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Envy in Mission-Oriented Organizations

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Envy in Mission-Oriented Organizations*

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October 3, 2017

Abstract

According to the labor donation theory, workers adhering to their firms' mission are willing to donate a portion of their paid labor. In this paper, we study how workers' fairness concerns limit the firm's ability to extract labor donation from its employees. We find that, in sectors where the firm's mission is important, optimal contracts are such that high-ability employees perceive their wage as less fair than low-ability employees and they must be rewarded with an "envy rent". The opposite is true in sectors where the firm's mission does not play a relevant role. We empirically test the predictions of the model using the German Socio-Economic Panel finding support for our theoretical results.

Keywords: Mission-oriented organizations, envy, labor donations, screening.

JEL classifications: D03, D82, M54.

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1 Introduction

Mission-oriented organizations provide collective goods as education, health care, research and defence. In such organizations, employees benefit from being personally involved in the production process (see [Besley and Ghatak, 2005](#)). For their willingness to be of service, workers adhering to the mission of their employers (that we will call *motivated* henceforth) typically accept additional tasks and/or responsibilities with low or no pay increase. Such behaviors are obviously beneficial for the employer. According to the labor donation theory ([Preston, 1989](#)), motivated workers are willing to donate a portion of their paid labor. In other words, they are ready to receive lower wages because they obtain satisfaction from the fact that their efforts allow the achievement of socially-valuable goals. In mission-oriented organizations, volunteering is typically an important source of labor in the form, for example, of unpaid overtime (see [Gregg et al., 2011](#), and [Salamon et al., 2012](#)).¹ Data from the Workplace Employment Relations Study for UK collected in 2011 show that almost the 70% of employees adhere to the organization’s values (see Table 1). The degree to which workers’ share the values of their organization is also positively correlated with the amount of unpaid overtime that employees donate to their employer, thereby supporting the labor donation theory.²

| Share the values of the organization | Frequency | Percentage | Cumulative |
|--------------------------------------|-----------|------------|------------|
| Strongly Agree | 2,934 | 16.12 | 16.12 |
| Agree | 9,146 | 50.26 | 66.38 |
| Neither Agree Nor Disagree | 4,783 | 26.28 | 92.67 |
| Disagree | 1,080 | 5.94 | 98.60 |
| Strongly Disagree | 254 | 1.40 | 100.00 |
| Total | 18,197 | 100.00 | |

Table 1: Distribution of answers. Data collected from the Workplace Employment Relations Study for the UK in 2011.

Our research question is the following: Are mission-oriented organizations still able to extract labor donations from motivated employees when the latter are fairness concerned? Indeed, even

¹Using data from the British Household Panel Survey (BHPS), [Gregg et al. \(2011\)](#) show that individuals in the non-profit sector are significantly more likely to do unpaid overtime than those in the for-profit sector. Moreover, [Salamon et al. \(2012\)](#) show that volunteer time accounts for about a quarter of not-for-profit contribution to GDP on average in the seven countries studied.

²Using data from the Workplace Employment Relations Study for UK in 2011, we find that the correlation coefficient between the amount of unpaid overtime and the employees’ mission-orientation is equal to 0.1343.

motivated employees are concerned with and may suffer from pay inequalities possibly stemming from workers' heterogeneity. A recent empirical literature on fairness in the workplace shows that employees are *envious* when they receive a lower net compensation, namely a lower wage net of the cost of performing the task, than that of their colleagues and that pay inequality among peers can be detrimental to the work atmosphere (see [Card et al., 2012](#), and [Breza et al., 2016](#)).³ We argue that, precisely because of their labor donations, motivated employees may be particularly sensitive to pay inequalities. As a result, taking into account the interplay between envy and workers' motivation is crucial in understanding whether and to what extent the employer can still extract labor donations from her employees.

We propose a simple model to study how fairness considerations affect both labor donations and employment contracts in mission-oriented organizations when employees differ in their ability, that can be either high or low, and which is their private information. Screening contracts are defined by a wage rate and an (observable) effort task, the latter corresponding, for example, to the number of hours the employees are required to work. Since employees enjoy their contribution to the firm's mission, their labor donations are increasing in the effort they are required to perform. As a result, when high-ability workers are asked to work more than their low-ability colleagues, they offer higher labor donations. These labor donations are profitable for the firm, but they create a gap between (net) compensations of employees.

Because of fairness concerns, the subset of workers receiving a net compensation lower than the one of their colleagues must be rewarded with an '*envy rent*'. In addition, given that workers' ability is their private information, high-ability workers have to be rewarded with an '*information rent*'. We show that, not surprisingly, high-ability workers always receive a higher wage and a more intense task than low-ability colleagues. More interestingly, we explain how labor donations are affected by envy rents and information rents and we derive conditions such that it is optimal to have either the high- or the low-ability workers as the higher net earner in the workplace. In particular, the model predicts that, in sectors where the firm's mission (and thus workers' labor donation) is important and heterogeneity in ability is high, the firm optimally designs contracts where high-ability employees receive a lower net compensation than their low-ability colleagues. Thus, in sectors where the firm's mission is important, optimal contracts entail '*envy at the top*'. In contrast, in sectors where the firm's mission is not important, we show that the information rent paid to high-ability employees is sufficiently high to make their

³[Mas \(2006\)](#) also shows that being paid below a reference point has a negative impact on performance.

net compensation relatively higher, and thus the low-ability colleagues envious. Hence, when the firm’s mission is not important optimal contracts entail ‘*envy at the bottom*’.⁴

The intuition for our results is the following. Irrespective of the degree of her mission-orientation, the employer has to pay an information rent to prevent high-ability employees from mimicking their low-ability colleagues. Let us consider, first, the instance in which both workers’ heterogeneity in ability and the firm’s mission are high. When this is the case, labor donation from high-ability employees is high both in absolute and in relative terms. Here the information rent paid to high-ability types is not large enough to reverse the ordering between net compensations. In different words, labor donation from high-ability employees (net of the information rent they receive) is still higher than the one from low-ability employees so that high-ability types are the lower net earners and thus are envious of their low-ability colleagues: the ‘*envy at the top*’ solution emerges.⁵ In contrast, when the firm’s mission is not important, then labor donations are relatively low and the information rent received by high-ability types reverses the ordering of net compensations. Now, the solution with ‘*envy at the bottom*’ emerges and low-ability employees are envious of the higher net compensation received by their high-ability colleagues.

Finally, we empirically test the predictions of our model through the German Socio-Economic Panel (GSOEP), which contains data on workers’ fairness considerations and reliable proxies for workers ability and for their labor donations. We show that our theoretical predictions are supported by the data. Specifically, we find that high-ability employees always receive a higher wage and work for a larger amount of hours than low-ability employees. However, in sectors where labor donation is important, i.e. health care, education, and public services, high-ability employees on average perceive their wage as less fair (and are thus more envious) than the average of low-ability employees. The opposite evidence is observed in some sectors where labor donation is not relevant, such as in the trade sector. Here, on average, low-ability workers perceive their compensation as less fair than the average of their high-ability colleagues.

The remainder of the article is as follows. The related literature is discussed in the next section. In Section 3, the setup of the model is presented. The analysis of the optimal employment contract under full information is studied in Section 4, the screening employment

⁴We also show that, when no one of the previous two solutions is feasible, the principal offers a pooling contract to her employees (which implies again ‘*envy at the bottom*’).

⁵If workers were not sharing the organization’s mission and were not offering some labor donation to their employer, then the solution with ‘*envy at the top*’ would not be possible. Indeed, given the information rent their high-ability colleagues receive, in the absence of labor donations the low-ability employees would necessarily be the ones who are envious.

contract when employees' ability is their private information is analyzed in Section 5; in Section 6 the empirical analysis is carried out and concluding remarks are provided in Section 7. All mathematical computations and proofs of the results are in the Appendix.

2 Related Literature

A recent literature studies organizations where employees derive non-monetary benefits from undertaking some tasks or from providing some types of services (see [Biglaiser and Albert Ma, 2007](#), [Buurman et al., 2012](#), [Dur and Zoutenbier, 2014](#), [Cassar, 2016](#), and [Barigozzi and Burani, 2016](#)). The idea is that, in some sectors, workers may care about the output produced by their organization, or about the recipients of the services they provide, i.e. their patients, students, or customers. Considerable attention has been received by the public sector and by 'public service motivation' allowing the extraction of some labor donation from bureaucrats and civil servants (see among others [Bond and Glode, 2011](#), [Jaimovich and Rud, 2014](#), [Francois, 2000, 2007](#), [Glazer, 2004](#), [Macchiavello, 2008](#), and [Francois and Vlassopoulos, 2008](#), for a survey focusing both on the public and the non-profit sectors).

Many of the mentioned papers study the sorting of workers characterized by heterogeneous motivation into different sectors of the labor market and its consequences for optimal pay policies and organizational design. We study instead how the interaction between labor donations and fairness considerations affects optimal contracts when employees differ in their ability and this is their private information.

In addition to the empirical studies mentioned in the introduction, a recent experimental evidence has analyzed how employees respond to fairness considerations (see [Fehr and Schmidt, 2006](#), for an overview). Few theoretical studies have analyzed behaviors and choices of workers who are fairness concerned. Like [Desiraju and Sappington \(2007\)](#), [von Siemens \(2011, 2012\)](#), and [Manna \(2016\)](#), we consider a setting with adverse selection on some workers' characteristic and we assume that employees suffer a disutility whenever they feel worse off than their colleagues. Differently from the existing literature, we derive optimal contracts when workers are fairness-concerned and the employer is willing to maximize labor donations from motivated employees. In this literature, our paper is most closely related to the one of [Desiraju and Sappington \(2007\)](#), with which we share the idea that a worker's payoff is measured as his/her net compensation. However, while in [Desiraju and Sappington \(2007\)](#) workers are inequity averse and may be *ex-ante* identical (meaning that they do not observe their ability *ex-ante*), in our setting they

differ *ex-ante* and suffer from fairness concerns only when they are the lower net-earners in the workplace, i.e. only *envy* is relevant in our setting.⁶

Finally, by focusing on an adverse selection problem, this paper also complements the literature that studies optimal incentive contracts when employees are motivated by fairness considerations in a moral hazard setting (see among others [Bartling and von Siemens, 2010](#), [Englmaier and Wambach, 2010](#), [Kragl and Schmid, 2009](#), and [Neilson and Stowe, 2010](#)).

3 The Model

A mission-oriented employer (she) is willing to hire a unit mass of workers. We have in mind an organization producing collective goods and services (see [Besley and Ghatak, 2005](#)), whose market power can be justified on the ground of its specific and characterizing mission which is valuable to prospective workers.

The mission-oriented organization offers its employees a contract that consists of a wage, ω , and effort, e . The effort provided by each employee is contractible, i.e. it is observable and verifiable (as, for example, the number of hours an employee is required to work), and it is the only input the firm needs in order to produce. The firm's production function displays constant returns to effort so that the amount of output produced is $q(e) = e$, whose unit value is normalized at 1. Such valuation can reflect the price at which the employer sells a unit of output, the marginal benefit obtained by a manager in a non-profit organization from increasing output, the preferences of the government when it is the producer (hence we are agnostic about the organization's ownership structure). The employer has the following per-worker payoff:

$$\pi = e - \omega(e). \tag{1}$$

Employees differ in their cost of exerting effort (henceforth, ability) θ , which is their private information. There are two types of employees: high-ability workers, with $\theta_H = 1$, have a low cost of exerting effort, while low-ability workers, with $\theta_L = \theta > 1$, are characterized by a high cost of exerting effort. Workers' heterogeneity is denoted by $\Delta\theta = \theta - 1 > 0$. The fraction of high-ability employees is λ , while the fraction of low-ability employees is $1 - \lambda$, with $\lambda \in (0, 1)$. This information is common knowledge. Workers are risk neutral, wealth constrained, and have

⁶[Loewenstein et al. \(1989\)](#) show that individuals exhibit a strong and robust aversion against disadvantageous inequality. Fewer individuals also exhibit an aversion to advantageous inequality. However, this effect seems to be significantly weaker than the aversion to disadvantageous inequality.

a reservation wage of zero.⁷ The employee i 's utility is:

$$U_i(e_i, \omega_i, e_{-i}, \omega_{-i}; \theta_i) = N_i + \gamma e_i - \beta (\max \{N_{-i} - N_i, 0\}),$$

$$\text{where } N_i = \omega_i - \frac{1}{2} \theta_i e_i^2$$

with $i = L, H$, and where the subscript $-i$ indicates the type different from i .

