The Good, the Bad, and the Lazy: Labor Management in Non-Profit Organizations *

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Abstract

We consider the difficulties that nonprofit organizations in a broader sense face in the labor market when they are not able to condition wages on performance. Agents in our model may be intrinsically motivated for certain tasks or missions, but their motives do not necessarily coincide with the goals of the firm. Wages are an insufficient screening device, and we analyze alternative control mechanisms such as ex ante investigation of candidates and ex post auditing.

Keywords: motivated agents, non-profit, sabotage, candidate selection.

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1 Introduction

Workers' wages structure in non-profit and for-profit firms tend to be quite different. In the nonprofit sector, wages are typically low, there are no or little monetary incentive schemes and there is no or little performance evaluation or control of workers. By contrast, in the for-profit sector, wages are higher, and generally incentive schemes and performance evaluation of some kind exist.[1]

This observation raises several questions: (1) Is the incentive structure in the non-profit sector optimal? (2) What types of workers find this structure attractive? (3) What can be done to prevent undesirable types of workers from entering the non-profit sector?

Given the lacking incentive structures, one would expect employees in non-profit institutions either not to work, or to be working for other reasons than the money they earn, i.e. they are intrinsically motivated. That means, both lazy and motivated workers might be working side by side in the non-profit sector.[2] The non-profit sector thus faces a hidden action or moral hazard problem.

Moreover, intrinsic motivation may arise from different individual motives. Some motivated workers may be motivated for reasons that are detrimental to the organization and may be especially attracted by the low level of control in the nonprofit sector. This sector will therefor attract both 'good' and 'bad' motivated workers, thus leading to a problem of *hidden information* or adverse selection.

While wages structure may serve as a means to deal with the first problem, they are an insufficient screening device when it comes to the second, since only the absolute level of motivation (no matter whether 'good' or 'bad') determines the sector choice of a worker. Non-profit organizations therefore have to find other mechanisms to deter undesirable workers.

In this paper, we present a basic model to show that the different wage and incentive structures in the non-profit sector may be an optimal solution for dealing with the moral hazard problem described above: by offering below market wages, only workers with sufficiently high intrinsic motivation enter the nonprofit sector. However, this solution does not allow to screen out

[1]See for example Handy and Katz (1998) on the wage differential between for-profits and non-profits and DeVaro and Brookshire (2007) for promotions and incentives.

[2]This is essentially the result of Delfgaauw and Dur (2006) who show that with unobservable effort, both lazy and dedicated workers work in the nonprofit sector.

'bad' motivated workers.[3] We therefore consider possible other measures to deter this type of agents, such as audit or a thorough, and hence costly, ex ante selection of candidates.

The structure of the paper is as follows: the following section gives a brief summary of the related literature, Section 3 outlines the basic model. After showing the effect of sabotage in the basic model in Section 4, we then go on to discuss the possible countermeasures a firm can take such as ex ante screening (Section 5) or ex post auditing (Section 6). Section 7 concludes.

2 Related Literature

The role of intrinsic motivation and its effects on agents' behavior has received increasing attention in recent years.[4]

In our analysis, intrinsic motivation can be linked to a certain mission pursued by a particular organization. In this respect our model is close to the paper by Besley and Ghatak (2005), who show that matching may save on high-powered incentives when there are agents who care about a firm's mission. However, the authors allow for incentive pay in both sectors and do not consider productivity differences. Furthermore, the papers by Francois (2000) and Francois (2002) have a similar focus as our work: the author analyzes how 'public service motivation' may render public provision of services preferable to provision by private profit maximizing firms. Workers in his model care about the level of output independently of the sector they work in. But whereas in the for-profit sector lower effort will be compensated by other measures in order to maximize profits, this is not the case in the public sector. The nonprofit character of public organizations therefore serves as a commitment device that gives motivated workers an incentive to provide a high level of effort.

There are many sectors where wages are not paid conditional on performance, as for instance the civil service sector or many nonprofit organizations.[5] Nonprofits sometimes are even legally forbidden to pay incentive wages, cf. the discussion in Glaeser (2002). Depending on the sector, this may have institutional reasons, as for example in the judicial sector, where economic incen-

[3]These 'bad' guys are sometimes called saboteurs in the following, since they sabotage the firm by lowering its output or by damaging its reputation with their behavior.

[4]See for example Bénabou and Tirole (2003), Frey (1997), Seabright (2002), Murdock (2002) and Akerlof and Kranton (2005).

[5]See also Borzaga and Tortia (2006) and Ballou and Weisbrod (2003) for empirical studies on the incentives in for-profit and different forms of nonprofit organizations.

tives are minimized in order to guarantee high quality independent judgement (Posner, 1993). But especially in the case of development aid, performance may just be too difficult to assess due to high costs of monitoring in the field.

This may lead to shirking and absenteeism as has been analyzed for example by Chaudhury et al. (2006) and Banerjee and Duflo (2006). But workers may not only just work less but also they may behave in a way that damages the organization for which they work or which is outright criminal. For instance, "Save the Children", a UK based nonprofit, mentions a case in their report (SCUK 2006) where aid workers were collectively abusing minors in a refugee camp in Liberia. Another recent example for misled, though maybe well meant, NGO action is the case of Arche de Zoë, a French NGO that wanted to offer foster homes to war orphans from the crisis region of Darfur in western Sudan. When it turned out that many of the children were neither orphans nor from Darfur, but from Chad, the NGO workers were accused of kidnapping and sentenced to eight years of hard labor in Chad (cf. New York Times, December 27, 2007).

To prevent things like that, nonprofits therefore may want to engage in a more sophisticated selection process of candidates. The difficulties of such a process have for instance been discussed in Goldman (1982) and Greenberg and Haley (1986) for the selection of judges, but otherwise the problem seems to have received surprisingly little attention, and practically no formal treatment.

3 Basic Model

Workers in our model differ in both their productivity and in their level of intrinsic motivation. All workers produce at least output q. A worker with productivity $\mu^i \in \{\mu^L, \mu^H\}$ who exerts effort e may produce additional output Δq with probability $\mu^i e$. That is, the total output produced by a worker is

$$q + \Delta q \mu^i e \ .$$

For simplicity, we assume that workers' productivity, μ^i, which condition their probability of success $\mu^i e$, is either high or low. Low productivity workers have $\mu^L = 0$ so that their probability of success is $\mu^L e = 0$, whereas high productivity workers have $\mu^H = 1$. Their probability of producing a high output is $\mu^H e = e$. Let p be the probability that a worker is productive. The cost of effort is given by

$$c(e) = \frac{a}{2} e^2 \ ,$$

where a is a sufficiently large constant to ensure an interior solution for $\mu^i e \in [0,1]$ (see assumption A1 below).

