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DOI: http://doi.org/10.1016/j.jebo.2020.09.011

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Francesca Barigozzi† and Ester Manna‡

September 19, 2020

Abstract

We study how envy affects screening contracts offered to employees who care about the mission of the organisation and differ in ability, which is their private information. We show that organisation's mission plays a critical role. In sectors where mission is important, despite receiving higher wages than their less talented colleagues, high-ability workers perceive their contract as unfair because they are required to perform much more demanding tasks. In contrast, in sectors where mission is not particularly relevant, the less talented employees are envious towards their high-ability colleagues. Our model provides novel implications for organisations' compensation schemes and new insights on the possible effects of minimum wage policies. We test our theoretical predictions by using the German Socio-Economic Panel data and a novel survey addressed to academics in Spain.

Keywords: Mission, envy, workers' ability, screening.
JEL classifications: D03, D82, M54.

*We are grateful to Gani Aldashev, Emmanuelle Auriol, Giacomo Calzolari, Claudia Cerrone, Alessandro De Chiara, Josse Delfgaauw, Oliver Fabel, Guido Friebel, Marc Kaufmann, Georg Kirchsteiger, Botond Koszegi, Marco Magnani, Arieda Muco, Tommaso Reggiani, Bernd Theilen, Adam Szeidl, Ferdinand von Siemens, and the audience at the University of Vienna, the Universitat Rovira i Virgili, the XXXIII Jornadas de Economia Industrial, the 45th Annual Conference of the European Association for Research in Industrial Economics, the XVII Journées LAJV, the XXX Annual Conference of the Italian Society of Public Economics, the Colloquium on Personnel Economics (COPE), and the NGO: Non-Profits, Governments, and Organisations Workshop for a number of insightful comments and useful observations. Ester Manna also acknowledges the financial support of the Ministerio de Economia y Competitividad and Fondo Europeo de Desarrollo Regional through grant ECO2016-78991-R (MINECO/FEDER, UE), Ministerio de Ciencia, Innovación y Universidades through grant RTI2018-096155-B-I00, and the Government of Catalonia through grant 2014SGR493.

†University of Bologna, P.zza Scaravilli 2, 40126 Bologna, Italy. E-mail: francesca.barigozzi@unibo.it.

‡Professora Lector Serra Húnter, Universitat de Barcelona, Barcelona Economic Analysis Team (BEAT), Avinguda Diagonal 696, 08034, Barcelona, Spain. E-mail: estermanna@ub.edu. **Corresponding author**.

1 Introduction

Workers' feeling of fairness is critically affected by *relative* compensations and the way in which tasks and responsibilities are assigned among colleagues. As highlighted by recent empirical and experimental evidence, inequities among peers can be detrimental to the work atmosphere and social comparisons are costly to manage for organisations (see Mas, 2006, Card et al., 2012, and Breza et al., 2017).

Managing social comparison costs may be particularly difficult in mission-oriented organisations. Firms are defined as mission-oriented if they provide collective goods like education, health care, research, and defence (see Besley and Ghatak, 2005), or embrace corporate social responsibility, becoming for example environmentally friendly (see Bénabou and Tirole, 2010). In such firms, those workers who adhere to the mission of the organisation are in principle willing to donate a portion of their paid labour, accepting lower wages, because they are happy to contribute to the achievement of socially-valuable goals (Preston, 1989). However, a problem arises when the employer tries to exploit labour donation of highly-talented workers by charging them with tasks that are much more difficult and time consuming than the ones assigned to their less-productive colleagues, as we show in this paper.[1]

We develop a simple model to study how *disadvantageous inequity aversion* or *envy* affects labour donation in mission-oriented organisations and how such organisations manage social comparison costs by designing optimal screening contracts. We show that, in mission-oriented organisations, employees' envy leads to surprising and novel results. Differently from the previous theoretical literature on disadvantageous inequity aversion (see von Siemens, 2011, 2012, and Manna, 2016), we find that high-ability employees might be those who suffer from envy and must consequently be compensated for it. More specifically, we show that in sectors where mission is important, despite receiving higher wages than their less talented colleagues, high-ability workers perceive their contract as unfair because they are required to perform much more demanding tasks. Our analysis shows that, to minimise social comparison costs, taking into account the interplay between envy and the employees' motivation is crucial.