The employees' utility consists of three terms.

(i) First, employees receive a *net compensation* N_i that is given by the difference between the wage and the cost of exerting effort;

(ii) Second, employees obtain a premium γe_i for contributing to the output of the mission-oriented firm, where $\gamma \in [0, 1]$ is the degree of the organization's social mission.^{8,9} Such premium increases with both the amount of effort that an employee is required to perform and the degree of the firm's mission. Importantly, this premium generates some labor donation from the employees to the firm.¹⁰ Indeed, according to the labor donation theory (Preston, 1989), employees are willing to donate a portion of their paid labor (in the form, for example, of unpaid overtime) because they obtain satisfaction from the fact that their efforts achieve socially-valuable goals. Given that the employees' premium increases with the amount of labor they provide, a crucial aspect of our model is the following: when high-ability employees are required a larger effort than low-ability ones, the former are also willing to offer a higher labor donation to their employer than the latter.

(iii) Finally, employees suffer a utility loss whenever they feel worse off than their colleagues. Specifically, workers of type i are envious of their colleagues of type $-i$ if their net compensation N_i is relatively lower.¹¹ The parameter $\beta \geq 0$ measures the employees' level of envy towards a

⁷In our setting, labor donations are always feasible because the cost of effort is interpreted as the (monetary equivalent of the) physical or psychological cost of performing a given task.

⁸By assuming that γ is lower than 1 we assure that workers are never volunteering, no matter the information structure and the type of contract offered by the employer.

⁹The degree of the organization's mission depends on the type of collective good or service produced. For example, the mission of a non-profit organization providing education and health care for the poor is perceived as more relevant than the mission of an organization providing aesthetic medicine aimed to reducing the signs of aging.

¹⁰Given that employees' motivation stems from the employer's mission, applicants with the same ability receive the same premium when hired by the mission-oriented firm.

¹¹Notice that, to be consistent with the labor donation theory, the net compensation has been defined as the wage paid by the employer net of the disutility loss from performing the task, $\frac{1}{2} \theta_i e_i^2$, but gross of the motivational premium stemming from the firm's mission, γe_i . Think about unpaid overtime that workers are donating to the employer because they are keen to contribute to her mission. In our interpretation, such labor donations do not affect workers' perception of fairness which only depends on the relative difference between the salary and the number of paid hours appearing in contracts. In other words, workers' fairness concerns derive from the comparison of separating contracts (w_i, e_i) , $i = L, H$,

higher-net-earner colleague and is common knowledge. The assumption that employees compare their compensations is supported by social psychologists like [Festinger \(1962\)](#) and [Adams \(1963\)](#). They argue that workers desire a fair relation between the effort required by the employer and the offered salary.

We innovate with respect to the previous literature by studying the interaction between workers' fairness concerns and labor donations when the employer offers a menu of screening contracts. Indeed, in her attempt to extract labor donations from workers of different types, the principal is not only constrained by the employees' concern for fairness but also by their private information on ability. Specifically, the principal will possibly offer *envy rents* and *information rents* to her employees which may offset their labor donation. Thus, in what follows, we will focus on *net* labor donations:

Definition 1. *We call net labor donation, the amount of (observable) effort that an employee is willing to exert for free for his mission-oriented employer net of the possible rewards for fairness concerns (envy rent) and for truthful information (information rent):*

$$\text{net labor donation} = \gamma e_i - \text{possible envy rent} - \text{possible info rent}.$$

The **timing of the game** is as follows. In Stage 0, each employee is informed about his own type; in Stage 1, the employer offers a menu of contracts consisting of levels of effort and wages; in Stage 2, employees independently decide whether or not to accept a contract. Once a contract is accepted and the worker is hired, the type of each employee and the accepted contract become common knowledge;¹² in Stage 3, the effort is exerted, production is undertaken, wages are paid, and profits are realized.

We are going to show that three types of solution emerge. We call 'envy at the top' the solution where high-ability employees receive the lower net compensation, i.e. $N_L > N_H$; 'envy at the bottom' is the solution in which low-ability employees receive the lower net compensation, i.e. $N_L < N_H$; finally, the 'envy free' solution occurs when $N_L = N_H$ and the two types of workers receive the same net compensation. In each solution, envious employees are rewarded with an 'envy rent'.

(possibly) offered by the employer.

¹²This assumption allows the employees to compare their rents. In contrast, we do not assume that the employer and her employees are able to renegotiate the contract.

4 Mission and fairness concerns under full information

If workers' ability is observable, the employer maximizes equation (1) subject to the employees' participation constraint:

$$N_i + \gamma e_i - \beta (\max \{N_{-i} - N_i, 0\}) \geq 0 \quad (2)$$

The firm optimally sets the workers' participation constraints to zero and must reward those employees who receive the lower net compensation. This limits the firm's ability to take advantage of labor donations from high-ability workers.¹³

We find that two mutually exclusive solutions are possible under full information: one entailing 'envy at the top' ($N_L > N_H$) and the other being 'envy free' ($N_L = N_H$). Condition 1 below assures that $N_L > N_H$ and holds if and only if $e_H > e_L$. If Condition 1 does not hold, then $N_L = N_H$ and $e_H = e_L$, so that the solution is envy-free.

$$\textbf{Condition 1: } \Delta\theta > \frac{\beta\gamma}{(1-\lambda)(1+\beta+\gamma)}.$$

According to Condition 1, different net compensations and effort levels are profitable only if employees' heterogeneity, $\Delta\theta$, is high enough. Intuitively, compensating high-ability employees for being envious is profitable only when their labor donation is sufficiently larger than the one from low-ability employees, or when heterogeneity is high. Conversely, when employees' heterogeneity is low, so that Condition 1 is not met, then the firm optimally sets employees' net compensations (and, thus, their labor donations) equal so as to save high-ability employees' envy rent.

Interestingly, the right-hand side of Condition 1 increases in γ and in β , meaning that Condition 1 becomes more and more difficult to satisfy as the cost of envy and/or the degree of the employer's mission (and thus labor donations from her employees) increase. In Figure 1 we represent the regions of parameters where the solutions $N_L > N_H$ and $N_L = N_H$ take place in the plane (γ, θ) . Notice that an increase in β reduces the area in which the solution $N_L > N_H$ is possible (second graph in Figure 1). Intuitively, as workers' concern about pay inequality increases, the employer has to provide a higher 'envy rent' to compensate high-ability workers receiving the lower net compensation. This reduces the employer's incentives to extract higher

¹³In Appendix A.1 and A.2 we show the solution of the extreme cases in which the organization has no mission ($\gamma = 0$), and in which the workers are not envious ($\beta = 0$).

labor donations from high-ability workers. It is worth noticing that if the mission was not relevant at all, i.e. if $\gamma = 0$, envy would not play any role under full information (see Appendix A.2).

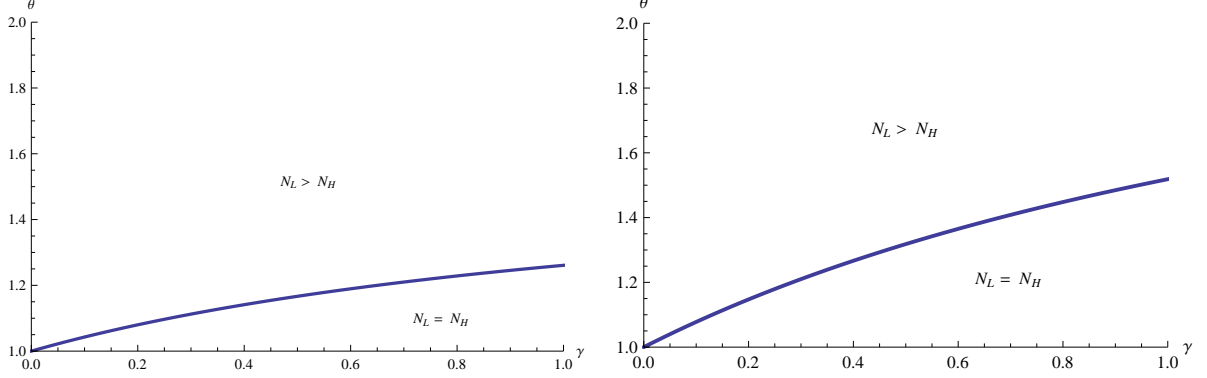


Figure 1: Condition 1 with $\lambda = 0.5$ and $\beta = 0.3$ or $\beta = 0.7$.

To derive workers' (net) labor donations let us consider the expressions for wages as a function of effort levels when Condition 1 holds:

$$\begin{aligned}\omega_L &= \frac{1}{2}\theta e_L^2 - \gamma e_L, \\ \omega_H &= \frac{1}{2}e_H^2 - \gamma e_H + \beta(N_L - N_H) = \frac{1}{2}e_H^2 - \underbrace{\gamma \left(\frac{1}{1+\beta}e_H + \frac{\beta}{1+\beta}e_L \right)}_{\text{envy rent as a decrease in labor donation}}.\end{aligned}\quad (3)$$

Recalling Definition 1, net compensation of low-ability workers is $\omega_L - \frac{1}{2}\theta e_L^2 = N_L = -\gamma e_L$ which is negative. Low-ability workers are here offering to the firm all their premium for contributing to its output. In other words, their labor donation corresponds to γe_L . Net compensation of high-ability workers is instead $N_H = -\gamma \left(\frac{1}{1+\beta}e_H + \frac{\beta}{1+\beta}e_L \right)$ and their labor donation is consequently equal to $\gamma \left(\frac{1}{1+\beta}e_H + \frac{\beta}{1+\beta}e_L \right)$. This is a general feature of our model: net labor donation always corresponds to the negative of workers' net compensation N_i .

It is worth noticing that optimal contracts are such that the high-ability employees' labor donation is $\gamma \left(\frac{1}{1+\beta}e_H + \frac{\beta}{1+\beta}e_L \right) < \gamma e_H$. The intuition is the following. As mentioned in point (ii) of the model set-up, by offering contracts contingent on the employees' ability, the employer takes advantage of the larger labor donation from high-ability employees. However, given that under full information $e_H > e_L$ goes hand by hand with $N_L > N_H$, the higher labor donation from high-ability employees is partially offset by the envy rent they receive. Hence, the employer faces a trade-off between separating efforts' levels from employees of different types and paying the envy rent to high-ability ones.

Optimal efforts write:

$$e_L^{FT} = \frac{1}{\theta} + \frac{\gamma}{\theta} \left(1 + \frac{\lambda}{1-\lambda} \frac{\beta}{1+\beta} \right), \quad e_H^{FT} = 1 + \frac{\gamma}{1+\beta}, \quad (4)$$

where superscript FT stands for the solution of full-information with ‘envy at the top’. One can easily check that β has a negative impact on e_H^{FT} , while it impacts positively on e_L^{FT} . Hence, the higher the utility loss from envy experienced by high-ability employees, the lower the effort required from them and the higher the effort required from low-ability colleagues. Indeed, by reducing the effort of high-ability employees and by increasing the one of low-ability employees, the employer reduces the gap between net compensations and, thus, the disutility from envy. As a consequence, she can pay a lower envy rent to high-ability employees, but she also extracts lower labor donations from high-types.

When extracting larger labor donations from high-ability types becomes too costly, the employer optimally switches to the ‘envy free’ solution with effort levels $e_H^{FF} = e_L^{FF} = \frac{1+\gamma}{\lambda+(1-\lambda)\theta}$, where FF stands for the solution of full-information free of envy. As we expected, here the effort does not depend on β .

Proposition 1 summarizes the solution under full information.

Proposition 1. Envy under full information. *When the firm observes the employees’ ability, two solutions exist. (i) If workers heterogeneity is sufficiently high, optimal contracts entail ‘envy at the top’ ($0 > N_L > N_H$), efforts are described in (4) above and are such that $e_H^{FT} > e_L^{FT}$. Despite the ‘envy rent’ that high-ability workers receive, their (net) labor donation is higher than the one from low-ability workers. (ii) If workers heterogeneity is low, then contracts are envy free ($0 > N_L = N_H$) with $e_H^{FF} = e_L^{FF}$. Here both workers’ types provide the same labor donation.*

5 Mission, fairness concerns, and screening

When the employees’ ability is their private information, labor donations are reduced not only because of workers’ concerns for fairness, but also because of information rents to be paid for screening. Recall that our objective is to derive net labor donations corresponding to the negative of workers’ net compensations ($-N_i$).