There are two types of firms: for-profit firms F and nonprofit firms N. In the for-profit sector, performance boni are paid, but firms do not have a mission. By consequence, and in parallel to the model by Besley and Ghatak (2005), intrinsic motivation does not play a role in the for-profit sector. In the nonprofit sector on the other hand, workers may get a non-monetary payoff θ from realizing a project that serves a certain mission. That is, they have a level of intrinsic motivation θ, that is uniformly distributed on $[0, \bar{\theta}]$. Moreover, the nonprofit sector might pay a performance bonus, in addition to the fixed wage. In order to rule out corner solutions for the probability of success of the project, we make the following assumption:

A1 $$a \geq \Delta q + \overline{\theta}.$$

Workers' utility increases in the amount of money they earn and in the non-pecuniary benefit derived from serving a certain mission. Their utility decreases in the effort provided. The utility function of a worker with productivity $\mu^i \in \{\mu^L, \mu^H\}$ who works in sector $j = N, F$ takes the form

$$u_j^i = \begin{cases} w_j + b_j \mu^i e - ae^2/2 & \text{if } j = F \\ w_j + (b_j + \theta_j)\mu^i e - ae^2/2 & \text{if } j = N \end{cases},$$

where w_j is the basic salary in sector $j = F, N$ and b_j is a success bonus, which is paid if the worker produces a high output. As pointed out before, intrinsic motivation plays no role in the for-profit sector, i.e. $\theta_F = 0$.

The paper focuses on the impact of intrinsic motivation on optimal work incentive. In the utility function the worker hence gets non-monetary benefit upon successful completion of his task. Workers might however also get non-monetary utility from the mere fact of working for a nonprofit organization in so far as this may give them a certain social status. This effect does not incite employees to work hard. They will get the social status by simply joining the organization and even if they do nothing on their job. By contrast, there is also a certain satisfaction to be gained if you do your job successfully, and we assume that this job satisfaction component is closely linked to the fact that you can identify with your work and ultimately with the organization you are working for. This effect is captured in the non-monetary benefit θ that a worker gets in sector N when he does his job successfully. Since it is this second component that influences a worker's effort, we refer to it as intrinsic motivation. The social status effect would show up in our model as an additive component to the basic wage which hence could be further reduced.

While adding this effect does not change our results (computations are available on request), it makes the paper less readable. We hence concentrate on the more relevant effect of intrinsic motivation as modeled above.

3.1 For-Profit Sector

In sector F, a worker with productivity μ^i gets utility

$$u_F = w_F + b_F \mu^i e - ae^2/2 \ .$$

Taking into account that the probability of success is $\mu^H = 1$ for productive workers and $\mu^L = 0$ otherwise, the optimal effort level then is given by

$$e_F^* = \begin{cases} 0 & \text{if not productive} \\ b_F/a & \text{if productive} \end{cases} \ .$$

A worker in sector F therefore attains utility

$$u_F = \begin{cases} w_F & \text{if not productive} \\ w_F + b_F^2/(2a) & \text{if productive} \end{cases} \ .$$

A firm in sector F has a profit function per worker

$$\pi_F = \begin{cases} q - w_F & \text{if worker is not productive} \\ q - w_F + (\Delta q - b_F)\frac{b_F}{a} & \text{if worker is productive} \end{cases} \ .$$

We assume perfect competition in the for-profit sector, that is, firms make no rents. The optimal wage contract in sector F then is given by $w_F = q$ and $b_F = \Delta q$.

3.2 Non-profit Sector

In contrast to sector F, the non-profit sector is smaller. Organizations in N are characterized by a certain mission which somewhat shields them from the competitive pressure of the labor market. A firm in sector N takes the market outcome $w_F = q$ and $b_F = \Delta q$ as given. It offers a flat salary w_N, plus possibly a success bonus b_N. Moreover the worker derives a non-monetary benefit θ from doing his job successfully.

The utility function of a worker with productivity $\mu^i \in \{\mu^L, \mu^H\}$ then can be rewritten as

$$u_N = w_N + (\theta + b_N)\mu^i e - ae^2/2 \ .$$

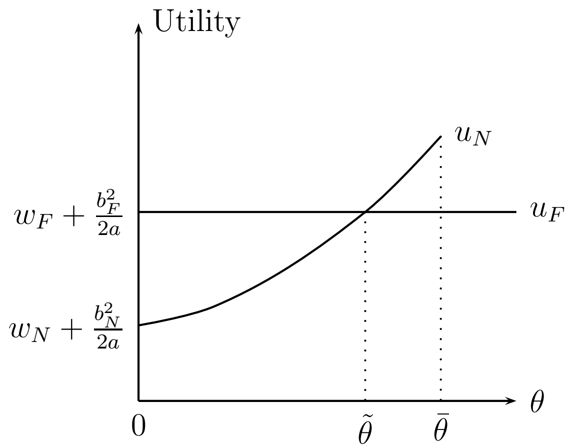

Figure 1: Utility levels of high productivity workers in N and F.

Taking into account that $\mu^H = 1$, the probability of success is $\mu^H e = e$ for productive workers and $\mu^L e = 0$ otherwise, the optimal effort level then is given by

$$e^* = \begin{cases} 0 & \text{if not productive} \\ \frac{\theta + b_N}{a} & \text{if productive} \end{cases} .$$

A worker in sector N therefore attains a utility

$$u_N = \begin{cases} w_N & \text{if not productive} \\ w_N + \frac{(\theta + b_N)^2}{2a} & \text{if productive} \end{cases} .$$

The expected profit of firm N is the sum of profits that N makes on low and high productivity workers, i.e. the sum of profits that firm N makes on the 'lazy' π^L and on the 'good' π^G times the respective shares of workers. We analyze these functions in more detail in the next section.

3.2.1 Workers participation constraint

What kind of workers does N attract for different levels of w_N and b_N? To answer this question, we have to compare the utility in N and F that a worker can get, as illustrated in Figure 1 for high productivity workers. We assume that indifferent workers prefer to work for the F sector (i.e., there is a slight fixed cost to work for N).

For unproductive workers the case is clear: Since we assumed that indifferent workers prefer to work in firm F, and since they have no chance to earn a success bonus, they prefer to work for N if and only if $w_N > w_F$. That is, the number of low-productivity workers in N is

$$n^L = (1 - p) \cdot \mathbf{1}_{w_N > w_F} \ , \tag{1}$$

i.e. the share of unproductive workers in the population given that the wage in the nonprofit sector is higher than the market wage.

Productive workers prefer to work for N rather than for F if and only if $u_N(w_N, b_N) > u_F(w_F, b_F)$. Taking into account the optimal wage policy in sector F as described in section 3.1, this condition can be rewritten as

$$w_N + \frac{(\theta + b_N)^2}{2a} > q + \frac{\Delta q^2}{2a} \ .$$

That is, for a given wage level (w_N, b_N), a worker with

$$\tilde{\theta}(w_N, b_N) = \sqrt{2a(q - w_N) + \Delta q^2} - b_N \tag{2}$$

is just indifferent between the two sectors.[6] All workers with $\theta > \tilde{\theta}(w_N, b_N)$ prefer to work for N. For a given contract (w_N, b_N) the number of high-productivity workers in sector N therefore is given by

$$n^H = p \cdot \frac{\bar{\theta} - \tilde{\theta}(w_N, b_N)}{\bar{\theta}} \ , \tag{3}$$

i.e. the share p of productive workers in the population times the share of motivated workers who prefer N over F. This result is illustrated in Figure 2: as longs as the wage in the non-profit sector is smaller or equal to the market wage, only productive workers (share p in the population) with a sufficiently high level of intrinsic motivation work for N.