In our model, there are three key elements. First, employees differ in their ability, that can be either high or low, and 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. Second, we assume that employees are envious towards their colleagues when they receive a lower *wage net of the cost of the task* they are required to perform, which depends on their ability. Third, employees enjoy their contribution to the firm's

[1]Consider the case of those Universities where academics are paid flat wages. The allocation of teaching and administrative duties is not always fair and more talented and motivated colleagues are often burdened with more difficult tasks. For example, they may be charged with the most delicate administrative duties (as being Degree Programme Director or member of different committees). They may also be asked to be more flexible in teaching, i.e. changing classes according to the contingent necessities of the Department. In these cases, even the most dedicated academics can feel demotivated observing that the effort and commitment of their colleagues is systematically lower than their own. To this respect, see Section 7 showing results from our *Survey in the Academic Workplace*.

mission meaning that their motivation is output-oriented (or effort-based), thus their labour donations are increasing in the contracted effort. As a result, when high-ability workers provide more effort than their low-ability colleagues, they also offer higher labour donations. Labour donations are profitable for the firm, but create a gap between (net) compensations of employees, thus raising both envy in the workplace and social comparison costs for the employer.

Because of envy, the workers who receive the lower net wage must be compensated with an *envy bonus*.[2] In addition, given that workers' ability is their private information, high-ability workers have to be rewarded with an *information rent* to prevent them from mimicking their low-ability colleagues. 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 labour donations are affected by envy bonuses and information rents and we show that the envious employee can either be the high- or the low-ability worker. In particular, the model predicts that, in sectors where the firm's mission (and thus workers' labour donation) is important and heterogeneity in ability is high, the firm optimally designs contracts where high-ability employees receive a lower net wage 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 has little importance, we show that the information rent paid to high-ability employees is sufficiently high to make their net wage relatively higher, and thus the low-ability colleagues envious. Hence, when the firm's mission has little importance, optimal contracts entail *'envy at the bottom'*.

As an intuition, let us start from the full-information setting where worker's ability is observable. When workers' heterogeneity is high, the firm offers contracts that make high-ability employees envious of their low-ability colleagues. To see why, consider that high-ability workers exert more effort, so their labour donation is larger than that of low-types. Moreover, since the firm holds both types of workers to their (identical) outside options, high-ability workers are required to exert a high effort for a relatively low wage: high-ability workers are worse off than low-types. Consequently, more productive workers envy their low-type coworkers and must be compensated with an envy bonus. If workers' heterogeneity is too low and/or the disutility from envy is too high, the envy bonus becomes too costly and the employer optimally offers 'envy free' contracts that imply lower labour donations but require no envy bonus. In the setting where the workers' ability is private information, high-ability workers must be rewarded with an information rent and the previous result may be reversed. This occurs when the mission of the firm has little importance because here labour donation is lower than the information rent. In this case, high-ability workers are better off than their low-ability colleagues, and the solution with 'envy at the bottom' emerges. We also find that screening is not always possible: when the relevance of the mission takes intermediate values the employer needs to resort to pooling contracts which make extracting labour donation impossible.

As a robustness check, in Section 6, we show that our results continue to hold when we

[2]In a field experiment, Breza et al. (2017) estimate that workers give up 9.3% of their earnings to avoid a workplace where they are paid differently than their peers.

consider an alternative specification of the envy term in which employees do not take into account their colleagues' ability. In Section 7, we present two pieces of evidence that are consistent with our theoretical analysis. One is based on the well-established German Socio-Economic Panel data (GSOEP), a representative panel study of the resident population in Germany. The other is an anonymous survey we designed, accordingly to our model specification, that was sent to scholars in the departments of Economics and Business of some of the leading public universities in Spain.

In the online appendix, we provide some possible extensions of our theoretical analysis. We first investigate the employer's incentives to costly modify the mission of the organisation. Second, we briefly discuss the case of workers characterised by both advantageous and disadvantageous inequity aversion. Finally, we discuss to what extent our results are robust to type-dependent outside options.

Our model provides some policy implications for mission-oriented organisations. Wage compression has been previously proposed as a policy to reduce comparison costs in the organisation (see Contreras and Zanarone, 2017) but this is not the case in our setting. To see why, consider that envy stems from net and not absolute wages in our model and that wage compression is equivalent to offering pooling contracts to the workers. However, since low-productivity workers have larger effort costs, pooling contracts generate 'envy at the bottom' in our model. This implies that wage compression alone does not eliminate comparison costs. In addition, pooling contracts turn out to be optimal only when neither 'envy at the top' nor 'envy at the bottom' are feasible so that they represent the least efficient strategy for the employer.