The organization maximizes

$$\pi = \lambda (e_H - \omega_H) + (1 - \lambda) (e_L - \omega_L)$$

subject to the employees' participation and incentive constraints:

$$N_H + \gamma e_H - \beta \max\{(N_L - N_H, 0)\} \geq 0 \quad (PC_H)$$

$$N_L + \gamma e_L - \beta \max\{(N_H - N_L, 0)\} \geq 0 \quad (PC_L)$$

$$N_H + \gamma e_H - \beta \max\{(N_L - N_H, 0)\} \geq \hat{N}_L + \gamma e_L - \beta \max\{(N_H - \hat{N}_L, 0)\} \quad (IC_H)$$

$$N_L + \gamma e_L - \beta \max\{(N_H - N_L, 0)\} \geq \hat{N}_H + \gamma e_H - \beta \max\{(N_L - \hat{N}_H, 0)\} \quad (IC_L)$$

where $\hat{N}_L = \omega_L - \frac{1}{2}e_L^2$ and $\hat{N}_H = \omega_H - \frac{\theta}{2}e_H^2$.

In the right-hand side of the incentive constraints, the worker's disutility from envy is computed by considering the difference between net compensation obtained by truthfully reporting his type and net compensation obtained as a mimicker. Specifically, \hat{N}_L is the net compensation that high-ability employees with $\theta_H = 1$ attain when they pretend to be low-ability, while \hat{N}_H is the net compensation that low-ability employees with $\theta_L = \theta > 1$ attain when they pretend to be high-ability workers.¹⁴

In the next subsections, we describe the four feasible solutions under asymmetric information on the employees' ability. In Subsection 5.1, we characterize the 'envy at the top' solution where $N_L > N_H$. In Subsection 5.2, we describe the 'envy free' solution where $N_L = N_H$. In Subsection 5.3, we study the 'envy at the bottom' solution where $N_L < N_H$. Interestingly, this solution was not possible in the case of full information. In Subsection 5.3.1, we characterize the pooling solution where both types of employees receive the same contract. Finally, in Subsection 5.4, we derive the optimal solution, i.e. the one assuring the highest payoff to the organization. The latter depends on the values of the parameters $\Delta\theta$, β and γ .

¹⁴Rearranging the expressions for \hat{N}_H and \hat{N}_L we observe that:

$$N_H = \hat{N}_H + \frac{1}{2}\Delta\theta e_H^2 \Rightarrow N_H > \hat{N}_H$$

$$N_L = \hat{N}_L - \frac{1}{2}\Delta\theta e_L^2 \Rightarrow N_L < \hat{N}_L$$

Constraints from (PC_H) to (IC_L) are ultimately defined by the ordering of truthfully reporters' and mimickers' net compensations. In Appendix A.4 we describe the possible orderings of N_i and \hat{N}_i , and we explain which, among them, give rise to feasible solutions.

5.1 Screening with ‘envy at the top’

When the employer designs contracts in which high-ability workers receive the lower net compensation ($N_L > N_H$), the unique possible solution is the one in which (IC_H) and (PC_L) are both binding. In particular, wages can be written as:

$$\omega_L^T = \frac{1}{2}\theta e_L^2 - \gamma e_L, \quad (5)$$

$$\omega_H^T = \frac{1}{2}e_H^2 - \underbrace{\gamma \left(\frac{1}{1+\beta}e_H + \frac{\beta}{1+\beta}e_L \right)}_{\text{envy rent as a decrease in labor donation}} + \underbrace{\frac{1}{2} \frac{\Delta\theta}{1+\beta} e_L^2}_{\text{info rent}}, \quad (6)$$

where the superscript T stands for ‘envy at the top’.

Low-ability employees receive neither an information nor an envy rent. In contrast, high-ability employees must here be rewarded both for receiving the lower net compensation and for truthfully revealing their private information. As under full information, the ‘envy rent’ translates in a reduction of labor donation. As for the information rent paid to the high-ability employees, it is increasing in the workers’ heterogeneity, as it is standard in the classic adverse selection model. However, the information rent is now decreasing in the envy parameter β . This implies a ‘negative spillover’ of the envy rent on the information rent: as β increases, the ‘envy rent’ increases as well (because labor donation becomes lower and lower), while the information rent decreases.

From (6) and (5), net compensations are:

$$N_L^T = -\gamma e_L, \quad N_H^T = -\gamma \left(\frac{1}{1+\beta}e_H + \frac{\beta}{1+\beta}e_L \right) + \frac{1}{2} \frac{\Delta\theta}{1+\beta} e_L^2. \quad (7)$$

Recall that, at the ‘envy at the top’ solution, it must be $N_L > N_H$. Given that N_L^T is negative, $0 > N_L^T > N_H^T$ holds, implying that both (net) labor donations are positive. In particular, high-ability types’ labor donation is only partially offset by their information rent and is still higher than the one of low-ability workers:

$$\gamma \left(\frac{1}{1+\beta}e_H + \frac{\beta}{1+\beta}e_L \right) + \frac{1}{2} \frac{\Delta\theta}{1+\beta} e_L^2 > \gamma e_L > 0.$$

Rearranging the previous inequality, we observe that at the ‘envy at the top’ solution effort

levels must satisfy the following inequality:

$$\frac{\gamma}{1+\beta}(e_H - e_L) > \frac{1}{2} \frac{\Delta\theta}{1+\beta} e_L^2. \quad (8)$$

Condition (8) shows that monotonicity ($e_H > e_L$) must be satisfied.¹⁵ Its interpretation is straightforward: Condition (8) states that the information rent paid to high-ability employees must be low enough to maintain $N_L > N_H$ and to let the firm take advantage of heterogeneous labor donations from the two types. In turn, the benefit from extracting a higher labor donation from high-ability employees is increasing in the relevance of the firm's mission.

Substituting wage levels (6) and (5) into the employer's program and computing the FOCs with respect to effort levels, one obtains:

$$e_L^T = \frac{\lambda\beta\gamma+(1-\lambda)(1+\gamma)(1+\beta)}{\Delta\theta\lambda+(1-\lambda)(1+\beta)\theta}; \quad e_H^T = 1 + \frac{\gamma}{1+\beta}. \quad (9)$$

High-ability workers exert the same effort as under full information. Not surprisingly, the effort level of low-ability workers is downward distorted. The higher workers' heterogeneity $\Delta\theta$, the higher the distortion in the effort exerted by low-ability employees. The degree of the employer's mission γ has a positive impact on effort, irrespective of the agents' type. In contrast, the envy parameter β has a negative impact on e_H , but its impact on e_L is positive.

From the effort levels in (9) we observe that the monotonicity condition $e_H^T > e_L^T$ always holds. In addition, comparing labor donations at this solution with those obtained at the corresponding solution under full information, and recalling that $e_H^T = e_H^{FT}$ while $e_L^T < e_L^{FT}$, we observe that net labor donations from both types of workers are lower under adverse selection. Not surprisingly, the information rent paid to high-ability employees reduces their labor donations. Moreover, in order to pay a lower information rent, the employer distorts the effort of low-ability workers downward.

Substituting the effort levels in (9) into Condition (8) we obtain the region of the parameters for which this solution is feasible. Interestingly, we find that the 'envy at the top' solution is only feasible when both motivation from the employer's mission and workers' heterogeneity are high enough.

The following lemma characterizes the 'envy at the top' solution:

¹⁵In Appendix A.5 we also derive the implementability condition for this program which is weaker than $e_H > e_L$ and thus turns out to be irrelevant (see Condition 22).

Lemma 1. Screening with ‘envy at the top’. *The solution in which $0 > N_L > N_H$ is feasible when the organization’s mission is relevant and heterogeneity in workers’ ability is high. Efforts are described in (9) above and are such that the effort exerted by high-ability workers is equal to the corresponding effort of full information ($e_H^T = e_H^{FT}$), whereas the effort exerted by low-ability workers is downward distorted ($e_L^T < e_L^{FT}$). Net labor donation from high-ability workers is higher than the one from low-ability workers. Net labor donations from both high- and low-ability workers are lower than under full information.*

5.2 Screening with ‘envy-free’ contracts

The unique possible solution such that net compensations are equal requires the incentive compatibility constraint of high-ability workers to be binding (while no participation constraint is binding at this solution). By imposing $N_L = N_H$ and by setting the incentive constraint of high-ability types binding, the solution entails:

$$\gamma(e_H - e_L) = \frac{1}{2}\Delta\theta e_L^2. \quad (10)$$

The previous condition specifies the difference between effort levels assuring both that the solution is envy-free and that high ability workers are not willing to mimic low-ability types. Also notice that Condition (10) is fully consistent with (8).

The optimal envy-free contracts are such that:

$$\begin{aligned} e_L^F &= \frac{2\gamma}{1+\sqrt{\theta}} & e_H^F &= \frac{2\gamma\sqrt{\theta}}{1+\sqrt{\theta}} \\ \omega_L^F &= \omega_H^F = \omega^F & &= \frac{2\theta\gamma^2}{(1+\sqrt{\theta})^2} \end{aligned} \quad (11)$$

where the superscript F stays for envy-free. One can easily check that the effort levels in (11) satisfy condition (10) and implies that net compensations are zero ($N_L = N_H = 0$). As a consequence, irrespective of the model’s parameters, the screening solution with envy-free contracts is always feasible.

The lemma below characterizes the envy-free solution:

Lemma 2. Screening with ‘envy-free’ contracts. *The envy-free solution is always feasible. Efforts and wages are described in (11) above and are such that $e_H^F > e_L^F$ and $\omega_H^F = \omega_L^F = \omega^F$. Net labor donations of both types are zero ($N_L = N_H = 0$).*

Given that labor donations are zero and the utilities of both types of employees are strictly positive ($U_H > U_L > 0$), this solution is costly for the employer. Hence, envy-free contracts will be implemented only when other more profitable solutions are not feasible (see Subsection 5.4).

5.3 Screening with ‘envy at the bottom’

While under full information optimal contracts are such that the net compensation of low-ability employees is always weakly higher than the one of high-ability workers ($N_H \leq N_L$), under asymmetric information a new solution is possible, entailing a higher net compensation for high-ability workers ($N_H > N_L$). Intuitively, this solution becomes relevant when the information rent to be paid to high-ability types is high enough to revert the ordering between net compensations.

As at the ‘envy at the top’ solution, we find that constraints IC_H and PC_L must be binding. From the latter constraints, wages can be written as:

$$\omega_L^B = \frac{1}{2}\theta e_L^2 - \underbrace{\gamma \left(\frac{1}{1+\beta}e_L + \frac{\beta}{1+\beta}e_H \right)}_{\text{increased labor donation}} + \underbrace{\frac{1}{2}\beta\Delta\theta e_L^2}_{\text{envy rent}}, \quad (12)$$

$$\omega_H^B = \frac{1}{2}e_H^2 - \gamma e_H + \underbrace{\frac{1}{2}\Delta\theta e_L^2}_{\text{info rent}} + \underbrace{\frac{1}{2}\beta\Delta\theta e_L^2}_{\text{cumulated envy rent}}, \quad (13)$$

where the superscript B stands for solution with ‘envy at the bottom’.

Low-ability employees are the ones receiving the lower net compensation and are thus rewarded an envy-rent, i.e. $\frac{1}{2}\beta\Delta\theta e_L^2$. As β increases so does the envy rent paid to low-ability employees. However, such envy-rent is partially offset by an increase of labor donation captured by the term $\gamma \left(\frac{1}{1+\beta}e_L + \frac{\beta}{1+\beta}e_H \right) > \gamma e_L$. High-ability employees cumulate the same envy-rent and, on top of that, they also receive their standard information rent. The two rents sum up to the term $\frac{1}{2}(1+\beta)\Delta\theta e_L^2$ which may partially or totally offset their labor donation γe_H .

Net compensations write:

$$N_L^B = -\gamma \left(\frac{1}{1+\beta}e_L + \frac{\beta}{1+\beta}e_H \right) + \frac{1}{2}\beta\Delta\theta e_L^2, \quad N_H^B = -\gamma e_H + \frac{1}{2}(1+\beta)\Delta\theta e_L^2, \quad (14)$$

where it must be $N_H > N_L$. Substituting expressions (14) in the previous inequality we obtain

that, at the ‘envy at the bottom’ solution, effort levels must satisfy the following condition:

$$\gamma(e_H - e_L) < \frac{1}{2}(1 + \beta)\Delta\theta e_L^2. \quad (15)$$

Condition (15) states that the total rent paid to high-ability types (which contains the information rent and the ‘cumulated envy rent’) must be higher than the difference in labor donations provided by the two types of workers. With respect to the envy at the top solution, here the firm’s mission is relatively unimportant, labor donations are relatively low and thus the information rent paid to high-ability workers reverses the ordering of net compensations.