It is easy to check that if N offers exactly the same contract as F all productive workers prefer to work in the non-profit sector.[7] This is fairly intuitive: they get the same monetary rewards as in the for-profit sector plus the psychological bonus to work for a mission.

Even if N offers zero monetary incentives, i.e. if $w_N = 0$ and $b_N = 0$, there may be workers motivated enough to work for N. This is the case if the level of intrinsic motivation is sufficiently high, more precisely if $\bar{\theta} > \sqrt{2aq + \Delta q^2}$.[8]

[6] Note that it has to hold that $w_N < q + \Delta q^2/(2a)$, otherwise everyone would want to work in N and you could reduce w_N without losing anyone.

[7] That is if $w_N = w_F = q$ and $b_N = b_F = \Delta q$, then $\tilde{\theta}(w_N, b_N) = 0$.

[8] $\bar{\theta}$ has to be higher than the critical level $\tilde{\theta}$ at $w_N = 0$ and $b_n = 0$.

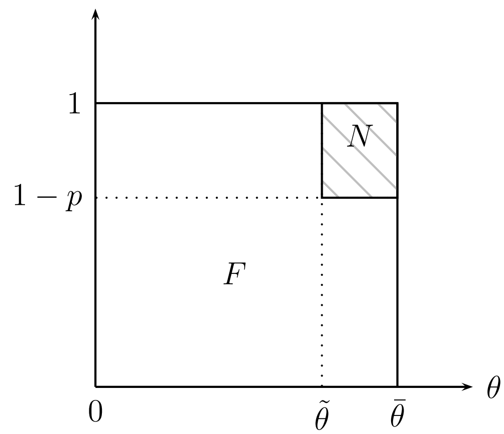

Figure 2: Distribution of workers when $w_N \leq w_F$.

3.2.2 Profit function of N

The profit that N makes on low productivity workers is:

$$\pi^L(w_N) = n^L \cdot (q - w_N) = (1-p)\mathbf{1}_{\{w_N > w_F\}}(q - w_N)\ . \tag{4}$$

Unproductive workers only work for N if $w_N > w_F = q$, that is if they earn more than what they actually produce. If possible, N will therefore try to avoid lazy (i.e., type L) workers, and choose a wage below the market wage q.

As we have seen in the previous section, productive workers who work for N provide a level of effort $e_N = (\theta + b_N)/a$. Dropping the argument of $\tilde{\theta}(w_N, b_N)$, the expected effort from this group at a given contract (w_N, b_N) therefore is

$$E[e_N] = \frac{1}{a}\left(b_N + \frac{\bar{\theta} + \tilde{\theta}}{2}\right)\ . \tag{5}$$

The profit on workers with high productivity hence is

$$\pi^H(w_N, b_N) = n^H\Big[q - w_N + (\Delta q - b_N)E[e_N]\Big]\ , \tag{6}$$

where n^H is the number of high productivity workers in N as given by (3), and $E[e_N]$ is the average effort of these workers as given by (5). That is, N's profit is equal to the number of productive workers n^H who prefer to work in N for a given contract (w_N, b_N) times the average net profit per worker.[9]

[9] Note that both n^H and $E[e_N]$ depend on (w_N, b_N), since they depend on the critical level of motivation $\tilde{\theta}(w_N, b_N)$. We dropped the argument to make things easier to read.

As you increase w_N and b_N, the critical level of motivation $\tilde{\theta}$ goes down, i.e. the number of workers n^H in N goes up. At the same time the average probability of success as given by $E[e_N]$ goes down while the wage costs per worker are rising, thus decreasing expected per worker profit. The optimal contract is trading off these two effects.

The optimal contract (w_N^*, b_N^*) solves:

$$\frac{\partial \pi^H}{\partial w_N} = -\frac{p}{\bar{\theta}}(\bar{\theta} - \tilde{\theta}) - \frac{p}{\bar{\theta}}\frac{\partial \tilde{\theta}}{\partial w_N}\left[q - w_N + (\Delta q - b_N)\frac{b_N + \tilde{\theta}}{a}\right] \leq 0$$

$$\frac{\partial \pi^H}{\partial b_N} = \frac{p}{a\bar{\theta}}(\bar{\theta} - \tilde{\theta})\left[\Delta q - 2b_N - \frac{\tilde{\theta} + \bar{\theta}}{2}\right] + \frac{p}{\bar{\theta}}\left[q - w_N + (\Delta q - b_N)\frac{b_N + \tilde{\theta}}{a}\right] \leq 0$$

where $\partial \tilde{\theta}/\partial w_N = -a/(\tilde{\theta} + b_N)$.

Proposition 1 *If $\bar{\theta}$ is sufficiently high, then the optimal wage contract in N is $b_N^* = 0$ and $w_N^* \leq q$. A sufficient condition is $\bar{\theta} > \Delta q(3 + \sqrt{2})$.*

For a proof of this proposition, see the Appendix. If this condition holds, the optimal wage is given by

$$w_N^* = q + \frac{\Delta q^2}{2a} - \frac{1}{18a}\left[\bar{\theta} - \Delta q + \sqrt{(\bar{\theta} - \Delta q)^2 + 3\Delta q^2}\right]^2, \qquad (7)$$

which is smaller than the market wage in the for-profit sector $w_F = q$.

Hence, if there are enough highly motivated productive workers, i.e. if $\bar{\theta}$ is sufficiently high, then N optimally should pay no bonus because the average intrinsic motivation of workers in N then anyway is high enough to make them provide effort. Also, N should pay a wage below the market wage since sufficiently motivated workers will work even for less money, and at the same time, low productivity workers will stay out of the nonprofit sector.

The non-profit firm thus makes a rent on motivated workers which is given by

$$\pi^H(w_N^*) = \frac{p}{\bar{\theta}}(\bar{\theta} - \tilde{\theta}_0(w_N^*)) \cdot \frac{1}{2a} \cdot \left[(\tilde{\theta}_0(w_N^*))^2 - \Delta q^2 + \Delta q(\bar{\theta} + \tilde{\theta}_0(w_N^*))\right], \quad (8)$$

where

$$\tilde{\theta}_0(w_N^*) = \frac{1}{3}\left[\bar{\theta} - \Delta q + \sqrt{(\bar{\theta} - \Delta q)^2 + 3\Delta q^2}\right]. \qquad (9)$$

While it may seem contradictory that non-profits actually may earn rents, it follows logically from the fact that non-profits can attract motivated workers who need lower monetary incentives to provide effort than regular workers do. However, this intrinsic motivation is linked to the fact that non-profits have some mission they pursue. Since this is not the case in the for-profit sector, firms in this sector cannot exploit workers' intrinsic motivation.[10]

Corollary 1 *If $\bar{\theta}$ is low and the basic production q is also low, then the optimal contract in N is $w_N^* = 0$ and $b_N^* \geq 0$. A sufficient condition for this is $\bar{\theta} < \Delta q \cdot 4.41$ and $q < 2.41 \cdot \Delta q^2/a$.*

The proof follows the same reasoning as the proof of proposition 1. For detailed calculations see the Appendix.

