha(t) = 0$), employee t chooses a level of effort equal to his work ideal. By taking the partial derivative of expression (6) with respect to $\alpha(t)$, one can study how increasing the monetary incentive at the margin affects the effort exerted when the effect of the social norm is neutralized. We get

$$\frac{\partial e(t)}{\partial \alpha(t)} = \frac{1}{c} \tag{7}$$

This expression is similar to the one appearing in Holmström and Milgrom (1987). Effort increases as the firm provides more monetary incentives. We now endogenize the social norm. By plugging expression (6) into expression (3) and solving, we obtain the average effort exerted by employees:

$$E\left[e\right] = E\left[t\right] + \frac{E\left[\alpha\right]}{\lambda c} \tag{8}$$

where $E\left[\alpha\right] = \int_{\underline{t}}^{\bar{t}} \alpha(t)f(t)dt$ is the average power of incentives and $E\left[t\right] = \int_{\underline{t}}^{\bar{t}} tf(t)dt$ is the average personal ideal.

Expression (8) shows there are two sources that fuel employees' effort: personal work ideals and monetary incentives. Interestingly, the way the average effort depends on the average personal work ethic *is not* affected by the employees' sensitivity to the social ideal: for the firm, having a pro social workforce does not dampen the positive influence of personal ideals on effort. However, the way the average effort depends on the average power of monetary incentives *is* affected by employees' sensitivity to the social ideal: a higher sensitivity makes monetary incentives more effective. The two previous results are driven by similar multiplier effects. For convenience, we only describe the multiplier effect on monetary incentives. Analytically, it takes the following shape:

$$\frac{dE\left[e\right]}{dE\left[\alpha\right]} = \frac{1}{\lambda c} = \frac{1}{\lambda} \times \frac{\partial E\left[e\right]}{\partial E\left[\alpha\right]} \tag{9}$$

with ${}^1\!/\!{}_\lambda \geq 1$. To explore the functioning of the social multiplier, let us sum expression (6) over types, weighted by the probability distribution function f. We obtain

$$E\left[e\right] = \lambda E\left[t\right] + (1-\lambda)E\left[e\right] + \frac{E\left[\alpha\right]}{c} \tag{10}$$

Let us suppose that the average power of monetary incentives $E\left[\alpha\right]$ increases by an amount equal to $\triangle E\left[\alpha\right]$. In a first round, this has a direct effect on average effort: the right-hand side in expression (10) increases by $\triangle E\left[\alpha\right]/c$, which causes the left-hand side $E\left[e\right]$ to rise by the same amount. In the second round, the change in monetary incentives has an indirect effect on effort through the social norm: a higher social work ideal has emerged at the end of the previous round, inducing the employees to exert even more effort. Formally, the right-hand side increases by $(1-\lambda)\triangle E\left[\alpha\right]/c$, which causes an equivalent rise of the left-hand side. Summing the successive increases, we obtain:

$$\triangle E\left[e\right] = \left[1 + (1-\lambda) + (1-\lambda)^2 + ...\right] \frac{\triangle E\left[\alpha\right]}{c} = \frac{1}{\lambda}\frac{\triangle E\left[\alpha\right]}{c} \tag{11}$$

The multiplier $\frac{1}{\lambda}$ is the sum of the direct monetary effect, 1, and the indirect social effect, $\frac{1-\lambda}{\lambda}$.

Using equations (6) and (8), we can write the effort of an employee of personal ideal t as

$$e^*(t) = \lambda t + (1-\lambda)E\left[t\right] + \frac{1}{\lambda c}\left(\lambda\alpha(t) + (1-\lambda)E\left[\alpha\right]\right) \tag{12}$$

Expression (12) states that the effort level $e^*(t)$ is increasing in the power of incentives, $\alpha(t)$. When employees are sensitive to the collective (that is, when $\lambda < 1$), an employee with a low personal ideal chooses an effort level above the one he would choose if the sensitivity to the social norm was zero (that is, when $\lambda = 1$). Note that an employee with a high personal ideal does not necessarily choose a lower effort level when he is more sensitive to the collective identity: although he is attracted by the lower average work ethic, monetary incentives become more effective so that effort may increase. Expression (12) also shows that an employee who has chosen a contract with a low (respectively high) proportional share chooses an effort level above (respectively below) the level he would choose in the absence of social ideal. We summarize the main results in the following proposition.