Summing up the incentive constraints we derive the implementability condition for this program which implies ‘strong’ monotonicity:

$$e_H^B \geq e_L^B \sqrt{1 + \beta}. \quad (16)$$

By substituting wages (12) and (13) into the firm’s program and deriving FOCs with respect to the effort levels, we obtain:

$$e_L^B = \frac{(1-\lambda)(1+\beta+\gamma)}{(1+\beta)[\lambda\Delta\theta(1+\beta)+(1-\lambda)(\theta+\beta\Delta\theta)]}; \quad e_H^B = 1 + \gamma + \gamma\frac{1-\lambda}{\lambda}\frac{\beta}{1+\beta}. \quad (17)$$

While the effort level of low-ability workers is downward distorted, high-ability employees exert a higher level of effort than under full information.

Substituting effort levels (17) into (14), we find that net labor donations are lower than under full information because of the ‘envy rent’ paid to low-ability types, and also rewarded to high-ability types, and because of the information rent paid to high-ability types. Finally, while net labor donation from low-ability types is always positive, it is possible that the term $\frac{1}{2}(1+\beta)\Delta\theta e_L^2$ in (13) is so high that net labor donation from high-ability types becomes negative.

The ‘envy at the bottom’ solution is feasible when Conditions (15) and (16) are both satisfied. Substituting the expressions for the effort levels in (17) into conditions (15) and (16) we obtain the region of the parameters such that this solution is feasible. As expected, the ‘envy at the bottom’ solution is feasible when the employer’s mission is not very relevant.

The following lemma characterizes the ‘envy at the bottom’ solution:

Lemma 3. Screening with ‘envy at the bottom’. *The ‘envy at the bottom’ solution ($N_H > N_L$) is feasible when the employer’s mission is not relevant. Efforts are described in (17) above and are*

such that the effort of high-ability workers is upward distorted ($e_H^T > e_H^{FT}$), whereas the effort of low-ability workers is downward distorted ($e_L^T < e_L^{FT}$) with respect to full information. Net labor donation from low-ability workers is always positive ($N_L < 0$), whereas the one from high-ability workers can be negative ($N_H \leq 0$). Net labor donations from both high- and low-ability employees are lower than under full information.

5.3.1 Pooling contracts

When the employer offers pooling contracts with $e_H = e_L = e^P$ and $\omega_H = \omega_L = \omega^P$, we necessarily are in a case of ‘envy at the bottom’ because low-ability types provide effort at a higher cost and thus receive a lower net compensation. Hence, low-ability workers accept the contract only if they are compensated with an ‘envy rent’. The latter is set such that the participation constraint of low-ability types is binding, while the one of high-ability workers is *a fortiori* satisfied. From (PC_L), the pooling wage writes:

$$\omega^P = \frac{1}{2}\theta (e^P)^2 - \gamma e^P + \underbrace{\frac{1}{2}\beta\Delta\theta (e^P)^2}_{\text{envy rent}}$$

where the last term corresponds to the envy rent paid to low-ability workers which is also rewarded to their high-ability colleagues.

Substituting wage ω^P into the profit function and computing the first-order condition with respect to e^P , we obtain:

$$e^P = \frac{1+\gamma}{\beta\Delta\theta+\theta}; \quad \omega^P = \frac{1}{2} \frac{(1+\gamma)(1-\gamma)}{\beta\Delta\theta+\theta} \quad (18)$$

The lemma below characterizes the pooling contract (e^P, ω^P):

Lemma 4. Pooling. *The pooling contract is always feasible and it entails ‘envy at the bottom’ ($N_H > N_L$). The effort and the wage are described in (18) above. Labor donation from low-ability workers is perfectly offset by the envy rent ($N_L = 0$), while net labor donation from high-ability workers is negative ($N_H > 0$).*

This solution is always feasible, but it is costly for the employer. This is because net labor donation from low-ability workers is zero, whereas the one from high-types is negative. Workers’ utilities are such that $U_H > U_L = 0$.

5.4 The prevailing solution

In parameters' regions where more than one solutions is feasible, the employer will pick the one which assures the highest payoff. In this section, we compare the firm's payoff under the different feasible solutions and we derive the optimal one.

As we have shown in the previous subsections, both screening with 'envy free' contracts and pooling contracts are always feasible. The solution with 'envy at the top' and the one with 'envy at the bottom' are instead only feasible under some conditions. The former is feasible when both motivation from the employer's mission, γ , and workers' heterogeneity, $\Delta\theta$, are high enough; the latter when motivation is low. Using standard mathematical programming, one can show that the parameters' regions in which the 'envy at the top' and the 'envy at the bottom' solutions are feasible do not overlap.¹⁶ In addition, in the region of the parameters where the solution with 'envy at the top' is feasible, it assures the largest payoff to the firm. Similarly, when the solution with 'envy at the bottom' is feasible, the latter leads to the largest payoff. Finally, when neither of the two previous solutions is feasible, the employer will implement the solution with pooling contracts because it assures a payoff to the organization which is larger than the one obtained with 'envy free' contracts.

As an intuition, the pooling solution turns out to dominate the 'envy free' solution because under pooling the employer is able to set the utility of low-ability workers to zero ($U_H > U_L = 0$), whereas she must leave positive utilities to both types ($U_H > U_L > 0$) if 'envy free' contracts are implemented. In other words, the employer is almost always constrained to leave larger rents to her employees when she offers the same net compensations to workers of different types. Moreover, discarding the pooling solution when the screening one is possible is not surprisingly because a pooling contract is always dominated by two screening contracts.

The prevailing solutions are illustrated in the figure below, while the following proposition summarizes the previous discussion.

Proposition 2. The prevailing solutions. *Three optimal solutions exist: (i) when the employer's mission, γ , is relevant and workers' heterogeneity, $\Delta\theta$, is high, then the optimal solution entails screening with 'envy at the top'. (ii) When the employer's mission is not relevant, then the optimal solution entails screening with 'envy at the bottom'. (iii) When neither of the two previous screening solutions is feasible, the optimal solution entails pooling with 'envy at the bottom'.*

¹⁶Mathematica files are available upon request to the authors.

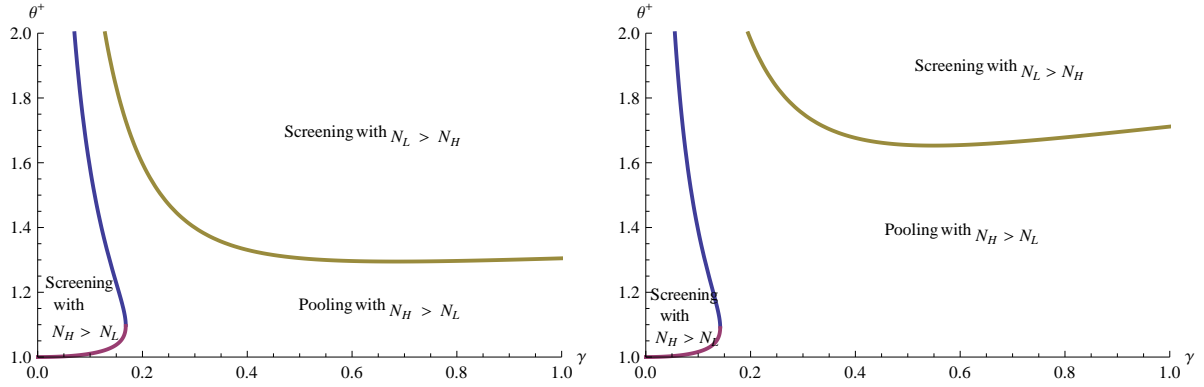


Figure 2: Prevailing solution with $\lambda = 0.5$ and $\beta = 0.3$ or $\beta = 0.7$.

Interestingly, an increase in β reduces the area in which the employer implements the two screening solutions (second graph in Figure 2). The intuition is similar to the one provided under full information: as the utility loss from envy increases, the employer has to compensate lower net-earners more. And as the ‘envy rent’ rent increases, offering separating contracts becomes less convenient for the organization.

Discussion of our theoretical results. We conclude this section by comparing our results with those obtained by previous theoretical studies on fairness concerns. In such studies workers do not share the mission of the organization and, as a consequence, they do not offer any labor donation to their employer.

Similarly to [Desiraju and Sappington \(2007\)](#), we find that both high-ability and low-ability employees can experience pay inequalities at the optimal screening contracts. However, while in [Desiraju and Sappington \(2007\)](#) the output of the high-ability employees is *downward* distorted, we find that it is *upward* distorted when the employer’s mission is not particularly relevant, namely at the solution with ‘envy at the bottom’. In our model, by distorting the effort of high-ability workers upward, the employer is able to increase net labor donation from high-ability employees without affecting the information and envy rents (which only depend on the effort of their low-ability colleagues, see expression 13). In addition, while offering ‘envy free’ contracts is never optimal in our model, eliminating all *ex-post* inequity can be optimal in [Desiraju and Sappington \(2007\)](#). This difference is driven both by the existence of labor donations in our model and by the fact that employees suffer from inequity aversion in [Desiraju and Sappington \(2007\)](#), implying that *all* workers must be compensated with a rent when some inequity exists.

In [von Siemens \(2011, 2012\)](#), and [Manna \(2016\)](#), optimal contracts are such that high-ability employees never suffer from envy and exert the efficient level of effort. Low-ability workers,

instead, are envious of their high-ability colleagues who receive the information rent and must be compensated with an envy rent. In addition, their effort is optimally distorted downward. This downward distortion of the effort exerted by low-ability workers also emerges in our model both at the ‘envy at the top’ and at the ‘envy at the bottom’ solution. To understand why, take for example the ‘envy at the bottom’ solution and consider that the envy rent paid to low-ability workers must also be paid to high-ability workers in order to prevent mimicking. Since the information rent and the two envy rents are costly for the firm and they depend on the effort exerted by low-ability employees, the firm finds it profitable to further distort away from efficiency the effort of the low-ability employees with respect to the standard adverse-selection problem without envy. As a result, we can conclude that envy magnifies the distortion in the effort exerted by the low-ability employees.

6 Empirical Analysis

To test the main theoretical predictions of our model we make use of the German Socio-Economic Panel data (GSOEP), a representative panel study of the resident population in Germany. The data include a wide range of information on individual and household characteristics, like employment, education, earnings, and personal attitudes.¹⁷ Our key variables are fairness concerns, employees’ ability, and the sector of employment which captures the relevance of the employer’s mission. Specifically, we are going to check predictions (i) and (ii) of Proposition 2.

Data on Perceived Income Fairness. In the 2005 wave of the survey we find the following question: *Is the income that you earn at your current job fair, from your point of view?*¹⁸ Table 2 shows the distribution of answers.

| Income Fair | Frequency | Percentage | Cumulative |
|-------------|-----------|------------|------------|
| Yes | 6,232 | 67.54 | 67.54 |
| No | 2,995 | 32.46 | 100 |
| Total | 9,227 | 100 | |

Table 2: Fairness Concerns in the dataset (2005 wave). Distribution of Answers

We create a dummy variable called Fairness that takes value 1 if employees answer yes to

¹⁷Detailed information about the SOEP can be found at <http://www.diw.de/en/soep>.

¹⁸Notice that the same question is also asked in the 2009 wave. In the appendix, as a robustness check, we replicate our analysis precisely using the 2009 wave.

the previous question, and 0 otherwise. This will be our dependent variable.

Data on Perceived Employees' Ability. The same wave also includes the following statements:

- *I see myself as someone who does things effectively and efficiently.*
- *I see myself as someone who does a thorough job.*
- *I see myself as someone who is original, comes up with new ideas.*

Respondents were asked to indicate on a 7-point scale how well this statement applies to them. An answer of 1 means “does not apply at all”, while an answer of 7 means “applies to me perfectly”.¹⁹ The responses to these three statements are strongly correlated. Therefore, we construct a measure of ability by taking the average responses over the three statements.²⁰ As a robustness check, we also consider these statements individually as different measures of the employees' perceived ability. The results of our analysis continue to hold.

Figure 3 shows the distributions of responses to each of the three statements. The first graph in Figure 4 shows the average responses over the three statements for the entire population, while the second graph shows the average responses in the Public services sector. We are going to explain why we make this distinction later on. For the moment just notice that the average distributions of responses are very similar.