In what follows we focus on the optimal flat wage contract.[11] The only choice variable for a firm in sector N then is its basic wage w_N which on the one hand determines both the number and the expected effort of workers in N and on the other hand just represents the wage cost.

4 Sabotage

So far, we have assumed that intrinsic motivation has an unambiguously positive effect on the payoff of firm N. Yet, the motives of workers in the non-profit sector may be quite diverse, and not all of them necessarily coincide with the goals of the organization. A worker who is motivated for the wrong reasons may even be harmful for a firm. Examples we have in mind are terrorism, espionage or cases of misbehavior by NGO workers such as corruption or sexual abuse. The latter has for example been documented by Save the Children UK in a refugee camp in Liberia where minors were abused by aid workers.[12] Situations such as these may result in a high level of intrinsic motivation, but it sabotages the performance of the firm as a whole. We therefore allow the impact of θ to be negative. A simple way to model this is to assume that workers' intrinsic motivation type θ is still uniformly distributed over $[0, \overline{\theta}]$, but that with probability $s \in [0, 1]$ the worker is a saboteur so that the damage in case of "success" is $-D$, where $D > 0$.

[10] This result is closely linked to the result by Besley and Ghatak (2005) who show that organizations who follow some mission may save on high powered incentives due to intrinsic motivation of their workers. However, their model otherwise follows a different approach.

[11] Note that nonprofits in some cases may also be required by laws and regulations to play flat salaries. However, as we have shown in the above, flat wages may also be optimal if there are enough motivated workers.

[12] See SCUK (2006).

In our model setup, sabotage only plays a role for productive workers. We consider the case where N does not pay a success bonus, but only a flat salary w_N.[13]

A saboteur with characteristic θ gets a utility level

$$u_N = w_N + \theta e - ae^2/2 ,$$

and hence chooses as his optimal effort level $e^* = \theta/a$ such that his overall utility from working in N becomes

$$u_N = w_N + \theta^2/(2a) .$$

Whether a worker prefers to work in N therefore only depends on his absolute level of motivation. The set of workers who prefer N over F thus is unchanged: $[\tilde{\theta}_0, \bar{\theta}]$.

The fact that a worker is a saboteur does however matter to firm N, since it lowers its output.[14] Let us consider just the profit on high productivity workers:

$$\pi^H_{sab} = n^H \Big[q - w_N + [(1-s)\Delta q - sD] \cdot E[e_N] \Big] , \qquad (10)$$

where n^H as defined in (3) and $E[e_N]$ as defined in (5) depend both on the wage in sector N.

Maximizing this over w_N, we get the optimal wage level with sabotage

$$w_N^{sab} \;=\; q + \frac{\Delta q^2}{2a} - \frac{1}{18a}\left[\bar{\theta} - A + \sqrt{(\bar{\theta} - A)^2 + 3\Delta q^2}\right]^2 , \qquad (11)$$

where $A = (1-s)\Delta q - sD$ is the expected extra output by both good and bad high productivity workers. Note that this is the optimal wage level as long as $w_N \leq w_F = q$, i.e. as long as there are no 'lazy' workers. This is equivalent to $(2-s)\Delta q - sD \leq \bar{\theta}$, which is always true as long as $\bar{\theta} > 2\Delta q$.

Proposition 2 *The optimal wage level with sabotage is smaller or equal to the optimal wage level without sabotage. The higher the probability of sabotage and the higher the damage caused by saboteurs, the lower the optimal wage level* w_N^{sab}.

[13] This may be either a result from optimization as shown before or due to exogenous reasons such as legal requirements for nonprofits.

[14] Note, that this problem does not arise in the for-profit sector since there performance is evaluated and intrinsic motivation plays no role.

Proof. First, note that w_N^{sab} is strictly falling in s.[15] Compare the optimal wage with sabotage as given by (11) with the optimal wage without sabotage as given by (7). $w_N^{sab} < w_N^*$ if $-(\bar{\theta} - \Delta q) < \sqrt{(\bar{\theta} - \Delta q)^2 + 3\Delta q^2}$ and $s > 0$. A sufficient condition for this to be true is $\bar{\theta} > \Delta q$. When the optimal wage without sabotage is lower than the market wage, i.e. when the sufficient condition for proposition 1 holds, this is automatically the case. q.e.d.

At a first glance, it may seem strange that N chooses to lower its wage w_N and thus to attract more extreme types θ. The intuition behind this is the following: Sabotage lowers the expected per capita gain from having productive workers. That is the marginal gains made on high productivity workers decrease and hence it is less interesting to hire them. Instead, it becomes relatively more important to save on fixed wages which are paid to all workers.

N's profit given the optimal wage policy then is given by

$$\pi_{sab}^H(w_N^{sab}) = \frac{p}{\bar{\theta}}(\bar{\theta} - \tilde{\theta}_0(w_N^{sab})) \cdot \frac{1}{2a} \cdot \left[(\tilde{\theta}_0(w_N^{sab}))^2 - \Delta q^2 + A(\bar{\theta} + \tilde{\theta}_0(w_N^{sab}))\right], \quad (12)$$

where

$$\tilde{\theta}_0(w_N^{sab}) = \frac{1}{3}\left[\bar{\theta} - A + \sqrt{(\bar{\theta} - A)^2 + 3\Delta q^2}\right], \quad (13)$$

and $A = (1 - s)\Delta q - sD$. This is lower than N's rents without sabotage, as the additional output produced by high productivity workers with sabotage A is lower than the additional output without sabotage Δq.

In any case, sabotage may considerably lower the rents in sector N. Non-profits therefore may want to try to select candidates before hiring them or to control them more closely once they are hired. In the following sections we explore these respective measures.

5 Ex Ante Selection of Candidates

Depending on the expected damage of hiring a saboteur, an organization or firm may want to invest in a more sophisticated selection process of applicants. This is commonly observed especially in sectors where the stakes are high or where candidates once hired are difficult to fire. The latter is for example the case for civil servants who are guaranteed lifetime employment and

[15] As the probability of sabotage s or the damage D become too high, we get a corner solution for w_N and the optimal wage then reduces to zero. Eventually, N's profit may even become negative. We assume in the following, that this is not the case here.

pension schemes in exchange for serving the state. Before being hired, they usually have to undergo a screening process which includes medical tests and checking of police records. Depending on the exact position, the selection process may be even more complicated, as for example discussed in Goldman (1982) and Greenberg and Haley (1986) for the case of judges in the United States. The selection process might be very long and thorough in case of intelligence agencies such as the FBI or the CIA.[16] However, checking each applicant is costly, and therefore has to be seen in relation to the potential damage of hiring a bad worker.