Proposition 1. *(1) Consider a given menu of linear contracts* $\{w(t)\}_{t\in T}$. *Then,*

(a) The average level of effort $E[e]$ *depends linearly on the average personal ideal* $E[t]$. *This relationship is not affected by the employees' sensitivity to the social ideal.*

(b) The average level of effort $E[e]$ *is higher when employees are more sensitive to the social ideal (that is, when* λ *is smaller).*

(2) *The fact that employees' preferences incorporate a social ideal creates a social multiplier effect, defined in (9), on monetary incentives.*

To conclude this section, it is interesting to calculate the certainty equivalent payoff for an employee with personal ideal t when he exerts the optimal effort level (12). We have

$$u(t,\alpha(t),\beta(t)) = \beta(t) + \frac{1-\lambda}{\lambda}\frac{\alpha(t)E[\alpha]}{c} + (\lambda t + (1-\lambda)E[t])\alpha(t) + \frac{1}{2c}(1-c\eta\sigma^2)\alpha^2(t) \qquad (13)$$

Note that $\partial^2 u/\partial t\partial\alpha(t) = \lambda > 0$: employees with a high personal ideal are more sensitive to an increase in the power of incentives than employees with a low personal ideal. This single-crossing condition will help the firm to screen the different types of employees under incomplete information.

3.2 Problem of the firm

We now turn to the problem of the firm for a given level of employees' sensitivity to the social ideal. As a benchmark we first consider the situation where the firm knows the employees' personal ideals. We then consider the situation where the firm cannot observe employees' personal ideals.

3.2.1 The case of complete information

The firm determines the menu of contracts by maximizing its expected profit

$$\max_{\{\alpha(t),\beta(t)\}} \int_{\underline{t}}^{\bar{t}} \left((1-\alpha(t))e^*(t)-\beta(t)\right) f(t)dt \tag{14}$$

under the participation constraints

$$\forall t \in T, u(t,\alpha(t),\beta(t)) \geq w_0 \tag{15}$$

The expression of $e^*(t)$ appears in (12). At the optimum the participation constraints must be binding. Using expression (13), we show in Appendix 1 that the firm's program can be written

$$\max_{\{\alpha(t)\}} \int_{\underline{t}}^{\bar{t}} \left(\frac{\alpha(t)}{\lambda c}+t-w_0-\frac{1}{2c}(1+c\eta\sigma^2)\alpha^2(t)\right) f(t)dt \tag{16}$$

Maximizing pointwise we obtain the optimal power of incentives:

$$\forall t \in T, \alpha^*_{CI}(t)=\frac{1}{\lambda(1+c\eta\sigma^2)} \tag{17}$$

where CI stands for complete information. Three things are worth noting about the optimal power of monetary incentives. First, the firm chooses the same proportional share for all employees, regardless of their personal ideals. This is due to the fact that the personal ideal of employees does not affect the way their effort responds to the monetary incentives: expression (12) implies that ${\partial^2 e^*(t)}/{\partial t \partial \alpha(t)}=0$. Second, the firm chooses a higher power of incentives when employees are more sensitive to the social ideal. Indeed the social multiplier effect (9) is higher when employees are more concerned with the collective. Third, at equilibrium, the firm has to offer a higher base salary to employees with a low personal ideal. It comes from the fact that for a given power of incentive $\alpha(t)$, the certainty equivalent (13) is increasing in the employees' personal ideal. This explains that under incomplete information, the firm will have to propose a different menu of contracts in order to prevent employees with high personal ideals to deviate to contracts aimed at employees with low personal ideals.

3.2.2 The case of incomplete information

We now assume that the firm does not observe the employees' personal ideals. The firm has to make sure that each type of employee chooses the contract that is specially designed for him. The profit maximizing program becomes

$$\max_{\{\alpha(t),\beta(t)\}} \int_{\underline{t}}^{\bar{t}} \left((1-\alpha(t))e^{*}(t)-\beta(t)\right) f(t)dt \tag{18}$$

under the participation constraints

$$\forall t \in T, u(t,\alpha(t),\beta(t)) \geq w_0 \tag{19}$$

and the incentive constraints

$$\forall t,t' \in T, u(t,\alpha(t),\beta(t)) \geq u(t,\alpha(t'),\beta(t')) \tag{20}$$