Control variables. In the regressions presented below, we control for sectors, occupations, gender, age, education, and whether employees are white or blue collar.²¹ See Table 3 for more details on the independent variables of our analysis.

¹⁹Since these data are self-reported, a possible objection is that people are too self-confident in determining their ability in the workplace. However, using a representative sample of the German population, [Abeler et al. \(2014\)](#) find that participants forego considerable amounts of money to avoid lying. Even if, in their setup, participants have a clear monetary incentive to misreport, the authors find that aggregate reporting behavior is close to the expected truthful distribution. This result suggests that participants have a large cost of lying.

²⁰In the 2009 wave of the survey there is an additional statement that is strictly correlated to the previous ones: *I see myself as someone who is eager for knowledge*. When using the 2009 wave, we construct our measure of ability by taking the average response over the four statements.

²¹In the 2009 wave we can also use the organization's size as a control.

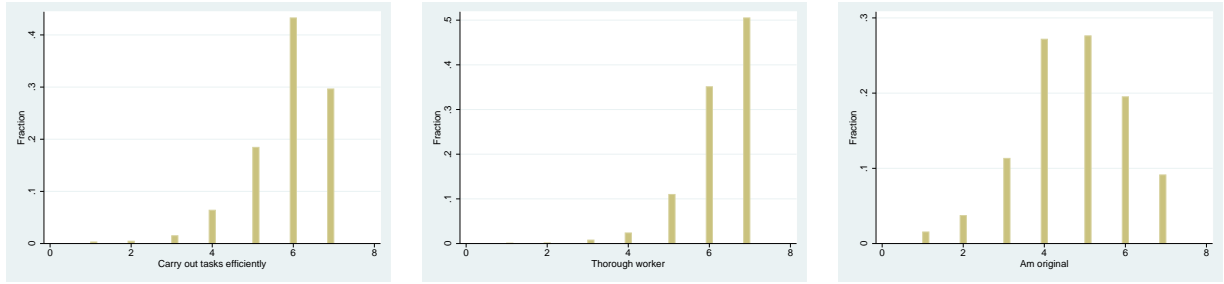


Figure 3: The histograms show the average responses to each of the three statements in 2005.

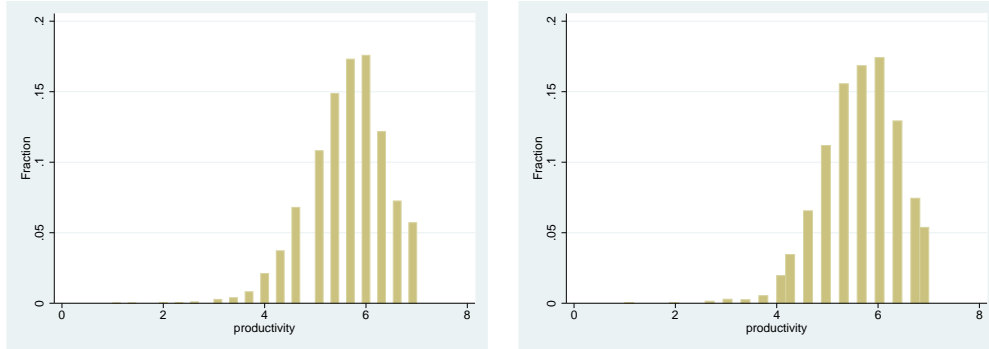


Figure 4: The histograms show the average responses over the three statements in 2005 for the entire population (on the left) and only for the public services sector (on the right).

| | |
|--------------|--|
| Ability | Average responses over the three statements. |
| Male | Dummy variable: 1=male. |
| Age | |
| Education | Dummy variable: 1= degree. |
| White-collar | Dummy variable: 1=white-collar, 0=blue-collar. |
| Sector | Sectors correspond to the classification of economic activities of the European Community (NACE code). It is controlled by 12 dummies. Agriculture, forest and mining sectors serve as a baseline. |
| Occupation | Occupations correspond to the ISCO code. It is controlled by 9 dummies. |

Table 3: Description of independent variables (2005 wave)

Predictions. We test the following predictions of our theoretical model:

1. High-ability employees receive a higher wage and work for a larger amount of hours than their low-ability colleagues.
2. High-ability employees perceive their wage as less fair than low-ability employees in sectors

where labor donation is important (or where the employer’s mission is relevant).

3. High-ability employees perceive their wage as more fair than low-ability employees in sectors where labor donation is not important (or where the employer’s mission is not relevant).

While the first prediction is always valid irrespective of the sectors where the firm operates, Predictions 2 and 3 depend on the relevance of the firm’s mission which in turn is related to the sector of activity. In Table 4 we show the sector classification and the distribution of employees working in each sector in 2005.

| | Frequency | Percentage | Cumulative |
|--|-----------|------------|------------|
| 0. Agriculture, forest and mining | 130 | 1.41 | 1.41 |
| 1. Manufacturing | 2,246 | 24.34 | 25.75 |
| 2. Electricity, gas | 102 | 1.11 | 26.86 |
| 3. Construction | 443 | 4.80 | 31.66 |
| 4. Trade | 1,154 | 12.51 | 44.16 |
| 5. Transport | 489 | 5.30 | 49.46 |
| 6. Restaurants and hotels | 218 | 2.36 | 51.83 |
| 7. Insurance and Real Estate | 490 | 5.31 | 57.14 |
| 8. Other business activities | 661 | 7.16 | 64.30 |
| 9. Public Services | 2,808 | 30.43 | 94.73 |
| 10. Arts, entertainment and recreation | 304 | 3.29 | 98.03 |
| 11. National executive committee | 39 | 0.42 | 98.45 |
| 12. Others | 143 | 1.55 | 100 |
| Total | 9,227 | 100 | |

Table 4: Sector Classification

To test Predictions 2 and 3, we have to identify those sectors in which the organization’s mission plays a relevant role and employees enjoy some non-monetary benefits from their job. To achieve this aim, we use two alternative methods. First, we consider “Sectors with High Labor Donation” the ones where a high percentage of employees works overtime and does not receive any compensation for that. In particular, in the survey we find the following two questions: *Do you work overtime? If you do work overtime, is the work paid, compensated with time-off, or not compensated at all?* We argue that employees who are interested in the organization’s

mission are more likely to do unpaid overtime. Similarly to our analysis, [Gregg et al. \(2011\)](#) use unpaid overtime as their measure of donated labor. The authors argue that unpaid overtime is a good proxy as it captures the hours worked above the contractual requirement for which the individual does not receive any direct compensation. Using the British Household Panel Survey (BHPS), [Gregg et al. \(2011\)](#) show that workers in the non-profit sector are more likely to do unpaid overtime than those in the for-profit sector.²²

Second, as a robustness check, we consider “Sectors with High Labor Donation” the ones where there is a high percentage of employees who are not happy about their monetary compensation, but their satisfaction in the workplace is high.²³ The idea here is that people who adhere to the mission of their employer like their job and remain in the organization even if they perceive their compensation as too low.

Using these alternative methods, we find that the sector where labor donation is particularly important is the one that provides Public Services: Sector 9 in Table 4. Figure 5 shows the distribution of answers for unpaid overtime in each sector. It is possible to notice that almost the 30% of employees in the Public Services Sector work overtime and they do not receive any monetary compensation for that. This sector includes Public Administration and Defense, Education, and Health Care. In this sector, there is a total of 2,808 individuals who responded the questions (more than 30% of the entire sample). Most part of employees are women (64.60% against the 35.40% of men). While the 46% of men holds a university degree, only the 36% of the women does. The average age is 43 years.

As a robustness check, in the appendix, we exclude civil servants from employees belonging to the Public Services Sector. When we restrict our analysis to private firms’ employees, a total of 2,050 individuals filled the survey. Most part are women (73% against the 27% of men). While the 38% of men holds a university degree, only the 27% of the women does. The average age is 42 years. Importantly, our results continue to hold when we restrict the analysis to private firms’ employees (see Table 9 in Appendix B), showing that results are not driven by

²²[Salamon et al. \(2012\)](#) also show that volunteer time accounts for about a quarter of not-for-profit contribution to GDP on average in the seven countries studied. Non-profit firms can be seen as a particular subset of mission-oriented firms.

²³In this case, we combine the following question: *How satisfied are you with your job?* with the one regarding the perceived income fairness. More specifically, we consider individuals who do not perceive their income as fair, but their satisfaction in the job is above average.

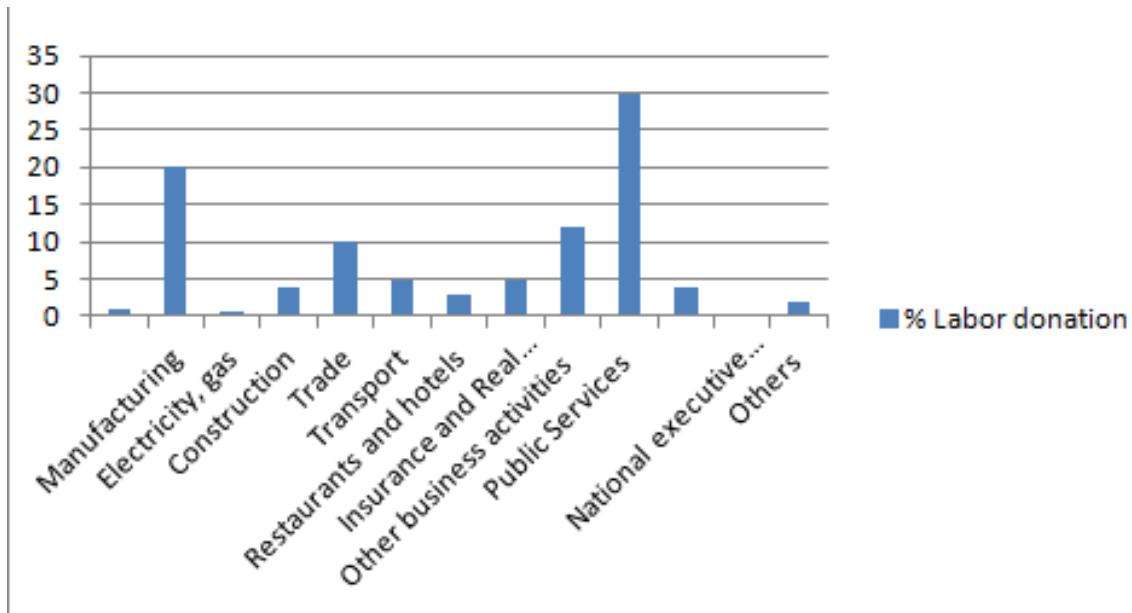


Figure 5: Distribution of answers for unpaid overtime in each sector. Unpaid overtime is used as a proxy for labor donation.

the peculiarity of public firms present in the Public Services Sector.

Empirical Analysis. In total 9,227 individuals responded to the questions on fairness, ability, and those regarding the controls. We consider all individuals working full time and part time, but we exclude apprentices and those who did not provide an answer. In all regressions, we cluster standard errors at NACE 2-digit level but the results are robust if we cluster them at the occupation level.

Results. Let us start considering Prediction 1. Irrespective of the sectors that we consider, self-assessed high-ability employees receive a higher wage and work more hours than self-assessed low-ability employees. These results are provided in Table 5. Also notice that all the independent variables have a positive and highly significant impact on income. Similar results are achieved when we measure the impact of the different variables on the contracted working hours (Column 2), with the exception of white collar whose effect is not significant. Furthermore, high-ability employees are more satisfied in their job and in life overall than low-ability employees, while age has a negative and significant impact on satisfaction. Finally, a higher level of education has a positive and significant impact on overall life satisfaction.

| | Income | Working Hours | Job Satisfaction | Overall Life Satisfaction |
|--------------|-----------------------|----------------------|----------------------|---------------------------|
| | (1) | (2) | (3) | (4) |
| | OLS coeff. | OLS coeff. | OLS coeff. | OLS coeff. |
| Ability | 98.24*** (0.000) | 5.21*** (0.000) | 0.46*** (0.000) | 0.31*** (0.000) |
| Male | 1161.84*** (0.000) | 67.58*** (0.000) | 0.05 (0.344) | 0.06 (0.102) |
| Age | 26.36*** (0.000) | - 0.81*** (0.000) | -0.012*** (0.000) | -0.009*** (0.000) |
| Education | 720.22*** (0.000) | 12.7*** (0.000) | -0.095 (0.183) | 0.109** (0.036) |
| White Collar | 435.27*** (0.000) | -2.83 (0.230) | -0.095 (0.112) | 0.019 (0.658) |
| Observations | 9,227 | 9,227 | 9,227 | 9,227 |
| Occupation | Yes | Yes | Yes | Yes |
| Sector | Yes | Yes | Yes | Yes |

Table 5: Prediction 1. The dependent variables are Income, Working Hours, Job Satisfaction, and Overall Life Satisfaction. The table reports the OLS coefficients. P-values are reported in parentheses. *** Denotes significance at the 1 percent level, ** at the 5 percent level, and * at the 10 percent level.