Our model also offers some new insights on the possible effects of minimum wage policies at the firm's level. The increase in the cost of labour due to minimum wage policies is exacerbated for mission-oriented organisations whose mission is relevant and rely on 'envy at the top' contracts. To see why, recall that high-ability workers are the lower net-earner at the 'envy at the top' solution and have to be rewarded with an envy bonus which depends on the difference in net wages. A minimum wage policy may indeed artificially increase the (net) wage of low-ability workers and, as a result, may increase social comparison costs for the organisation. Specifically, the firm might be obliged to raise both the salary of low- and high-ability workers in order to comply with the minimum wage policy and simultaneously maintain the difference between their net compensations at the optimal level.[3,4]

[3] Those results are in line with the empirical evidence showing that an increase in the minimum wage has an impact on the entire wage distribution and that minimum wage laws have so-called spillover effects (see Katz and Krueger, 1992, Card and Krueger, 1995, Dolado et al., 1997, and Teulings, 2003). In a lab experiment, Falk et al. (2006) show that an increase in the minimum wage affects people's perception of what a fair transaction is and creates entitlement effects.

[4] Interestingly, a minimum wage policy is less detrimental to a standard organisation without a mission. The reason is that only the 'envy at the bottom solution' emerges in this case and the minimum wage policy affects the cost of labour for low-ability workers, but not the wage of high-ability ones.

2 Related Literature

A recent literature studies organisations where employees derive non-monetary benefits from undertaking some tasks or from providing some types of services (see Besley and Ghatak, 2005, Biglaiser and Albert Ma, 2007, Delfgaauw and Dur, 2007, 2008, Buurman et al., 2012, Dur and Zoutenbier, 2014, Cassar and Armouti-Hansen, Forthcoming, Barigozzi and Burani, 2016, and DellaVigna and Pope, 2017). The idea is that, in some sectors, workers may care about the output produced by their organisation, or about the recipients of the services they provide, i.e. their patients, students, or customers. Considerable attention has been paid to the public sector and to 'public service motivation' allowing the extraction of some labour donation from bureaucrats and civil servants (see Francois, 2000, 2007, Glazer, 2004, Macchiavello, 2008, Francois and Vlassopoulos, 2008, Jaimovich and Rud, 2014, and Besley and Ghatak, 2018).

Many of the mentioned papers study the sorting of workers characterised by heterogeneous motivation into different sectors of the labour market and its consequences for optimal pay policies and organisational design. We study instead how the interaction between employees' motivation and their disadvantageous inequity aversion affects the optimal contracts when employees differ in their ability and this is their private information.

Surveys and empirical evidence show that employees are interested in how their own wage compares to their colleagues' (see Blinder and Choi, 1990, Bewley, 1995, 1999, Campbell and Kamlani, 1997, Card et al., 2012 , and Ockenfels et al., 2014). Moreover, pay inequity among peers can be detrimental to the work atmosphere as highlighted by the recent experimental evidence provided by Breza et al. (2017), and these social comparisons are costly for organisations. Mas (2006) also shows that being paid below a reference point has a negative impact on performance. In addition to these studies, lab experiments have analysed how employees' fairness considerations affect their behavior (see Fehr and Schmidt, 2006, for an overview).

Few theoretical studies have analysed behaviours and choices of workers who are envious. Like Desiraju and Sappington (2007), von Siemens (2011, 2012), and Manna (2016), we consider a setting with adverse selection on some workers' characteristics and we assume that employees suffer a disutility whenever they feel worse off than their colleagues. Differently from the existing literature, we derive screening contracts when workers are envious and the employer is willing to extract labour 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 envy derives from the comparison of net wages. However, while in Desiraju and Sappington (2007) workers are inequity averse and *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. we focus on envy. At the end of Section 5, we compare more in detail the results and predictions of our theoretical analysis with those obtained by previous studies on fairness concerns.

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 Kragl and Schmid, 2009, Bartling and von Siemens, 2010, Englmaier and Wambach, 2010, and Neilson and Stowe, 2010).

3 Model setup

A mission-oriented employer (she) is willing to hire a unit mass of workers. We have in mind an organisation embracing corporate social responsibility (see Bénabou and Tirole, 2010) and/or producing collective goods and services (see Besley and Ghatak, 2005), whose market power can be justified on the grounds of her specific and characterizing mission which is valuable to prospective workers.