Using standard arguments, we show in Appendix 2 that the optimization problem of the firm can be simplified to

$$\max_{\{\alpha(t)\}} \int_{\underline{t}}^{\bar{t}} \left(\frac{\alpha(t)}{\lambda c}+t-w_0-\frac{\lambda\alpha(t)\left(1-F(t)\right)}{f(t)}-\frac{1}{2c}(1+c\eta\sigma^2)\alpha^2(t)\right) f(t)dt \tag{21}$$

under the constraints

$$\forall t \in T, \frac{d\alpha(t)}{dt} \geq 0 \tag{22}$$

Expressions (16) and (21) differ because of the term $\int_{\underline{t}}^{t} \frac{\lambda\alpha(t)(1-F(t))}{f(t)} f(t)dt$ reflecting the informational rent the firm has to give to types $t > \underline{t}$ for them not to deviate from their specified contracts. This corresponds to the cost of having incomplete information on employees' personal ideals. Note that this cost is increasing in λ: the adverse selection problem is more severe when employees are less concerned with the collective identity. The constraints (22) state that the optimal power of incentives should be non decreasing with respect to the personal work ideal. We ignore momentarily

(22), and maximize expression (21) pointwise. We obtain

$$\forall t \in T, \alpha^*_{II}(t) = \frac{1}{\lambda(1+c\eta\sigma^2)} - \lambda\frac{1-F(t)}{f(t)}\frac{c}{1+c\eta\sigma^2} \tag{23}$$

where II stands for incomplete information. To guarantee that the constraints (22) are verified, we make the following assumption, common in an agency context:

Assumption 1. The hazard rate $\frac{f(t)}{1-F(t)}$ is increasing in t.[5]

Under assumption 1 the firm will be able to screen employees according to their personal ideals. The properties of $\alpha^*_{II}(t)$ are described in the following proposition.

Proposition 2.

1. *The power of incentives $\alpha^*_{II}(t)$ is increasing in t. There is no distortion in the contract designed for the highest personal ideal: $\alpha^*_{II}(\bar{t}) = \alpha^*_{CI}(\bar{t})$ and a downward distortion for the other personal ideals: $\alpha^*_{CI}(t) - \alpha^*_{II}(t) = \lambda\frac{1-F(t)}{f(t)}\frac{c}{1+c\eta\sigma^2}$ increases as t gets closer to $\underline{t}$.*
2. *The firm provides stronger monetary incentives when employees are more sensitive to the social norm: $\alpha^*_{II}(t)$ increases when λ decreases. Furthermore the distortion measured by $\alpha^*_{CI}(t) - \alpha^*_{II}(t)$ decreases when employees are more sensitive to the social norm.*
3. *The power of incentives $\alpha^*_{II}(t)$ is decreasing in the perceived risk level, $\eta\sigma^2$.*

Point 1 of proposition 2 is a result typical of adverse selection problems. To prevent employees with a high personal ideal to deviate, the firm has to give employees with smaller personal ideals a contract where the power of incentives is lower than under complete information, but the fixed part of the compensation is larger (to satisfy the participation constraint). As a consequence, there is a downward distortion compared with the case of complete information. Point 2 conveys two important results. First, the firm chooses a higher power of monetary incentives when employees are more sensitive to the social ideal. As employees become more oriented toward the collective, the social multiplier stated in proposition 1 has a stronger effect on the average effort: $dE[e]/dE[\alpha] = 1/\lambda c$ increases as λ decreases. Second, the distortion between the complete information case and the incomplete information case, $\alpha^*_{CI}(t) - \alpha^*_{II}(t)$, is reduced when employees are more sensitive to the

[5] This assumption is verified for distributions such as the uniform, the normal, the exponential, the logistic and the Laplace, among others.

social norm. In fact the effect of employee's personal ideals on their behavior becomes secondary to monetary incentives as they become more concerned with the group environment. In this case the firm proposes less differentiated monetary incentives.[6]

At equilibrium the payoff of the firm is

$$\pi^*(\lambda) = E[t] - w_0 + \frac{1}{2c(1+c\eta\sigma^2)} \int_{\underline{t}}^{\bar{t}} \frac{1}{\lambda^2} \left(1 - c\frac{\lambda^2 (1-F(t))}{f(t)}\right)^2 f(t)dt \tag{24}$$

Not surprisingly, the profit is increasing in the average personal ideal, $E[t]$, and increasing when employees become more sensitive to the social ideal.

4 Regulating the social ideal

We now assume that the firm is able to affect the social orientation of its workforce by choosing the amount of time employees can interact. Interactions can for example be favored and somewhat controlled through workshops and team-building activities, or by facilitating recreational breaks. There is a large amount of empirical evidence in sociology, management and economics suggesting that individuals are more sensitive to a group norm when they have frequent interactions with the other individuals belonging to the group (e.g. Cialdini and Trost, 2008, for sociology; Cohen and Prusak, 2001, for management; Bandieri, Barankay and Rasul, 2008 and 2010, for economics). Cohen and Prusak note for example that "if you want people to connect, to talk, to begin to understand and depend on one another, give them places and occasions for meeting, and enough time to develop networks and communities. Social capital needs breathing room - social space and time - within work and surrounding work".[7] Sociologists emphasize the fact that people learn and internalize the values embodied in the norms through repeated interactions with others. The act

[6]Note that if all employees have the same personal ideal $\hat{t}$ (that is, $T = \{\hat{t}\}$), then $\frac{1-F(\hat{t})}{f(\hat{t})} = 0$ and we have

$$\alpha_{II}^*(\hat{t}) = \frac{1}{\lambda(1+c\eta\sigma^2)}$$

We retrieve the result of the complete information case.