We now consider Prediction 2. To test this prediction, we focus our analysis on the Public Services Sector, where a large fraction of employees work overtime even if they do not receive any compensation for that. We study the relationship between the employees' perceived ability and their perceived fairness concerns in this sector. Our theoretical model predicts that, in this sector in which labor donations are important, high-ability employees are the ones who suffer because of envy. Since our dependent variable is a dummy, we use the Logit model.²⁴ In Table 6 we report the coefficients and odds ratio of the Logit model for the Public Services Sector. While Columns 1 and 2 only consider ability and only control for the employees' occupation, Columns 3 and 4 consider all the independent variables. P-values are reported in parentheses.

Results are in line with our theoretical predictions. More specifically, in the Public Services Sector the coefficients of ability have the negative sign and are statistically significant. To provide an interpretation of the magnitude of the effects, we report the odds ratio of the Logit

²⁴Similar results are obtained with a Probit model and are available upon request.

model (Columns 2 and 4). We find that for a one unit increase in the scale of ability the odds of fair income versus no fair income are 0.82 (0.83) times lower, given all the other variables constant. Table 6 also shows that the other independent variables have a statistically significant impact on the employees' fairness perception of income, with the exception of gender. A white-collar worker is more likely to perceive his wage as unfair than a blue-collar worker. This result goes in the same direction of the impact of the perceived employees' ability on fairness. A possible explanation is the following. Blue-collar workers are less interested in the organization's mission because they typically carry out more routine jobs and have less responsibilities. Finally, a higher level of education has a negative impact on the perceived fairness, while the age impacts positively on it, but its size is very low.

| | (1) | (2) | (3) | (4) |
|--------------|---------------------|--------------------|---------------------|--------------------|
| Fairness | Logit | Odds Ratio | Logit | Odds Ratio |
| Ability | -0.20*** (0.000) | 0.82*** (0.001) | -0.18*** (0.001) | 0.83*** (0.001) |
| Male | | | -0.077 (0.413) | 0.93 (0.413) |
| Age | | | 0.008** (0.040) | 1.00** (0.040) |
| Higher | | | -0.46*** (0.000) | 0.63*** (0.000) |
| White-collar | | | -0.40*** (0.000) | 0.67*** (0.000) |
| Observations | 2,808 | 2,808 | 2,808 | 2,808 |
| Occupation | Yes | Yes | Yes | Yes |

Table 6: Prediction 2. We consider the Public Services sector. The table reports the coefficients and odds ratio of the Logit model. While Columns 1 and 2 only consider our measure of ability and control for the employees' occupation, Columns 3 and 4 consider all the independent variables. P-values are reported in parentheses. In all regressions, standard errors are clustered at NACE 2-digit level. *** Denotes significance at the 1 percent level, ** at the 5 percent level, and * at the 10 percent level.

As predicted by our theoretical model, high-ability employees perceive their wage as unfair relatively more than low-ability employees in the public services sector where labor donation is important. Therefore, Prediction 2 is confirmed.

Finally, we test Prediction 3. Since labor donation is not particularly high in the other sectors, we first test this prediction by using all the dataset with the exception of the Public Services sector and we find that the impact of the employees' perceived ability on fairness is not statically significant. Then, we analyze its impact in each sector in isolation and we find that the employees' perceived ability has a positive and statically significant impact on fairness in the Trade Sector (sector *G* in the Nace classification). This sector includes: Trade, Repair of Cars; Trade, brokerage and wholesale trade; Retail trade; Guest industry. In total 1,154 individuals work in this sector (the 12.5% of the entire sample), the most part of employees are women (63% against the 37% of men). Only the 10% of the men (6% of the women) holds a university degree. The average age is 40 years.

In Table 7 we report the coefficients and odds ratio of the Logit model for this sector. While Columns 1 and 2 only consider ability and control for the employees' occupation, Columns 3 and 4 consider all the independent variables. P-values are reported in parentheses. To provide an interpretation of the magnitude of the effects, we report the odds ratio of the Logit model (Columns 2 and 4). We find that for a one unit increase in the scale of ability the odds of fair income versus no fair income are 1.18 times higher, keeping constant all the other variables. Therefore, we can conclude that Prediction 3 is confirmed when we consider the Trade Sector. Table 7 also shows that the other independent variables do not have a statistically significant impact on the employees' fairness perception of their income.

| | (1) | (2) | (3) | (4) |
|--------------|-------------------|-------------------|-------------------|-------------------|
| Fairness | Logit | Odds Ratio | Logit | Odds Ratio |
| Ability | 0.16** (0.041) | 1.18** (0.041) | 0.16** (0.041) | 1.18** (0.041) |
| Male | | | 0.07 (0.663) | 1.07 (0.663) |
| Age | | | 0.003 (0.557) | 1.003 (0.557) |
| Education | | | -0.41 (0.104) | 0.66 (0.104) |
| White-collar | | | -0.009 (0.955) | 0.99 (0.955) |
| Observations | 1,154 | 1,154 | 1,154 | 1,154 |
| Occupation | Yes | Yes | Yes | Yes |

Table 7: Prediction 3. We consider the Trade sector. The table reports the coefficients and odds ratio of the Logit model. While Columns 1 and 2 only consider our measure of ability and control for the employees' occupation, Columns 3 and 4 consider all the independent variables. P-values are reported in parentheses. In all regressions, standard errors are clustered at NACE 2-digit level. ***Denotes significance at the 1 percent level, ** at the 5 percent level, and * at the 10 percent level.

7 Conclusion

Despite receiving monetary compensations that are higher than the ones received by their less talented colleagues, productive workers may well perceive their situation as unfair when comparing the more demanding tasks and difficult duties they are required to perform with the ones of their less talented colleagues. Our empirical evidence documents that this occurs in those firms whose mission is important: in Public Administration, Defense, Education, and Health Care, the workers who consider their compensation as unfair are mainly the ones who earn more, are required to work a larger number of hours, and who see themselves as highly productive, i.e. the most talented employees. Conversely, in the Trade sector where the firms' mission is not particularly relevant and unpaid overtime is quite rare (and thus labor donation is low or inexistent), the workers who consider their situation as unfair are mainly the less talented employees.

Our theoretical model offers a possible explanation for those observations which is based on the interplay between employees' fairness concerns and labor donations. Our analysis suggests that the ability of mission-oriented employers to extract labor donations from their most productive employees is undermined by workers' fairness concerns. This is particularly the case when the workers' ability is not observable so that screening contracts must be designed. In her attempt to maximize labor donations from the most talented workers, the employer is limited by the 'envy rent' necessary to compensate the lower net-earners and by the information rent to be paid to high-ability employees. Our model shows that optimal contracts are substantially shaped by the relevance of the organization's mission. Specifically, the 'envy at the top' solution observed in Public Administration, Defense, Education, and Health Care would emerge because labor donations in those sectors are high and are only partially offset by the 'envy' and information rents paid to the most talented workers. Optimal screening contracts are such that the most talented workers are the lower net-earners and must be compensated for being envious. Instead, the 'envy at the bottom' solution observed in the Trade sector would emerge because labor donations in that sector are low and are partially or totally offset by the information rents paid to high-ability workers. Optimal contracts now entail an 'envy rent' for the less-talented employees who are dissatisfied of being the lower net-earner. Through the screening mechanism such 'envy rent' is also appropriated by the most talented workers, whose compensation increases even more.

The difficult trade-off between preserving a perception of fairness in the workplace and rewarding the most talented workers has been investigated before in the case of standard firms. Our paper complements previous works by analyzing the issue from the perspective of a mission-oriented organization willing to extract labor donations from high-performer employees. Our model and the related empirical evidence emphasize that the most talented employees may suffer some disutility loss because of envy in organizations whose mission is important. [von Siemens \(2011\)](#) has already shown that firms can use both contractual and organizational measures to reduce the costs arising from workers' social preferences. We contribute to the debate on fairness in the workplace suggesting that non-monetary rewards may become particularly important in mission-oriented organizations confronted with motivated workers. Specifically, the organization could increase attention towards its employees by adopting strategies as, for example, recognition and delegation which may effectively complement traditional monetary incentives used to screen workers (see [Bradler et al., 2016](#), and [De Chiara and Manna, 2016](#), for

models investigating recognition and delegation, respectively).

To dig the problem further, some assumptions are worth relaxing. First, maintaining the monopsonist framework of the present model, it would be interesting either to introduce heterogeneity in workers' adherence to the firm's mission (i.e. in workers' motivation) or to let the organization design its mission together with the screening contracts. Second, competition among organizations could be considered; for example in a setting with two organizations characterized by different missions that compete to attract the most talented workers. We leave those issues for future research.

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A Appendix

A.1 Full information with mission but no fairness concerns

This is the instance producing the largest surplus. When $\beta = 0$ the optimal contracts are such that $e_L < e_H$ and $\omega_L < \omega_H$ and write

$$\begin{aligned} e_H &= 1 + \gamma, & e_L &= \frac{1+\gamma}{\theta}, \\ \omega_H &= \frac{1-\gamma^2}{2}, & \omega_L &= \frac{1-\gamma^2}{2\theta}. \end{aligned} \tag{19}$$

Given that fairness concerns have no bite here, the unique solution entails $N_L > N_H$. Specifically, net compensations are:

$$N_H = -\gamma e_H \quad \text{and} \quad N_L = -\gamma e_L, \tag{20}$$

so that the difference between labor donations is here the highest as possible.

Notice that the assumption $0 \leq \gamma \leq 1$ implies that labor donation is sufficiently low to prevent motivated workers from receiving a negative wage when $\beta = 0$. In addition, given our interpretation of the effort cost as the monetary equivalent of a physical or psychological cost, limited liability is assured.

A.2 Full information with fairness concerns but no mission

When employees care about fairness, but the firm has no-mission ($\gamma = 0$), the employer sets $N_H = N_L = 0$ and no worker suffers from envy. Optimal contracts are

$$\begin{aligned} e_H &= 1, & e_L &= \frac{1}{\theta}, \\ \omega_H &= \frac{1}{2}, & \omega_L &= \frac{1}{2\theta}. \end{aligned}$$

In words, when fairness concerns are relevant but the firm has no-mission, the employer optimally prevents envy by setting the workers' participation constraints to zero. However, the firm cannot take advantage of labor donation.

A.3 Full information with labor donation and fairness concerns

Suppose that $N_H > N_L$, then workers' utilities are:

$$\begin{aligned} U_H &= \omega_H - \frac{1}{2}e_H^2 + \gamma e_H, \\ U_L &= \omega_L - \frac{1}{2}\theta e_L^2 + \gamma e_L - \beta(N_H - N_L). \end{aligned}$$

The principal maximizes her expected profits fixing $U_L = U_H = 0$. The wages are:

$$\begin{aligned} \omega_H &= \frac{1}{2}e_H^2 - \gamma e_H, \\ \omega_L &= \frac{1}{2}\theta e_L^2 - \gamma e_L + \beta(N_H - N_L). \end{aligned}$$

Substituting N_L and N_H in ω_L and rearranging:

$$\begin{aligned} \omega_H &= \frac{1}{2}e_H^2 - \gamma e_H, \\ \omega_L &= \frac{1}{2}\theta e_L^2 - \gamma \left(\frac{1}{1+\beta}e_L + \frac{\beta}{1+\beta}e_H \right). \end{aligned}$$

So that

$$N_H = -\gamma e_H \quad \text{and} \quad N_L = -\gamma \left(\frac{1}{1+\beta}e_L + \frac{\beta}{1+\beta}e_H \right).$$

Hence, $N_H > N_L$ requires $-\gamma e_H > -\gamma \left(\frac{1}{1+\beta}e_L + \frac{\beta}{1+\beta}e_H \right)$, which can be rewritten as $e_L > e_H$.

The previous inequality will be checked later on.