In our model, the firm N can invest in gathering information on an applicant at a cost of $c(i) = 0.5ci^2$. When investing an amount i, firm N learns with probability i whether the worker is 'good' or 'bad' (i.e., a saboteur). With probability $(1 - i)$, N learns nothing. Note that the firm has to spend this investigation effort on every worker in the set of applicants which is given by

$$n(w_N) = n^L + n^H = (1-p)\mathbf{1}_{\{w_N > w_F\}} + \frac{p}{\bar{\theta}}(\bar{\theta} - \tilde{\theta}_0) \; . \tag{14}$$

The expected profit of firm N then is given by

$$\begin{aligned} \pi(w_N, i) &= i \cdot (\text{profit if informed}) + (1-i) \cdot (\text{profit if uninformed}) \\ &\quad - c(i) \cdot (\text{set of applicants}) \\ &= i \cdot \pi^H + (1-i) \cdot \pi^H_{sab} + \pi^L - c(i) \cdot n(w_N) \; , \end{aligned}$$

where π^H is the profit on 'good' high productivity workers as given by (6), i.e. without sabotage. π^H_{sab} is the profit on both 'good' and 'bad' high productivity workers as given by (10), and π^L is the profit on low productivity workers as given by (4). n is the set of applicants at wage w_N as defined in (14).

[16]While it is notoriously difficult to get concrete numbers and statistics linked to intelligence services, at least some indication for the length of the selection process can be found. For example, the CIA states on its website (https://www.cia.gov/careers/faq/index.html♯a3):"Depending on an applicant's specific circumstances, the process may take as little as two months or more than a year. [. . .] Applicants must undergo a thorough background investigation examining their life history, character, trustworthiness, reliability and soundness of judgment [. . .] one's freedom from conflicting allegiances, potential to be coerced and willingness and ability to abide by regulations governing the use, handling and the protection of sensitive information. The Agency uses the polygraph to check the veracity of this information. The hiring process also entails a thorough medical examination of one's mental and physical fitness to perform essential job functions." The FBI states that "The clearance process can take anywhere from several months to a year or more" (see http://www.fbijobs.gov/61.asp♯3), and lists as part of the background check "a polygraph examination; a test for illegal drugs; credit and records checks; and extensive interviews with former and current colleagues, neighbors, friends, professors, etc."

Let us again consider the case when there are only high productivity workers. Maximizing $\pi(w_N, i)$ over w_N and i, we get

$$w_N^{sel} = q + \frac{\Delta q^2}{2a} - \frac{1}{18a}\left[\bar{\theta} - B + \sqrt{(\bar{\theta} - B)^2 + 3\Delta q^2 + 3aci^2}\right]^2 , \quad (15)$$

where $B = i\Delta q + (1-i)[(1-s)\Delta q - sD]$, and

$$c'(i) = \min\left\{ s(\Delta q + D)\frac{\bar{\theta} + \tilde{\theta}_0(w_N)}{2a}, 1 \right\} . \quad (16)$$

The higher the probability of sabotage and the higher the damage caused by saboteurs, the more the nonprofit firm wants to invest in ex ante candidate selection. Its investment decreases in the number of applicants that have to be tested, which increases as $\tilde{\theta}_0$ decreases.

Proposition 3 *The optimal wage with ex ante selection of candidates* w_N^{sel} *is lower than the optimal wage* w_N^* *when there are only 'good' workers.*

Proof. Compare the optimal wage with ex ante selection of candidates given by (15) with the optimal wage without sabotage as given by (7). $w_N^{sel} < w_N^*$ if

$$\bar{\theta} - B + \sqrt{(\bar{\theta} - B)^2 + 3\Delta q^2 + 3aci^2} > \bar{\theta} - \Delta q + \sqrt{(\bar{\theta} - \Delta q)^2 + 3\Delta q^2} .$$

Since $B = i\Delta q + (1-i)[(1-s)\Delta q - sD] < \Delta q$, the inequality is fulfilled for all values of c and i. q.e.d.

That the per worker investment i can be sizeable depending on the number of applicants and the level of security required has for example been pointed out by Slowik (2001). Eventually, it might be so high that all the rents generated from the lower wage costs when hiring motivated workers are consumed by this selection cost. Under certain conditions, a nonprofit firm therefore may want to turn to other measures to control for sabotage, as for example auditing which we will discuss in the next section.

6 Ex Post Audit

Suppose that the firm N can engage in an auditing scheme where workers are audited with probability α. Contrary to the selection of candidates which is ex-ante, auditing is ex-post. This implies that the damage is done when it occurs. Nevertheless audit is beneficial because it has a deterrence effect. Bad workers, who are detected based on their output, can be punished. This is a major difference with ex-ante selection. The only punishment in case of presumption of "badness" in a selection process is that the worker is not hired.

With auditing, the utility function of saboteurs[17] is given by

$$u_N = w_N - \theta \cdot e - ae^2/2 - k \cdot \alpha \ ,$$

where k is the loss incurred by a saboteur if found out.[18] For a given level of auditing α, a 'bad' worker therefore is indifferent between N and F if he is of type:

$$\tilde{\theta}(w_N, \alpha) \equiv \tilde{\theta}_\alpha = \sqrt{2a(q + k \cdot \alpha - w_N) + \Delta q^2} \ , \tag{17}$$

which is higher than the indifferent worker without sabotage, i.e. $\tilde{\theta}_\alpha > \tilde{\theta}_0$. The number of 'bad' motivated workers who want to work for N therefore goes down.

N can set the level of auditing at a cost $K(\alpha)$. Again considering only high productivity workers, the firm's expected profit is then given by

$$\pi^H_{audit} = n^H(1-s)\Big[q - w_N + \Delta q \cdot \frac{\bar{\theta} + \tilde{\theta}_0}{2a}\Big] + n^H_\alpha s\Big[q - w_N - D \cdot \frac{\bar{\theta} + \tilde{\theta}_\alpha}{2a}\Big] - K(\alpha) \ , \tag{18}$$

where n^H is the number of 'good' workers as given in (3) and n^H_α is the number of bad workers who choose to work in N at a given wage and auditing probability α as given by

$$n^H_\alpha = p \cdot \frac{\bar{\theta} - \tilde{\theta}_\alpha(w_N, \alpha)}{\bar{\theta}} \ . \tag{19}$$

The expected profit on high productivity workers hence is the sum of expected profits on both 'good' and 'bad' workers as given by the two terms in (18) respectively minus the auditing cost $K(\alpha)$. The terms in square brackets describe the respective per-worker profits which are multiplied with the probability that a worker is of either type (e.g., with probability s a worker is 'bad') and the shares of workers of each type that choose to work in N.

The question is whether an auditing scheme such as this performs better than just doing nothing. If N does not take any counter measures it will get the

[17] Note that saboteurs in our setting are high productivity workers. Their productivity equals their effort.

[18] This loss could include anything from a fine or the cost of losing the job up to going to jail as in the examples of sabotage, terrorism or child abuse.

profit as described in Section 4 which we can rewrite as

$$\pi^H_{sab} = n^H(1-s)\Big[q - w_N + \Delta q \cdot \frac{\bar{\theta}+\tilde{\theta}_0}{2a}\Big] + n^H s\Big[q - w_N - D \cdot \frac{\bar{\theta}+\tilde{\theta}_0}{2a}\Big] \ . \quad (20)$$

Comparing this with (18), we can see that whether the profit with auditing is higher depends on the cost of auditing $K(\alpha)$ for the firm, and on the fines imposed on the 'bad' guys. If k is very high, i.e. if 'bad' guys face a high loss if found out, then even a relatively low level of auditing α may deter sufficiently many saboteurs. That is, the critical level of intrinsic motivation $\tilde{\theta}_\alpha$ becomes so high, that the number of 'bad' guys choosing to work for N goes to zero.