[7]Friedley and Manchester (2005) make a similar point to explain what determines team cohesion in speech teams in high schools and colleges : "It is communication in the human moment that also most powerfully creates team cohesion - a strong sense of loyalty and commitment to the team vision as one's own ... Whether a room or lounge where team members can congregate between classes and the end of the day, practice space for formal and informal coaching sessions, travel time in cars and vans, or social time to enjoy pizza and a movie, both quantity and quality of communication are necessary to build a cohesive team climate of openness and trust."

of matching behaviors and beliefs to a group norm is referred to as conformity and is seen as the result of unconscious influences, social pressure, rewards or punishments inflicted by the group when following or not the norm. When individuals interact frequently, they become more affected by these benefits and costs and they are more willing to bear the emotional investment initially required to conform: their sensitivity to the group norm increases.

We normalize the length of the employees' work time to 1. The firm divides the employees' time between a productive period of length p where the instantaneous production problem is described in the two previous sections, and a period of length $b = 1 - p$ during which social bonding takes place between employees. As explained above, we assume that the employees' sensitivity to the social ideal is affected by the choice of the firm. The more time is allocated to social interactions, the more employees become sensitive to the social norm. Formally, $\lambda(p)$ is increasing in p.[8] We assume that during the period in which social bonding takes place, the employees receive their reservation compensation, w_0, at each instant of time. The firm maximizes

$$\max_p \; p\pi^* \left(\lambda(p)\right) + (1-p)(-w_0)$$

where $\pi^* (\lambda)$ is given by expression (24). Let $\varepsilon_\lambda(p)$ denote the elasticity of λ with respect to p: $\varepsilon_\lambda(p) = \frac{p\lambda'(p)}{\lambda(p)}$. We make the following assumption.

Assumption 2. (a) The function ε_λ is increasing in p. (b) There is a level $\hat{p} \in (0,1)$ satisfying $\varepsilon_\lambda(\hat{p}) = 1/2$. Let $\hat{b} = 1 - \hat{p}$.

The first part of assumption 2 means that investing in social capital has decreasing returns: when the initial level of interactions is low (respectively high), allowing for more interactions among employees has a strong positive impact (respectively a low impact) on their sensitivity to the social norm. The second part of the assumption guarantees that the effect of increasing interactions on employee's sensitivity to the group is sufficiently high to ensure that the firm will find it profitable to invest in social capital. We determine the optimal length for social interactions in Appendix 3. The properties are stated in the following proposition.

[8] It is convenient to express the analytical problem in p rather than in b.

Proposition 3. *Suppose the average personal ideal of employees is* $E(t) = \hat{t}$*.*

1. *When employees are homogeneous with regard to their personal ideals* ($T = \{\hat{t}\}$)*, the firm chooses to devote a share* b^* *of working time to develop the employees' orientation to the social ideal. We have* $b^* = \hat{b}$ *if* $\hat{t} = 0$*, where* $\hat{b}$ *is defined in assumption 2. Furthermore,* b^* *is decreasing in* $\hat{t}$*.*

2. *When employees are heterogeneous with regard to their personal ideals, the firm chooses to devote a share* b^{**} *of working time for social interactions. We have* $b^{**} > b^*$*. Furthermore* b^{**} *is decreasing in* $\hat{t}$*.*

Proposition 3 states two results. First, it is more profitable for the firm to devote time to develop the employees' social ideal when their average personal ideal is low. In this case effort is less fueled by personal work ethics and it is therefore less costly for the firm to substitute productive activities by bonding activities. Second, for a given average personal ideal, the firm devotes more time to develop social interactions for heterogeneous employees than for homogeneous employees. When employees are heterogeneous, the firm faces an adverse selection problem when designing the contracts and it has to give a rent to the employees with a high personal ideal for effort to make them choose the right contract. By fostering the social orientation of the workforce, the firm is able to reduce the effect of heterogeneity on individual behaviors and alleviate the informational problem. Its profits increase. Note finally that if assumption 2(b) was not satisfied, the firm would never allocate time for social interactions if faced with homogeneous employees.