Substituting the wages into the principal's maximization problem we obtain:

$$\pi = \lambda \left[e_H - \frac{1}{2}e_H^2 + \gamma e_H \right] + (1 - \lambda) \left[e_L - \frac{1}{2}\theta e_L^2 + \gamma \left(\frac{1}{1+\beta}e_L + \frac{\beta}{1+\beta}e_H \right) \right].$$

First order conditions with respect to effort levels are:

$$\begin{aligned} \frac{\partial \pi}{\partial e_H} : \lambda(1 - e_H + \gamma) + (1 - \lambda) \left(\frac{\beta}{1+\beta}\gamma \right) &= 0 \Leftrightarrow e_H = \frac{1+\gamma}{1} + \left(\frac{1-\lambda}{\lambda} \right) \left(\frac{\beta}{1+\beta} \right) \gamma; \\ \frac{\partial \pi}{\partial e_L} : 1 - \theta e_L + \frac{\gamma}{1+\beta} &= 0 \Leftrightarrow e_L = \frac{1}{\theta} + \frac{\gamma}{\theta(1+\beta)}. \end{aligned} \tag{21}$$

One can easily check that those effort levels are not consistent with the condition $e_L > e_H$. As a consequence, we discard the solution with $N_H > N_L$.

Suppose now that $N_H < N_L$. Workers' utilities are:

$$\begin{aligned} U_H &= \omega_H - \frac{1}{2}e_H^2 + \gamma e_H - \beta(N_L - N_H), \\ U_L &= \omega_L - \frac{1}{2}\theta e_L^2 + \gamma e_L. \end{aligned}$$

Imposing $U_L = U_H = 0$, the wages are:

$$\begin{aligned}\omega_H &= \frac{1}{2}e_H^2 - \gamma e_H + \beta(N_L - N_H), \\ \omega_L &= \frac{1}{2}\theta e_L^2 - \gamma e_L.\end{aligned}$$

Substituting the expressions for N_L and for N_H in ω_H and rearranging:

$$N_H = -\gamma \left(\frac{1}{1+\beta} e_H + \frac{\beta}{1+\beta} e_L \right) \quad \text{and} \quad N_L = -\gamma e_L.$$

From the expressions above, one can easily check that $0 > N_L > N_H$ if and only if $e_H > e_L$, which will be checked ex-post.

We can now substitute the wages into the expected profits of the principal:

$$\pi = \lambda \left[e_H - \frac{1}{2}e_H^2 + \gamma \left(\frac{1}{1+\beta} e_H + \frac{\beta}{1+\beta} e_L \right) \right] + (1-\lambda) \left[e_L - \frac{1}{2}\theta e_L^2 + \gamma e_L \right].$$

First order conditions with respect to the effort levels are:

$$\frac{\partial \pi}{\partial e_H} : \lambda \left[1 - e_H + \frac{\gamma}{1+\beta} \right] = 0 \Leftrightarrow e_H = 1 + \frac{\gamma}{1+\beta}$$

$$\frac{\partial \pi}{\partial e_L} : \lambda \left[\frac{\beta}{1+\beta} \gamma \right] + (1-\lambda) [1 - \theta e_L + \gamma] = 0 \Leftrightarrow e_L = \frac{1}{\theta} + \frac{\gamma}{\theta} \left[1 + \left(\frac{\lambda}{1-\lambda} \right) \left(\frac{\beta}{1+\beta} \right) \right]$$

Substituting those optimal efforts level in the condition $e_H > e_L$, we obtain Condition 1 stated in the main text.

Finally, when Condition 1 is not satisfied, then the firm optimally sets $e_H = e_L = e \Leftrightarrow N_L = N_H$. Then, the wages are:

$$\omega_L = \frac{1}{2}\theta e^2 - \gamma e \quad \text{and} \quad \omega_H = \frac{1}{2}e^2 - \gamma e, \quad \text{with } \omega_H < \omega_L.$$

Substituting the previous wages into the firm's maximization problem, we obtain:

$$\pi = \lambda \left[e - \frac{1}{2}e^2 + \gamma e \right] + (1-\lambda) \left[e - \frac{1}{2}\theta e^2 + \gamma e \right],$$

which gives:

$$\frac{\partial \pi}{\partial e} : \lambda(1 + \gamma - e) + (1-\lambda)(1 + \gamma - \theta e) = 0 \Leftrightarrow e = \frac{1 + \gamma}{\lambda + (1-\lambda)\theta}.$$

A.4 Feasible solutions with screening

Depending on the ordering of net compensations of truthfully reporters and mimickers, we can distinguish between 6 different instances (see Table 8) which, in turn, generate three classes of solutions. In particular, from Case 1 we can derive the class of solutions such that $N_L > N_H$, from Cases 1 and 6 we can derive the class of solutions such that $N_L = N_H$, finally, from Cases from 2 to 6 we can derive the class of solutions such that $N_L < N_H$. Each possible class of solutions will be feasible in a specific region of the parameters. Given that the single crossing condition is not satisfied in our framework, multiple solutions are in principle possible for each of the cases listed in Table 8, depending on the binding constraints. Even if the number of solutions is potentially large, only four solutions turn out to be feasible.

| Cases | Conditions |
|--------|--|
| Case 1 | $\hat{N}_L > N_L \geq N_H > \hat{N}_H$ |
| Case 2 | $N_H > \hat{N}_H \geq \hat{N}_L > N_L$ |
| Case 3 | $N_H > \hat{N}_L > \hat{N}_H > N_L$ |
| Case 4 | $\hat{N}_L > N_H > \hat{N}_H > N_L$ |
| Case 5 | $N_H > \hat{N}_L > N_L > \hat{N}_H$ |
| Case 6 | $\hat{N}_L > N_H \geq N_L > \hat{N}_H$ |

Table 8: Depending on the ordering of net compensations of truthfully reporters and mimickers, We can distinguish between 6 different cases.

Specifically, one can show that, in Case 1, only two solutions are possible: (i) the one such that $N_L > N_H$ and constraints IC_H and PC_L are both binding (presented in Subsection 5.1 in the main text) and (ii) the solution such that $N_L = N_H$ and constraint IC_H is binding (presented in Subsection 5.2). Cases 2 and 3 turn out to be equivalent, the only possible solution here entails $N_L < N_H$ and constraints IC_H and PC_L are both binding (this solution is presented in Subsection 5.3). Finally, one can show that solutions derived in Cases 4, 5 and 6 are not feasible and must be discarded. We also derive the pooling solution that necessarily entails envy at the bottom and is thus presented as a subsection of Subsection 5.3 (specifically, Subsection 5.3.1).

A.5 Screening contracts with ‘envy at the top’

Let us consider Case 1 of Table 8: $\hat{N}_L > N_L > N_H > \hat{N}_H$. We can rewrite the participation and incentive constraints in the following way:

$$\omega_L - \frac{\theta}{2}e_L^2 + \gamma e_L \geq 0 \quad (PC_L)$$

$$\omega_H - \frac{1}{2}e_H^2 + \gamma e_H - \beta(N_L - N_H) \geq 0 \quad (PC_H)$$

$$\omega_L - \frac{\theta}{2}e_L^2 + \gamma e_L \geq \omega_H - \frac{\theta}{2}e_H^2 + \gamma e_H - \beta(N_L - \hat{N}_H) \quad (IC_L)$$

$$\omega_H - \frac{1}{2}e_H^2 + \gamma e_H - \beta(N_L - N_H) \geq \omega_L - \frac{1}{2}e_L^2 + \gamma e_L \quad (IC_H)$$

Let us first derive the monotonicity condition. By adding the incentive constraints of the two types of agents:

$$\omega_L - \frac{\theta}{2}e_L^2 + \gamma e_L + \omega_H - \frac{1}{2}e_H^2 + \gamma e_H - \beta(N_L - N_H) \geq \omega_H - \frac{\theta}{2}e_H^2 + \gamma e_H - \beta(N_L - \hat{N}_H) + \omega_L - \frac{1}{2}e_L^2 + \gamma e_L$$

The previous condition can be rewritten as:

$$\frac{1}{2}\Delta\theta(e_H^2 - e_L^2) + \beta(N_H - \hat{N}_H) \geq 0$$

or, similarly,

$$\frac{1}{2}\Delta\theta e_H^2(1 + \beta) - \frac{1}{2}\Delta\theta e_L^2 \geq 0,$$

and rearranging we obtain:

$$e_H \geq \frac{e_L}{\sqrt{1 + \beta}}, \quad (22)$$

i.e. a ‘weak’ monotonicity condition.

It is easy to show that the unique possible solution is such that IC_H and PC_L are binding.

If IC_H and PC_L bind, then

$$\omega_H - \frac{1}{2}e_H^2 + \gamma e_H - \beta(N_L - N_H) = \frac{1}{2}\theta e_L^2 - \gamma e_L - \frac{1}{2}e_L^2 + \gamma e_L,$$

which also implies

$$U_H = \frac{1}{2}\Delta\theta e_L^2.$$

Therefore, PC_H is satisfied. We can now rewrite IC_L as:

$$\omega_L \geq \frac{1}{2}\theta e_L^2 - \gamma e_L + \frac{1}{2}1e_H^2 - \gamma e_H + \beta(N_L - N_H) + \frac{1}{2}\Delta\theta e_L^2 - \frac{1}{2}\theta e_H^2 + \gamma e_H - \beta(N_L - N_H)$$

$$\omega_L \geq \frac{1}{2}\theta e_L^2 - \gamma e_L - \frac{1}{2}\Delta\theta(e_H^2(1 + \beta) - e_L^2)$$

$$U_L \geq -\frac{1}{2}\Delta\theta[e_H^2(1 + \beta) - e_L^2].$$

Hence also IC_L is satisfied. We can then conclude that, when IC_H and PC_L are binding, PC_H and IC_L are also satisfied.

From IC_H and PC_L binding, one can derive the expressions for the wages that are reported in (6) and (5) in the main text. Substituting the wages into the firm's maximization problem, we obtain the following expression for the employer's profits:

$$\pi = \lambda \left[e_H - \left(\frac{1}{2}e_H^2 - \gamma \left[\frac{\beta}{1+\beta}e_L + \frac{1}{1+\beta}e_H \right] + \frac{1}{2}\Delta\theta e_L^2 \right) \right] + (1 - \lambda) \left[e_L - \left(\frac{1}{2}\theta e_L^2 - \gamma e_L \right) \right].$$

First order conditions are:

$$\frac{\partial \pi}{\partial e_H} : \lambda \left(1 - e_H + \frac{\gamma}{1 + \beta} \right) = 0 \Leftrightarrow e_H^T = 1 + \frac{\gamma}{1 + \beta}$$

$$\frac{\partial \pi}{\partial e_L} : \lambda \left(\frac{\beta}{1 + \beta} \gamma - \frac{1}{1 + \beta} \Delta\theta e_L \right) + (1 - \lambda)(1 - \theta e_L + \gamma) = 0 \Leftrightarrow e_L^T = \frac{\lambda \beta \gamma + (1 - \lambda)(1 + \gamma)(1 + \beta)}{\Delta\theta \lambda + (1 - \lambda)(1 + \beta)\theta}$$

A.6 Screening with 'envy-free' contracts

The 'envy-free' solution is obtained from Case 1 of Table 8 by imposing that $N_L = N_H$. We thus have $\hat{N}_L > N_L = N_H > \hat{N}_H$. The incentive and participation constraints can be rewritten as:

$$\omega_L - \frac{\theta}{2}e_L^2 + \gamma e_L \geq 0$$

$$\omega_H - \frac{1}{2}e_H^2 + \gamma e_H \geq 0$$

$$\omega_L - \frac{\theta}{2}e_L^2 + \gamma e_L \geq \omega_H - \frac{\theta}{2}e_H^2 + \gamma e_H - \beta(N_L - \hat{N}_H)$$

$$\omega_H - \frac{1}{2}e_H^2 + \gamma e_H \geq \omega_L - \frac{1}{2}e_L^2 + \gamma e_L$$

where $N_L = N_H$ implies that $\omega_H - \frac{1}{2}e_H^2 = \omega_L - \frac{\theta}{2}e_L^2$ or that:

$$\omega_H - \omega_L = \frac{1}{2}e_H^2 - \frac{\theta}{2}e_L^2. \quad (23)$$

One can show that the only incentive compatible solution is the one such that the incentive constraint for the high-ability employees is binding, implying that:

$$\omega_H - \frac{1}{2}e_H^2 + \gamma e_H = \omega_L - \frac{1}{2}e_L^2 + \gamma e_L. \quad (24)$$

Substituting (23) into (24) we obtain condition (10) in the main text.