Whenever $\tilde{\theta}_\alpha > \bar{\theta}$, that is, when

$$k\alpha\tilde{\theta}_0^2 > \frac{\bar{\theta}^2}{2a} \ , \quad (21)$$

then a saboteur's expected cost of being detected $k\alpha$ is so high that even the most extreme type of saboteur does not want to enter sector N and is better off working in sector F. Of course, firms in sector N may only partly influence this cost. While they can set the probability of audit α they may not be able to implement high fines for various reasons. For example, for outright criminal actions by the worker, the fines depend on the legal context and may vary from country to country.

If the imposed fines are not high enough or if auditing is too costly to sustain a sufficiently high α, then it depends on the size of the damage D caused by saboteurs whether this scheme is still profitable. Especially if the damage is very high, just relying on audit may be too risky, since even one saboteur may destroy everything.

7 Discussion

We have shown in our model that flat wages below the market wage may be optimal in non-profit organizations when workers are intrinsically motivated. Non-profit organizations therefore may actually earn rents from exploiting this intrinsic motivation and thus saving on wage costs. In this setup, wages may serve as a means to screen out workers who are not motivated or unproductive.

Workers may however be motivated for different reasons, and the wage policy by itself does not allow to distinguish between different motives. So non-profits will attract both 'good' workers that work in the best interest of the organization as well as ‘bad’ workers that follow their own interest and thus hurt the organization.

In order to limit the damage caused by such saboteurs non-profits should therefore consider different measures to deter them. They could either try to select candidates before hiring them or try to control after the hiring decision. In the first case, firms have to engage in background checks etc. for each candidate they are considering, which involves high per candidate costs. However, especially if the potential damage caused by a ‘bad’ worker is high enough, it becomes vital for the organization to try to screen out bad applicants before hiring them. This would for example be the case in intelligence services where the security of a country might be at stake when the wrong agents are hired.

In the second case, when controlling ex post, i.e. after the hiring decision and the action choice of the worker, the damage already has occurred when you control for it. But in as far as non-profits can impose sufficiently high fines on ‘bad’ workers, the latter will eventually prefer to work in the for-profit sector since the risk of being exposed is too high. Auditing thus deters ‘bad’ workers or at least reduces the number of such workers choosing to work in the non-profit sector. However, those ‘bad’ workers who still do, have a higher intrinsic motivation and thus are more likely to cause damage. By consequence, auditing may work extremely well when the expected cost of being detected for saboteurs is high, but it may have no positive effect if the costs of auditing are very high or the damage caused by saboteurs is high. In the latter case, ex ante selection is likely to perform better.

Appendix

Proof of Proposition 1

Proposition 1 states that if $\bar{\theta}$ is large enough, the optimal contract is $b_N^* = 0$ and $w_N^* < q$.

To see this, let us start with the first part of the proposition. Setting the first order condition with respect to w_N to zero, we can show that for sufficiently large $\bar{\theta}$ the first order condition with respect to b_N becomes negative.

The first order condition with respect to w_N is given by

$$\frac{\partial \pi^H}{\partial w_N} = -\frac{p}{\bar{\theta}}(\bar{\theta} - \tilde{\theta}) - \frac{p}{\bar{\theta}} \frac{\partial \tilde{\theta}}{\partial w_N} \left[q - w_N + (\Delta q - b_N) \frac{b_N + \tilde{\theta}}{a} \right] ,$$

where $\partial \tilde{\theta} / \partial w_N = -a/(\tilde{\theta} + b_N)$. To get the optimal wage, we have to set this first order condition to zero. by multiplying with $(\tilde{\theta} + b_N)/a$ we can rewrite

$$\frac{p}{\bar{\theta}}(\bar{\theta} - \tilde{\theta}) \frac{-(\tilde{\theta} + b_N)}{a} + \frac{p}{\bar{\theta}} \left[q - w_N + (\Delta q - b_N) \frac{b_N + \tilde{\theta}}{a} \right] = 0 .$$

Now compare this to the first order condition with respect to b_N:

$$\frac{\partial \pi^H}{\partial b_N} = \frac{p}{\bar{\theta}}(\bar{\theta} - \tilde{\theta}) \frac{1}{a} \left[\Delta q - 2b_N - \frac{\tilde{\theta} + \bar{\theta}}{2} \right] + \frac{p}{\bar{\theta}} \left[q - w_N + (\Delta q - b_N) \frac{b_N + \tilde{\theta}}{a} \right] \leq 0 .$$

We can see that if

$$\frac{-(\tilde{\theta} + b_N)}{a} > \frac{1}{a} \left[\Delta q - 2b_N - \frac{\tilde{\theta} + \bar{\theta}}{2} \right] ,$$

then the the FOC with respect to w_N, which we set to zero, is greater than the FOC with respect to b_N which hence must be negative. Solving this for $\bar{\theta}$ we get a sufficient condition on $\bar{\theta}$: Whenever

$$\bar{\theta} > \tilde{\theta} - 2b_N + 2\Delta q , \tag{22}$$

then the above inequality holds and it is hence optimal to set the bonus b_N to zero.

Now suppose that $b_N = 0$. The first order condition with respect to w_N then simplifies to

$$\frac{\partial \pi^H}{\partial w_N} = -\frac{p}{\bar{\theta}}(\bar{\theta} - \tilde{\theta}_0) - \frac{p}{\bar{\theta}} \frac{\partial \tilde{\theta}_0}{\partial w_N} \left[q - w_N + \frac{\Delta q}{a} \tilde{\theta}_0 \right] = 0 ,$$

where $\tilde{\theta}_0 = \sqrt{2a(q - w_N) + \Delta q^2}$. After some transformations this simplifies to

$$3\tilde{\theta}_0^2 + 2\tilde{\theta}_0(\Delta q - \bar{\theta}) - \Delta q^2 = 0 \; .$$

Solving for $\tilde{\theta}_0$, we get the following solutions: First, we get

$$\tilde{\theta}_0^- = \frac{1}{3}\left[\bar{\theta} - \Delta q - \sqrt{(\bar{\theta} - \Delta q)^2 + 3\Delta q^2}\right] \; .$$

This solution is smaller than zero since the expression under the square root is bigger than $\bar{\theta} - \Delta q$. Since θ is only defined on the interval $[0, \bar{\theta}]$, we are left with the second solution, which is

$$\tilde{\theta}_0^+ = \frac{1}{3}\left[\bar{\theta} - \Delta q + \sqrt{(\bar{\theta} - \Delta q)^2 + 3\Delta q^2}\right] \; .$$

The optimal wage w_N^* has to be such that $\tilde{\theta}_0^+ = \tilde{\theta}_0$ as defined above, i.e.