5 Concluding remarks

The literature in economics and management theory have recently emphasized that workers are not driven solely by personal considerations but are also concerned with the goals and beliefs of the group or organization in which they work. This observation has lead some authors to suggest that the firm could regulate workers' sensitivity to the collective identity in order to foster performance. In Economics, Organizations and Management, Milgrom and Roberts (1992) note for example that "important features of many organizations can best be understood in terms of deliberate attempts to change preferences of individual participants". One way for firms to shape and change identities is to foster interactions between employees by providing them with time and space to meet. In this paper we have developed a model to study the circumstances under which a firm invests in social capital in order to strengthen the social orientation of its employees and provide extra incentives to exert effort. While there is an opportunity cost associated to bonding activities, namely the lesser time available for production, there are also two benefits. First, a social multiplier effect makes monetary incentives more effective. Second, the distorted effect of adverse selection on contracts is reduced as the shared social ideal becomes more important for employees than their heterogeneous personal ideals.

The past few decades have seen a surge in the number of firms using bonding activities. What has driven such a change? Some researchers suggest that, in times where job security and employees' attachment to firms are diminishing, firms could use soft management policies to shift employees' identity from being personal to collective (Casey, 1996 or Pratt, 2000). Cohen and Prusak (2001) explain for example that nurturing professional and personal connections among workers is a way for firms to deal with rising volatility and heterogeneity in the workplace. Our model is consistent with this explanation: a decrease in the average personal work ideals of employees or a greater heterogeneity of the workforce leads the firm to allocate more time to bonding activities. Motivating employees through the collective identity acts as a substitute to declining individual work ethics and constitutes a solution to deal with a greater heterogeneity in the workforce.

Two extensions of the model could be of interest. First in our framework, there is only one reference group, namely the entire workforce, relatively to which the social norm of effort is defined. It could interesting to make the number of reference groups endogenous and consider that employees choose the group they want to conform to. Second, we assume that employees have the same sensibility to the social norm. One could therefore extend the framework to allow for different degrees of sensibility.

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Appendices

Appendix 1. Derivation of the optimal contract under complete information

Setting expression (5) equal to w_0 and using expressions (6) and (12), we can write

$$\begin{aligned}\int_{\underline{t}}^{\bar{t}} \left((1-\alpha(t))e^*(t)-\beta(t)\right) f(t)dt &= \int_{\underline{t}}^{\bar{t}} \left(e^*(t)-w_0-\frac{1}{2c}(1+c\eta\sigma^2)\alpha^2(t)\right) f(t)dt \\ &= \int_{\underline{t}}^{\bar{t}} \left(\lambda t+(1-\lambda)E\left[t\right]+\frac{\lambda\alpha(t)+(1-\lambda)E\left[\alpha\right]}{\lambda c}-w_0-\frac{\alpha^2(t)}{2c}(1+c\eta\sigma^2)\right) f \\ &= \int_{\underline{t}}^{\bar{t}} \left(\frac{\alpha(t)}{\lambda c}+t-w_0-\frac{1}{2c}(1+c\eta\sigma^2)\alpha^2(t)\right) f(t)dt\end{aligned}$$

Appendix 2. Derivation of the optimal contract under incomplete information

We want to show that the program

$$\max_{\{\alpha(t),\beta(t)\}} \int_{\underline{t}}^{\bar{t}} \left((1-\alpha(t))e^*(t)) - \beta(t)\right) f(t)dt \tag{25}$$

subject to

$$\forall t \in T, u(t,\alpha(t),\beta(t)) \geq w_0 \tag{26}$$

and

$$\forall t,t' \in T, u(t,\alpha(t),\beta(t)) \geq u(t,\alpha(t'),\beta(t')) \tag{27}$$

can be simplified to

$$\max_{\{\alpha(t)\}} \int_{\underline{t}}^{\bar{t}} \left(\frac{\alpha(t)}{\lambda c}+t-w_0-\frac{\lambda\alpha(t)\left(1-F(t)\right)}{f(t)}-\frac{1}{2c}(1+c\eta\sigma^2)\alpha^2(t)\right) f(t)dt \tag{28}$$

subject to the constraints

$$\forall t \in T, \frac{d\alpha(t)}{dt} \geqq 0 \tag{29}$$

We follow roughly the method of Laffont and Martimort (2001). For convenience let us define

$$u(t,\tilde{t}) = u(t,\alpha(\tilde{t}),\beta(\tilde{t})) \tag{30}$$

where

$$u(t,\alpha(\tilde{t}),\beta(\tilde{t})) = \beta(\tilde{t}) + \frac{1-\lambda}{\lambda}\frac{\alpha(\tilde{t})E[\alpha]}{c} + (\lambda t + (1-\lambda)E[t])\alpha(\tilde{t}) + \frac{1}{2c}(1-c\eta\sigma^2)\alpha^2(\tilde{t}) \tag{31}$$