One can check that condition (10) is verified when $N_L = N_H = 0$ or when net compensations are both zero. Specifically, it must be $\omega_H - \frac{1}{2}e_H^2 = \omega_L - \frac{\theta}{2}e_L^2 = 0$. Hence $\omega_H = \omega_L$ and $\frac{1}{2}e_H^2 = \frac{\theta}{2}e_L^2$ must hold, which implies that $e_H = e_L\sqrt{\theta}$. Substituting $e_H = e_L\sqrt{\theta}$ into $\frac{1}{2}e_H^2 - \frac{\theta}{2}e_L^2 = 0$ we obtain expression (11) in the main text. Substituting the effort levels into equation $\omega_H - \frac{1}{2}e_H^2 = \omega_L - \frac{\theta}{2}e_L^2 = 0$ we obtain the wage rate ω^F .

A.7 Screening contracts with ‘envy at the bottom’

In both Cases 2 and 3 of Table 8, the incentive and participation constraints writes:

$$\omega_L - \frac{\theta}{2}e_L^2 + \gamma e_L - \beta(N_H - N_L) \geq 0 \quad (PC_L)$$

$$\omega_H - \frac{1}{2}e_H^2 + \gamma e_H \geq 0 \quad (PC_H)$$

$$\omega_L - \frac{\theta}{2}e_L^2 + \gamma e_L - \beta(N_H - N_L) \geq \omega_H - \frac{\theta}{2}e_H^2 + \gamma e_H \quad (IC_L)$$

$$\omega_H - \frac{1}{2}e_H^2 + \gamma e_H \geq \omega_L - \frac{1}{2}e_L^2 + \gamma e_L - \beta(N_H - \hat{N}_L) \quad (IC_H)$$

Let us consider the implementability condition. By adding the two incentive constraints:

$$\omega_L - \frac{\theta}{2}e_L^2 + \gamma e_L - \beta(N_H - N_L) + \omega_H - \frac{1}{2}e_H^2 + \gamma e_H \geq \omega_H - \frac{\theta}{2}e_H^2 + \gamma e_H + \omega_L - \frac{1}{2}e_L^2 + \gamma e_L - \beta(N_H - N_L),$$

which can be rewritten as:

$$\frac{1}{2}\Delta\theta(e_H^2 - e_L^2) \geq \beta(N_H - N_L). \quad (25)$$

Let us consider that PC_L and IC_H are both binding. We report wages in expressions (13) and (12) of the main text.

Here we show that, when PC_L and IC_H are binding, PC_H and IC_L are satisfied as well.

The participation constraint of the efficient type is satisfied if:

$$\omega_H \geq \frac{1}{2}e_H^2 - \gamma e_H$$

substituting wage ω_H :

$$\frac{1}{2}e_H^2 - \gamma e_H + \frac{1}{2}\Delta\theta e_L^2(1 + \beta) \geq \frac{1}{2}e_H^2 - \gamma e_H$$

$$\text{or } \frac{1}{2}\Delta\theta e_L^2(1 + \beta) > 0.$$

Therefore, PC_H is satisfied. We can rewrite IC_L as:

$$\omega_L \geq \frac{1}{2}\theta e_L^2 - \gamma e_L + \beta(N_H - N_L) + \frac{1}{2}e_H^2 + \frac{1}{2}\Delta\theta e_L^2(1 + \beta) - \frac{1}{2}\theta e_H^2.$$

Substituting wage ω_L , the previous inequality can be rewritten as:

$$\frac{1}{2}\theta e_L^2 - \gamma e_L + \beta(N_H - N_L) \geq \frac{1}{2}\theta e_L^2 - \gamma e_L + \beta(N_H - N_L) + \frac{1}{2}e_H^2 + \frac{1}{2}\Delta\theta e_L^2(1 + \beta) - \frac{1}{2}\theta e_H^2.$$

After some simple computations, we find that

$$\frac{1}{2}\Delta\theta e_H^2 \geq \frac{1}{2}\Delta\theta e_L^2(1 + \beta) \Leftrightarrow e_H \geq e_L\sqrt{1 + \beta}.$$

Hence IC_L is satisfied from the implementability condition.

Substituting expressions (13) and (12) for the wages into the employer's profits:

$$\begin{aligned} \max_{e_L, e_H} \pi = & \lambda \left[e_H - \left(\frac{1}{2}\theta e_H^2 - \gamma e_H + \frac{1}{2}\Delta\theta e_L^2(1 + \beta) \right) \right] + \\ & + (1 - \lambda) \left[e_L - \left(\frac{\bar{\theta}}{2}e_L^2 - \gamma \left(\frac{1}{1 + \beta}e_L + \frac{\beta}{1 + \beta}e_H \right) + \frac{\beta}{2}\Delta\theta e_L^2 \right) \right] \end{aligned}$$

First order conditions with respect to the effort levels are:

$$\frac{\partial \pi}{\partial e_H} : \lambda[1 - e_H + \gamma] + (1 - \gamma) \left(\frac{\beta}{1 + \beta}\gamma \right) = 0 \Leftrightarrow e_H^B = 1 + \gamma + \gamma \frac{1 - \lambda}{\lambda} \frac{\beta}{1 + \beta}.$$

$$\frac{\partial \pi}{\partial e_L} : -\lambda[\Delta\theta(1 + \beta)e_L] + (1 - \lambda) \left[1 + \frac{\gamma}{1 + \beta} - (\theta e_L + \beta\Delta\theta e_L) \right] = 0 \Leftrightarrow$$

$$e_L^B = \frac{(1 - \lambda)(1 + \beta + \gamma)}{(1 + \beta)[\lambda\Delta\theta(1 + \beta) + (1 - \lambda)(\theta + \beta\Delta\theta)]}$$

A.7.1 Pooling contracts

A pooling contract entails $e_H = e_L = e^P$ and $\omega_H = \omega_L = \omega^P$. Given that low-ability types provide effort at a higher cost and, as a result, receive a lower net compensation, we are here in a case of ‘envy at the bottom’. The participation constraint of low-ability types binds when:

$$\omega^P - \frac{\theta}{2} (e^P)^2 + \gamma e^P - \beta(N_H - N_L) = 0.$$

This assures that both types are willing to accept the contract. Now, since the difference between net compensations $N_H - N_L$ is equal to $\frac{1}{2}\Delta\theta (e^P)^2$, we can rewrite the previous equation as:

$$\omega^P = \frac{1}{2}\theta (e^P)^2 - \gamma e^P + \frac{1}{2}\beta\Delta\theta (e^P)^2 \quad (26)$$

Substituting ω^P into the profit function, we obtain the following expression:

$$\pi^P = \lambda \left[e^P - \left(\frac{1}{2}\theta (e^P)^2 - \gamma e^P + \frac{1}{2}\beta\Delta\theta (e^P)^2 \right) \right] + (1-\lambda) \left[e^P - \left(\frac{1}{2}\theta (e^P)^2 - \gamma e^P + \frac{1}{2}\beta\Delta\theta (e^P)^2 \right) \right]$$

The first-order condition with respect to e^P is:

$$\frac{\partial \pi}{\partial e^P} = 1 - \theta e^P + \gamma - \beta\Delta\theta e^P = 0 \Leftrightarrow e^P = \frac{1 + \gamma}{\beta\Delta\theta + \theta}.$$

Substituting the effort e^P into (26), we obtain the wage rate ω^P in (18).

B Robustness Checks

In this section, we study two robustness checks for the empirical analysis. In particular, we first test Prediction 2 by excluding civil servants. Then, we replicate our analysis by using the 2009 wave of the German Socio-Economic Panel.

Civil Servants. To test Prediction 2, we have considered the Public Services Sector where labor donation is relevant and we have found that our theoretical prediction is confirmed. A possible objection is that in the health-care and education sector many employees are civil servants working in (public or non-profit) organizations that not necessarily maximize profits. To address such objection we performed our analysis excluding civil servants from the dataset and we checked that our results are still satisfied. In Table 9, we repeat the analysis provided in Table 6 without civil servants. The coefficients of ability have the negative sign and are

statistically significant. For a one unity increase in the scale of ability the odds of fair income versus no fair income are 0.83 times lower, given all other variables constant. The level of education continues to impact negatively on the employees' fairness concerns, while the other independent variables are not statistically significant.

| | (1) | (2) | (3) | (4) |
|--------------|---------------------|--------------------|---------------------|--------------------|
| Fairness | Logit | Odds Ratio | Logit | Odds Ratio |
| Ability | -0.19*** (0.000) | 0.83*** (0.000) | -0.19*** (0.000) | 0.83*** (0.000) |
| Male | | | -0.075 (0.598) | 0.93 (0.598) |
| Age | | | 0.003 (0.649) | 1.00 (0.649) |
| Higher | | | -0.48** (0.023) | 0.62** (0.023) |
| White-collar | | | -0.11 (0.448) | 0.89 (0.448) |
| Observations | 2,050 | 2,050 | 2,050 | 2,050 |
| Occupation | Yes | Yes | Yes | Yes |

Table 9: Prediction 2. We consider the Public Services sector but we exclude from this sample civil servants employees. The table reports the coefficients and odds ratio of the Logit model. While Columns 1 and 2 only consider our measure of ability and control for the employees' occupation, Columns 3 and 4 consider all the independent variables. P-values are reported in parentheses. In all regressions, standard errors are clustered at NACE 2-digit level. *** Denotes significance at the 1 percent level, ** at the 5 percent level, and * at the 10 percent level.

2009 Wave. We repeat our analysis considering the 2009 wave of the dataset and we report results for Predictions 2 and 3. In total, 10,434 individuals responded to the questions on fairness, ability, and those regarding the controls. We consider all individuals who were fully employed or worked part time, but we exclude apprentices and those who did not provide an answer. Interestingly, in the 2009 wave we can also control for the size of the organization. In all regressions, we cluster standard errors at NACE 2-digit level but the results are robust if we cluster them at the occupation level. When we only consider the Public Services sector, there is a total of 3,122 individuals who responded the questions. In this sector, the most part of

employees are women (66% against the 34% of men). While almost the 50% of men holds a university degree, only the 37% of the women does. The average age is 43 years.²⁵

In Table 10 we report the coefficients and the odds ratio of the Logit regression for the public services sector.²⁶ While Columns 1 and 2 only consider ability and control for size and occupation, Columns 3 and 4 consider all the independent variables. P-values are reported in parentheses. All results are in line with those reported in the main text. More specifically, the coefficients of ability have the negative sign and are statistically significant in the Public Service Sector.

| | (1) | (2) | (3) | (4) |
|--------------|--------------------|--------------------|---------------------|---------------------|
| Fairness | Logit | Odds Ratio | Logit | Odds Ratio |
| Ability | -0.15** (0.033) | 0.861** (0.033) | -0.14** (0.042) | 0.87** (0.042) |
| Male | | | 0.00 (0.998) | 1.00 (0.998) |
| Age | | | 0.003 (0.687) | 1.00 (0.687) |
| Education | | | -0.055 (0.206) | 0.957 (0.206) |
| White-collar | | | -0.37*** (0.005) | 0.689*** (0.005) |
| Observations | 3,122 | 3,122 | 3,122 | 3,122 |
| Size | Yes | Yes | Yes | Yes |
| Occupation | Yes | Yes | Yes | Yes |

Table 10: The table reports the coefficients of the Logit and Probit regressions. While Columns 1 and 2 only consider our measure of ability and control for size and occupation, Columns 3 and 4 consider all the independent variables. P-values are reported in parentheses. In all regressions, standard errors are clustered at NACE 2-digit level. ***Denotes significance at the 1 percent level, ** at the 5 percent level, and * at the 10 percent level.

To provide an interpretation of the magnitude of the effects, we report the odds ratio of the Logit model (columns 2 and 4). We find that for a one unit increase in the scale of ability the odds of fair income versus no fair income are 0.86 (0.87) times lower, given all the other

²⁵Notice that the descriptive statics are similar to those observed in the 2005 wave.

²⁶Results are confirmed with a probit model.

variables constant. Prediction 2 is confirmed: high-ability employees perceive their wage as unfair more often than low-ability employees in the sector where labor donation is important.

To test Prediction 3, we study the impact of the employees' perceived ability on fairness considerations in the other sectors. We find that, irrespective of the sector that we analyze, the effect is never statistically significant.



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