$$\frac{1}{3}\left[\bar{\theta} - \Delta q + \sqrt{(\bar{\theta} - \Delta q)^2 + 3\Delta q^2}\right] = \sqrt{2a(q - w_N) + \Delta q^2} \; .$$

Solving this for w_N we get

$$w_N^* = q + \frac{\Delta q^2}{2a} - \frac{1}{18a}\left[\bar{\theta} - \Delta q + \sqrt{(\bar{\theta} - \Delta q)^2 + 3\Delta q^2}\right]^2 \; .$$

This is smaller than the market wage q when

$$\bar{\theta} \geq 2\Delta q \; . \tag{23}$$

So finally, we have to check whether condition (22) holds for $\tilde{\theta}_0^+$ and $b_N = 0$, i.e. if

$$\begin{aligned} \bar{\theta} &> \tilde{\theta}_0^+ + 2\Delta q \\ \Leftrightarrow \bar{\theta} &> \frac{1}{3}\left[\bar{\theta} - \Delta q + \sqrt{(\bar{\theta} - \Delta q)^2 + 3\Delta q^2}\right] + 2\Delta q \; . \end{aligned}$$

Solving for $\bar{\theta}$, we get a modified condition for (22) which is

$$\bar{\theta} \geq \Delta q(3 + \sqrt{2}) \; . \tag{24}$$

When we compare (23) and (24), we find that the latter condition is more restrictive. This means that whenever $\bar{\theta}$ is high enough to make a zero bonus optimal, then it is also optimal to pay a below market wage.

Proof of Corollary 1

Corollary 1 states that if $\bar{\theta}$ is small enough, the optimal contract is $w_N^* = 0$ and $b_N^* \geq 0$.

Let us again start with the first part of the proposition. Setting the first order condition with respect to b_N to zero, we can show that for sufficiently small $\bar{\theta}$ the first order condition with respect to w_N becomes negative. We hence get exactly the inverse condition compared to proposition 1, namely that

$$\bar{\theta} < \tilde{\theta} - 2b_N + 2\Delta q \tag{25}$$

has to hold.

Now suppose that $w_N = 0$. The first order condition with respect to b_N then simplifies to

$$\frac{\partial \pi^H}{\partial b_N} = \frac{p}{\bar{\theta}}(\bar{\theta} - \tilde{\theta})\frac{1}{\tilde{\theta}_w + b_N}\left[\Delta q - 2b_N - \frac{\bar{\theta} + \tilde{\theta}_w}{2}\right] + \frac{p}{\bar{\theta}}\frac{a}{\tilde{\theta}_w + b_N}\left[q + (\Delta q - b_N)\frac{b_N + \tilde{\theta}_w}{a}\right] = 0 \ ,$$

where $\tilde{\theta}_w = \sqrt{2aq + \Delta q^2} - b_N$. Setting the first order condition to zero, and solving for b_N we get

$$b_N = \frac{1}{3}\left[\Delta q - 2\bar{\theta} + \sqrt{(\Delta q - 2\bar{\theta})^2 - 3(\bar{\theta}^2 - 2\bar{\theta}\Delta q - \Delta q^2 - 4aq)}\right] . \tag{26}$$

This is greater or equal to zero if

$$-3(\bar{\theta}^2 - 2\bar{\theta}\Delta q - \Delta q^2 - 4aq) > 0 \ ,$$

that is if

$$\bar{\theta} < \Delta q + \sqrt{2\Delta q^2 + 4aq} \ . \tag{27}$$

We can further simplify (26) and then get the optimal bonus

$$b_N^* = \frac{1}{3}\left[\Delta q - 2\bar{\theta} + \sqrt{(\Delta q + \bar{\theta})^2 + 3\Delta q^2 + 12aq}\right] .$$

Next, we have to check whether condition (25) is fulfilled for this bonus payment b_N^*, that is if

$$\begin{aligned} \bar{\theta} &< \sqrt{2aq + \Delta q^2} - 3b_N^* + 2\Delta q \\ b_N^* &< \frac{1}{3}\left[\sqrt{2aq + \Delta q^2} + 2\Delta q - \bar{\theta}\right]. \end{aligned}$$

It turns out that this is true as long as

$$\frac{\Delta q^2 + 5aq}{\sqrt{2aq + \Delta q^2}} - \Delta q < \bar{\theta} \; . \tag{28}$$

So we have two conditions on $\bar{\theta}$, given by (27) and (28). If both conditions are to hold at the same time, then

$$\frac{\Delta q^2 + 5aq}{\sqrt{2aq + \Delta q^2}} - \Delta q < \Delta q + \sqrt{2\Delta q^2 + 4aq} \; .$$

>From this inequality, we can derive a condition on the size of the basic output q. The calculations in detail are as follows:

$$\begin{aligned}
\frac{\Delta q^2 + 5aq}{\sqrt{2aq + \Delta q^2}} - \Delta q &< \Delta q + \sqrt{2\Delta q^2 + 4aq} \\
\frac{\Delta q^2 + 5aq}{\sqrt{2aq + \Delta q^2}} &< 2\Delta q + \sqrt{2(\Delta q^2 + 2aq)} \\
\Delta q^2 + 5aq &< 2\Delta q\sqrt{2aq + \Delta q^2} + \sqrt{2}(\Delta q^2 + 2aq) \\
1 + \frac{5aq}{\Delta q^2} &< 2\sqrt{1 + \frac{2aq}{\Delta q^2}} + \sqrt{2}(1 + \frac{2aq}{\Delta q^2})
\end{aligned}$$

Bringing all to one side we get

$$\begin{aligned}
2\sqrt{1 + \frac{2aq}{\Delta q^2}} + \sqrt{2}(1 + \frac{2aq}{\Delta q^2}) - 1 - \frac{5aq}{\Delta q^2} &> 0 \\
2\sqrt{1 + \frac{2aq}{\Delta q^2}} + \sqrt{2} - 1 + (2\sqrt{2} - 5)\frac{aq}{\Delta q^2} &> 0 \\
2\sqrt{1 + \frac{2aq}{\Delta q^2}} + \sqrt{2} - 1 + (\sqrt{2} - \frac{5}{2})\frac{aq}{\Delta q^2} &> 0 \\
2\sqrt{1 + \frac{2aq}{\Delta q^2}} + \sqrt{2} - 1 + (1 + \frac{2aq}{\Delta q^2})(\sqrt{2} - \frac{5}{2}) - \sqrt{2} + \frac{5}{2} &> 0 \\
(\sqrt{2} - \frac{5}{2})(1 + \frac{2aq}{\Delta q^2}) + 2\sqrt{1 + \frac{2aq}{\Delta q^2}} + \frac{3}{2} &> 0
\end{aligned}$$

Define $x \equiv \sqrt{1 + \frac{2aq}{\Delta q^2}}$, and substitute, then

$$\begin{aligned}
(\sqrt{2} - \frac{5}{2})x^2 + 2x + \frac{3}{2} &> 0 \\
(2\sqrt{2} - 5)x^2 + 4x + 3 &> 0
\end{aligned}$$