is the certainty equivalent payoff for an employee with personal ideal t when he has chosen the contract $\left\{\alpha(\tilde{t}),\beta(\tilde{t})\right\}$ (see equation (13)). Let

$$u(t) = u(t,t) \tag{32}$$

Condition (27) implies the following local first-order condition for type t:

$$\left.\frac{\partial u(t,\tilde{t})}{\partial \tilde{t}}\right|_{\tilde{t}=t} = 0 \tag{33}$$

or

$$\frac{d\beta(t)}{dt} + \frac{1-\lambda}{\lambda c}\frac{d\alpha(t)}{dt}E[\alpha] + (\lambda t + (1-\lambda)E[t])\frac{d\alpha(t)}{dt} + (\frac{1}{c} - \eta\sigma^2)\alpha(t)\frac{d\alpha(t)}{dt} = 0 \tag{34}$$

The local second-order condition for t is

$$\left.\frac{\partial^2 u(t,\tilde{t})}{\partial \tilde{t}^2}\right|_{\tilde{t}=t} \leq 0 \tag{35}$$

or

$$\frac{d^2\beta(t)}{dt^2} + \frac{1-\lambda}{\lambda c}\frac{d^2\alpha(t)}{dt^2}E[\alpha] + (\lambda t + (1-\lambda)E[t])\frac{d^2\alpha(t)}{dt^2} + (\frac{1}{c} - \eta\sigma^2)\left(\left(\frac{d\alpha(t)}{dt}\right)^2 + \alpha(t)\frac{d^2\alpha(t)}{dt^2}\right) \leq 0 \tag{36}$$

By differentiating (34) with respect to t, we find

$$\frac{d^2\beta(t)}{dt^2} + \frac{1-\lambda}{\lambda c}\frac{d^2\alpha(t)}{dt^2}E[\alpha] + \lambda\frac{d\alpha(t)}{dt} + (\lambda t + (1-\lambda)E[t])\frac{d^2\alpha(t)}{dt^2} + (\frac{1}{c} - \eta\sigma^2)\left(\left(\frac{d\alpha(t)}{dt}\right)^2 + \alpha(t)\frac{d^2\alpha(t)}{dt^2}\right) = 0 \tag{37}$$

By using (36), (37) can be written more simply as

$$\frac{d\alpha(t)}{dt} \geq 0 \tag{38}$$

Note that the local incentive constraint for employee t (expression (34)) implies the global incentive constraint for t (expression (27)). Indeed let us consider $t' \neq t$. Using (34), we can write

$$\begin{aligned} \beta(t) - \beta(t') &= \int_{t'}^{t} \dot{\beta}(\tau) d\tau \qquad (39) \\ &= -\int_{t'}^{t} \left(\frac{1-\lambda}{\lambda} \frac{\dot{\alpha}(\tau) E[\alpha]}{c} + (\lambda\tau + (1-\lambda)E[t])\dot{\alpha}(\tau) + (\frac{1}{c} - \eta\sigma^2)\alpha(\tau)\dot{\alpha}(\tau) \right) d\tau \\ &= -\int_{t'}^{t} \frac{\partial}{\partial \tau} \left(\frac{1-\lambda}{\lambda} \frac{\alpha(\tau) E[\alpha]}{c} + (\lambda\tau + (1-\lambda)E[t])\alpha(\tau) + \frac{1}{2}(\frac{1}{c} - \eta\sigma^2)\alpha^2(\tau) - \lambda A(\tau) \right) d\tau \end{aligned}$$

where $A(\tau)$ is a primitive of $\alpha(\tau)$. We have

$$\begin{aligned} \beta(t) - \beta(t') &= -\left[\frac{1-\lambda}{\lambda} \frac{\alpha(\tau) E[\alpha]}{c} + (\lambda\tau + (1-\lambda)E[t])\alpha(\tau) + \frac{1}{2}(\frac{1}{c} - \eta\sigma^2)\alpha^2(\tau) \right]_{t'}^{t} + \int_{t'}^{t} \lambda\alpha(\tau) d\tau \\ &= -\frac{1-\lambda}{\lambda} \frac{\alpha(t) E[\alpha]}{c} - (\lambda t + (1-\lambda)E[t])\alpha(t) - \frac{1}{2}(\frac{1}{c} - \eta\sigma^2)\alpha^2(t) + \frac{1-\lambda}{\lambda} \frac{\alpha(t') E[\alpha]}{c} \\ &\quad + (\lambda t' + (1-\lambda)E[t])\alpha(t') + \frac{1}{2}(\frac{1}{c} - \eta\sigma^2)\alpha^2(t') + \int_{t'}^{t} \lambda\alpha(\tau) d\tau \qquad (40) \end{aligned}$$