Workers' effort e is the only input the firm needs in order to produce. The effort is contractible, i.e. it is observable and verifiable (as, for example, the number of hours an employee is required to work). 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 normalised at 1. Such valuation can reflect the price at which a for-profit firm sells a unit of output, the marginal benefit obtained from increasing output by the manager of a non-profit organisation, the preferences of the government when it is the producer. In different words, we are agnostic about the organisation's ownership structure. The employer has the following per-worker payoff:

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

where ω is the wage paid to her employee and is a function of effort.

Employees differ in their cost of exerting effort $c_i(\theta_i) = \frac{1}{2}\theta_i e_i^2$ that depends on ability θ_i, 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 $\theta_L = \theta$ and $1 < \theta < 2$, are characterised by a high cost of exerting effort. Workers' heterogeneity is denoted by $\Delta\theta = \theta - 1$ with $0 < \Delta\theta < 1$.[5] 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 a reservation wage of zero (we discuss type-dependent reservation wages in the online appendix).

Social psychologists like Festinger (1962) and Adams (1963) argue that workers long for a fair relation between the actual salary they receive and their performance, evaluating their own abilities in comparison to referent others. In other terms, envy depends on the comparison of worker's effective salary $\tilde{\omega}_i$ which is ω_i reduced by some function $f(c_i)$ of the effort cost which depends on the workers' ability.[6] Following this insight, previous theoretical works as Desiraju

[5] $\Delta\theta < 1$ assures that the threshold values in our main conditions are strictly positive.

[6] In line with this view, the company Comparably listed the 50 best-paying large companies considering in the compensation not only the salary itself, but also the sentiment of how employees feel about their compensation. This is because in looking for a job most prospective workers agree that compensation does not include just the salary, but also the employees' feeling of whether their pay is fair or generous given the job title and responsibilities they have (see the article of *Business Insider* on December 1st, 2017: "The 50 best-paying big companies, according to employees").

and Sappington (2007), and Manna (2016) further specify this idea assuming, for simplicity, that $f(c_i) = c_i(\theta_i)$ so that $\tilde{\omega}_i = \omega_i - c_i(\theta_i)$. This view, to which we also adhere to, has recently been borne out by the field experiment of Breza et al. (2017) who investigate to what extent reactions to pay inequality depend on whether it appears justified. Specifically, they ask the following questions: 'In a world with heterogeneous productivity, are fairness norms violated if pay levels are unequal? Or does fairness require that pay differences reflect productivity differences across workers?' (Breza et al., 2017, page 613). Importantly, they find that when workers can clearly perceive that their higher-paid peers are more productive than themselves, pay disparity has no discernible effect. In our baseline model, we follow this approach. However, in Section 6, we show that our results are robust when we consider an alternative specification of the envy term in which workers do not take into account their colleagues' ability.

We write the employee i's utility as:

$$U_i(e_i, \omega_i, e_{-i}, \omega_{-i}; \theta_i) = \underbrace{\omega_i - c_i(\theta_i)}_{\tilde{\omega}_i} + \gamma e_i - \hat{\beta}_i \max\{\tilde{\omega}_{-i} - \tilde{\omega}_i, 0\}, \quad (2)$$

with $i = L, H$, and where the subscript $-i$ indicates the type different from i. Given contracts consisting of a wage ω_i and an effort level e_i, the employees' utility contains the following three terms:

1. employees receive a *net wage* $\tilde{\omega}_i$ that is given by the difference between the wage and the cost of exerting effort, which depends on the workers' ability.

2. 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 organisation's social mission.[7] Such premium increases with both the amount of effort that an employee is required to exert and the degree of the firm's mission. Importantly, this premium generates some labour donation that is profitable to the firm. This is in line with the labour donation theory (Preston, 1989) according to which, in some firms and sectors, employees are willing to donate a portion of their paid labour (in the form, for example, of unpaid voluntary overtime) because they obtain satisfaction from the fact that their efforts achieve socially-valuable goals.[8]

   Given that the employees' premium increases with the amount of labour they provide, a crucial aspect of our model is the following: when contracts are separating ($e_H > e_L$), high-ability workers potentially offer higher labour donations. However, these higher labour

[7] The degree of the organisation's mission γ depends on the type of collective good or service produced. For example, the mission of a non-profit organisation providing health care for the poor is perceived as more relevant than the mission of an organisation providing aesthetic medicine aimed at reducing the signs of aging.

[8] Using 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.

donations can be completely offset by envy bonuses and information rents, as we will explain.