Solving for x we get

$$\begin{aligned}
x^{\pm} &= \frac{1}{2(2\sqrt{2}-5)}\Big[-4 \pm \sqrt{16 - 4\cdot 3\cdot(2\sqrt{2}-5)}\Big] \\
&= \frac{1}{2\sqrt{2}-5}\Big[-2 \pm \sqrt{4 - 3\cdot(2\sqrt{2}-5)}\Big] \\
&= \frac{-2 \pm \sqrt{19-6\sqrt{2}}}{2\sqrt{2}-5} \\
&= \frac{2 \mp \sqrt{19-6\sqrt{2}}}{5-2\sqrt{2}}
\end{aligned}$$

Since x has to be positive[19], when substituting back, we get

$$\begin{aligned}
\frac{2+\sqrt{19-6\sqrt{2}}}{5-2\sqrt{2}} &= \sqrt{1+\frac{2aq}{\Delta q^2}} \\
\frac{(2+\sqrt{19-6\sqrt{2}})^2}{(5-2\sqrt{2})^2} &= 1+\frac{2aq}{\Delta q^2}
\end{aligned}$$

The numerator on the left hand side becomes

$$(2+\sqrt{19-6\sqrt{2}})^2 = 4 + 4\sqrt{19-6\sqrt{2}} + 19 - 6\sqrt{2} = 23 - 6\sqrt{2} + 4\sqrt{19-6\sqrt{2}}\ .$$

The denominator on the left hand side simplifies to

$$(5-2\sqrt{2})^2 = 25 - 20\sqrt{2} + 4\cdot 2 = 33 - 20\sqrt{2}\ .$$

Hence the expression above simplifies to

$$\begin{aligned}
\frac{23-6\sqrt{2}+4\sqrt{19-6\sqrt{2}}}{33-20\sqrt{2}} - 1 &= \frac{2aq}{\Delta q^2} \\
\frac{23-6\sqrt{2}+4\sqrt{19-6\sqrt{2}}-33+20\sqrt{2}}{2(33-20\sqrt{2})} &= \frac{aq}{\Delta q^2} \\
\frac{-10+14\sqrt{2}+4\sqrt{19-6\sqrt{2}}}{2(33-20\sqrt{2})} &= \frac{aq}{\Delta q^2} \\
\frac{-5+7\sqrt{2}+2\sqrt{19-6\sqrt{2}}}{(33-20\sqrt{2})} &= \frac{aq}{\Delta q^2}\ .
\end{aligned}$$

[19] i.e. x^{+} is no solution.

Solving for q we get the following condition:

$$q = \frac{\Delta q^2}{a} \cdot \frac{-5 + 7\sqrt{2} + 2\sqrt{19 - 6\sqrt{2}}}{(33 - 20\sqrt{2})} \approx \frac{\Delta q^2}{a} \cdot 2.41 \ .$$

That is q has to be sufficiently small in order for the corollary to hold.

When we insert this result on q into the condition on $\bar{\theta}$ as given by (27), we get

$$\begin{aligned}
\bar{\theta} &< \Delta q + \sqrt{2\Delta q^2 + 4aq} \\
&< \Delta q + \sqrt{2\Delta q^2 + 4a\frac{\Delta q^2}{a} \cdot \frac{-5 + 7\sqrt{2} + 2\sqrt{19 - 6\sqrt{2}}}{(33 - 20\sqrt{2})}} \\
&< \Delta q \cdot \left[1 + \sqrt{2 + 4 \cdot \frac{-5 + 7\sqrt{2} + 2\sqrt{19 - 6\sqrt{2}}}{(33 - 20\sqrt{2})}}\right] \\
&< \Delta q \cdot \left[1 + \sqrt{\frac{46 - 12\sqrt{2} + 8\sqrt{19 - 6\sqrt{2}}}{(33 - 20\sqrt{2})}}\right]
\end{aligned}$$

The term in square brackets is approximately 4.41.

References

Akerlof, G., and R. Kranton (2005): "Identity and the Economics of Organizations," *Journal of Economic Perspectives*, 19(1), 9–32.

Ballou, J., and B. Weisbrod (2003): "Managerial rewards and the behavior of for-profit, governmental, and nonprofit organizations: evidence from the hospital industry," *Journal of Public Economics*, 87, 1895–1920.

Banerjee, A., and E. Duflo (2006): "Addressing Absence," *Journal of Economic Perspectives*, 20(1), 117–132.

Bénabou, R., and J. Tirole (2003): "Intrinsic and Extrinsic Motivation," *Review of Economic Studies*, 70, 489–520.

Besley, T., and M. Ghatak (2005): "Competition and Incentives with Motivated Agents," *American Economic Review*, 95(3), 616–636.

Borzaga, C., and E. Tortia (2006): "Worker Motivations, Job Satisfaction, and Loyalty in Public and Nonprofit Social Services," *Nonprofit and Voluntary Sector Quarterly*, 35(2), 225–248.

Chaudhury, N., J. Hammer, M. Kremer, K. Muralidharan, and F. H. Rogers (2006): "Missing in Action: Teacher and Health Worker Absence in Developing Countries," *Journal of Economic Perspectives*, 20(1), 91–116.

Delfgaauw, J., and R. Dur (2006): "Incentives and Workers' Motivation in the Public Sector," *Tinbergen Institute Discussion Paper*, TI 2004-060/1.

DeVaro, J., and D. Brookshire (2007): "Promotions and Incentives in Nonprofit and For-Profit Organizations," *Industrial and Labor Relations Review*, 60(3), 311–339.

Francois, P. (2000): "'Public service motivation' as an argument for government provision," *Journal of Public Economics*, 78, 275–299.

——— (2002): "Not-for-profit Provision of Public Services," *CMPO Working Paper Series*, No. 03/060.

Frey, B. (1997): *Not Just for the Money: an economic theory of personal motivation*. Edward Elgar Publishing.

Glaeser, E. (2002): "The Governance of Not-for-Profit Firms," *Harvard Institute of Economic Research Discussion Paper*, No. 1954.

Goldman, S. (1982): "Judicial Selection and the Qualities That Make a "Good" Judge," *Annals of the American Academy of Political and Social Science*, 462, 112–124.

Greenberg, P., and J. Haley (1986): "The Role of the Compensation Structure in Enhancing Judicial Quality," *Journal of Legal Studies*, 15(2), 417–426.

Handy, F., and E. Katz (1998): "The wage differential between nonprofit institutions and corporations: getting more by paying less?," *Journal of Comparative Economics*, 26(2), 246–261.

Murdock, K. (2002): "Intrinsic Motivation and Optimal Incentive Contracts," *RAND Journal of Economics*, 33(4), 650–671.

Posner, R. (1993): "What Do Judges and Justices Maximize? (The Same Thing Everybody Else Does)," *Supreme Court Economic Review*, 3, 1–41.

SCUK (2006): "From Camp to Community: Liberia Study of Exploitation of Children," Discussion paper, Save the Children UK.

Seabright, P. (2002): "Blood, Bribes and the Crowding-Out of Altruism by Financial Incentives," Mimeo, Universite de Toulouse.

Slowik, S. (2001): "Objective Pre-Employment Interviewing: Balancing Recruitment, Selection and Retention Goals," *Public Personnel Management*, 30(1), 77–93.