Hence

$$\begin{aligned} &\beta(t) + \frac{1-\lambda}{\lambda} \frac{\alpha(t) E[\alpha]}{c} + (\lambda t + (1-\lambda)E[t])\alpha(t) + \frac{1}{2}(\frac{1}{c} - \eta\sigma^2)\alpha^2(t) \\ &= \beta(t') + \frac{1-\lambda}{\lambda} \frac{\alpha(t') E[\alpha]}{c} + (\lambda t' + (1-\lambda)E[t])\alpha(t') + \frac{1}{2}(\frac{1}{c} - \eta\sigma^2)\alpha^2(t') + \int_{t'}^{t} \lambda\alpha(\tau) d\tau \\ &= \beta(t') + \frac{1-\lambda}{\lambda} \frac{\alpha(t') E[\alpha]}{c} + (\lambda t + (1-\lambda)E[t])\alpha(t') + \frac{1}{2}(\frac{1}{c} - \eta\sigma^2)\alpha^2(t') - \lambda(t-t')\alpha(t') + \int_{t'}^{t} \lambda\alpha(\tau) d\tau \end{aligned} \tag{41}$$

Therefore $u(t,t) = u(t,t') - \lambda(t-t')\alpha(t') + \int_{t'}^{t} \lambda\alpha(\tau)d\tau$. However $-\lambda(t-t')\alpha(t') + \int_{t'}^{t} \lambda\alpha(\tau)d\tau$ is positive because we know from (38) that $\alpha(t)$ is increasing. As a consequence the global incentive constraint is satisfied for type t.

We now rewrite the maximization problem of the firm as a function of $\alpha(t)$ and $u(t)$ instead of $\alpha(t)$ and $\beta(t)$. We know that $u(t) = \beta(t) + \frac{1-\lambda}{\lambda}\frac{\alpha(t)E[\alpha]}{c} + (\lambda t + (1-\lambda)E[t])\alpha(t) + \frac{1}{2c}(1 - c\eta\sigma^2)\alpha^2(t)$. The incentive constraints (34) are replaced by the constraints $\frac{du(t)}{dt} = \lambda\alpha(t)$ and $\frac{d\alpha(t)}{dt} \geq 0$.[9] Using $\frac{du(t)}{dt} > 0$ allows to write the participation constraint (26) as $u(\underline{t}) = w_0$. The maximization program of the firm becomes

$$\max_{\{\alpha(t),u(t)\}} \int_{\underline{t}}^{\bar{t}} \left(\frac{\lambda\alpha(t) + (1-\lambda)E[\alpha]}{\lambda c} + \lambda t + (1-\lambda)E[t] - u(t) - \frac{1}{2c}(1 + c\eta\sigma^2)\alpha^2(t) \right) f(t)dt \quad (42)$$

under the constraints:

$$\forall t \in T, \frac{du(t)}{dt} = \lambda\alpha(t) \quad (43)$$

$$\forall t \in T, \frac{d\alpha(t)}{dt} \geqq 0 \quad (44)$$

$$u(\underline{t}) = w_0 \quad (45)$$

Using (43) we can write

$$u(t) - u(\underline{t}) = \int_{\underline{t}}^{t} \lambda\alpha(\tau)d\tau \quad (46)$$

Using (45) and (46), we rewrite (42) as

$$\max_{\{\alpha(t)\}} \int_{\underline{t}}^{\bar{t}} \left(\frac{\lambda\alpha(t) + (1-\lambda)E[\alpha]}{\lambda c} + \lambda t + (1-\lambda)E[t] - \int_{\underline{t}}^{t} \lambda\alpha(\tau)d\tau - w_0 - \frac{1}{2c}(1 + c\eta\sigma^2)\alpha^2(t) \right) f(t)dt \quad (47)$$

[9]Indeed $\frac{du(t)}{dt} = \lambda\alpha(t) + \left(\frac{d\beta(t)}{dt} + \frac{1-\lambda}{\lambda c}\frac{d\alpha(t)}{dt}E[\alpha] + (\lambda t + (1-\lambda)E[t])\frac{d\alpha(t)}{dt} + (\frac{1}{c} - \eta\sigma^2)\alpha(t)\frac{d\alpha(t)}{dt}\right)$, but the term in parentheses is zero from the first order condition (34).

However

$$\int_{\underline{t}}^{\bar{t}} \left(\int_{\underline{t}}^{t} \lambda\alpha(\tau) d\tau \right) f(t)dt = \left[F(t) \int_{\underline{t}}^{t} \lambda\alpha(\tau) d\tau \right]_{\underline{t}}^{\bar{t}} - \int_{\underline{t}}^{\bar{t}} (\lambda\alpha(t))F(t)dt$$
$$= \int_{\underline{t}}^{\bar{t}} \lambda\alpha(t)dt - \int_{\underline{t}}^{\bar{t}} \lambda\alpha(t)F(t)dt = \int_{\underline{t}}^{\bar{t}} \lambda\alpha(t)\left(1 - F(t)\right) dt \quad (48)$$

As a consequence the maximization problem of the firm becomes

$$\underset{\{\alpha(t)\}}{max} \int_{\underline{t}}^{\bar{t}} \left(\frac{\lambda\alpha(t) + (1-\lambda)E\left[\alpha\right]}{\lambda c} + \lambda t + (1-\lambda)E\left[t\right] - w_0 - \frac{\lambda\alpha(t)\left(1 - F(t)\right)}{f(t)} - \frac{1}{2c}(1 + c\eta\sigma^2)\alpha^2(t) \right) f(t)dt \quad (49)$$

subject to the constraints (44), or

$$\underset{\{\alpha(t)\}}{max} \int_{\underline{t}}^{\bar{t}} \left(\frac{\alpha(t)}{\lambda c} + t - w_0 - \frac{\lambda\alpha(t)\left(1 - F(t)\right)}{f(t)} - \frac{1}{2c}(1 + c\eta\sigma^2)\alpha^2(t) \right) f(t)dt \quad (50)$$

subject to (44).

Appendix 3. Proof of proposition 3.

We solve

$$\underset{p}{max} p \left(E\left[t\right] - w_0 + \frac{1}{2c(1 + c\eta\sigma^2)\lambda^2(p)} \int_{\underline{t}}^{\bar{t}} \left(1 - \frac{c\lambda^2(p)\left(1 - F(t)\right)}{f(t)} \right)^2 f(t)dt \right) + (1-p)(-w_0) \quad (51)$$

Let $X(t,p) = 1 - \frac{c\lambda^2(p)(1-F(t))}{f(t)}$. The first order condition is

$$E[t] + \frac{1}{2c(1+c\eta\sigma^2)\lambda^2(p)} \int_{\underline{t}}^{\bar{t}} X^2(t,p)f(t)dt$$
$$-p\left(\frac{\lambda'(p)}{c(1+c\eta\sigma^2)\lambda^3(p)} \int_{\underline{t}}^{\bar{t}} X^2(t,p)f(t)dt + \frac{2}{c(1+c\eta\sigma^2)\lambda^2(p)} \int_{\underline{t}}^{\bar{t}} \frac{c\lambda(p)\lambda'(p)(1-F(t))}{f(t)} X(t,p)f(t)dt\right) = 0 \tag{52}$$

or

$$E[t] + \frac{1}{c(1+c\eta\sigma^2)\lambda^2(p)}\left(\frac{1}{2} - \varepsilon_\lambda(p)\right) \int_{\underline{t}}^{\bar{t}} X^2(t,p)f(t)dt$$
$$- \frac{2p}{c(1+c\eta\sigma^2)\lambda^2(p)} \int_{\underline{t}}^{\bar{t}} \frac{c\lambda(p)\lambda'(p)(1-F(t))}{f(t)} X(t,p)f(t)dt = 0 \tag{53}$$

where $\varepsilon_\lambda(p) = \frac{p\lambda'(p)}{\lambda(p)}$.

Let $E(t) = \hat{t}$. Suppose that employees are identical. Expression (53) reduces to

$$\hat{t} + \frac{1}{c(1+c\eta\sigma^2)\lambda^2(p)}\left(\frac{1}{2} - \varepsilon_\lambda(p)\right) = 0 \tag{54}$$

If $\hat{t} = 0$ then the solution of (54) is $p^* = \hat{p}$ with $\varepsilon_\lambda(\hat{p}) = 1/2$. If $\hat{t} > 0$ then the solution of (54) is $p^* > \hat{p}$. It is easily verified that p^* is increasing in $\hat{t}$.

Suppose employees are not identical (and hence necessarily $\hat{t} > 0$) then $\int_{\underline{t}}^{\bar{t}} X^2(t,p)f(t)dt < 1$. The solution of (53) is $p^{**} < p^*$ if $\hat{t}$ is not too large.