3. 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 wage $\tilde{\omega}_i$ is relatively lower. An employee's level of envy towards a higher-net-earner colleague is captured by the parameter $\beta \geq 0$. A high-ability worker knows that with probability λ he faces a high-ability colleague who receives the same contract, whereas with probability $1-\lambda$ he faces a low-ability employee. If a high-ability employee receives the highest net wage, he does not suffer from envy. Conversely, if a low-ability employee is the highest net-earners, a high-ability employee feels envious and the parameter β is weighed by the fraction of low-ability colleagues in the population. Therefore, we denote by $\hat{\beta}_H = (1-\lambda)\,\beta$ the high-ability employees' degree of envy when they are the lowest net-earners. In the same fashion, we denote by $\hat{\beta}_L = \lambda\beta$ the low-ability employees' degree of envy when they are envious towards their high-ability colleagues.[9]

   The literature quoted above indicates that fairness norms are such that pay inequalities are accepted when they reflect productivity differences across workers; hence, the cost of effort (which depends on ability), but not the premium γe_i, enters the envy term. However, note that workers anticipate that the employer takes advantage of the premium γe_i and that the contracted wage ω_i is decreased accordingly.[10] As an illustration, consider the case of nurses who donate labour to their patients with a part of contracted effort that is not compensated, and anticipate that the employer is in fact taking advantage of their labour donations.[11] When offered the choice among different contracts at the hospital (e.g. full-time or part-time), nurses do compare contracted salaries ω_i and effort levels e_i, $i = L, H$, anticipating their own effective cost and overtime, and the ones of their peers.

We innovate with respect to the previous literature by studying the interaction between workers' envy and labour donation. Indeed, in her attempt to extract labour donations from workers of different types, the principal is not only constrained by the employees' fairness concern, but also by their private information on ability. Specifically, the employer must reward her employees with *envy bonuses* and *information rents* which may or may not offset their labour donation. Thus, in what follows, we will focus on *net* labour donation:

[9] The fact that individuals exhibit a strong and robust aversion against disadvantageous inequity, but fewer individuals also exhibit an aversion to advantageous inequity, is supported by several empirical works (Loewenstein et al., 1989, Card et al., 2012, Cohn et al., 2014). In addition, aversion to advantageous inequity seems to be significantly weaker than the aversion to disadvantageous inequity. In the online appendix, we discuss how our results would change by adding advantageous inequity to our analysis.

[10] If the premium γe_i enters the envy term, not only workers are giving up a part of their wage because of labour donation but they also count γe_i as a benefit in the social comparison.

[11] Nurses in Quebec are routinely working unpaid overtime (CBC News of June 29th, 2014). Régine Laurent, president of the Fédération interprofessionnelle de la santé du Québec, stated: 'They are abusing the devotion we have towards our patients' (see https://www.cbc.ca/news/canada/montreal/quebec-nurses-routinely-take-on-unpaid-overtime-study-1.2691335).

Definition 1. *Net labour donation is the monetary equivalent of a worker's premium for contributing to the output, net of the possible rewards for disadvantageous inequity aversion (envy bonus) and for truthful information (information rent):*

$$\textit{Net labour donation} = \quad \gamma e_i - \textit{possible envy bonus} - \textit{possible info rent.}$$

As we will explain later on, net labour donation always corresponds to the negative of workers' net wage ($-\tilde{\omega}_i$), irrespective of whether or not the employer observes workers' ability. As an intuition, consider that we can rewrite the employee i's utility (2) as:

$$-\tilde{\omega}_i = \gamma e_i - \hat{\beta}_i \left(\max\left\{\tilde{\omega}_{-i} - \tilde{\omega}_i, 0\right\}\right) - U_i,$$

where the second term in the right-hand side accounts for the possible envy bonus, while the third one for the possible information rent (see also the specific illustrations following the equations describing wages as a function of efforts levels in the next sections).

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 compare the contracts offered by the principal and decide whether or not to accept a contract, and which contract they prefer to sign; in Stage 3, the effort is exerted, production is undertaken, wages are paid, and profits are realised.

All mathematical computations and proofs of the results are in the appendix.

4 Mission and envy under full information

As a benchmark, we first consider the setting where workers' ability is observable but the utility of the two types of workers is related because of the envy term. The employer maximises her expected payoff per worker:

$$\pi = \lambda\big(e_H - \omega_H\big) + (1-\lambda)\big(e_L - \omega_L\big), \tag{3}$$

subject to the employees' participation constraints:

$$\tilde{\omega}_i + \gamma e_i - \hat{\beta}_i \left(\max\left\{\tilde{\omega}_{-i} - \tilde{\omega}_i, 0\right\}\right) \geq 0 \quad \text{with} \quad i = L, H. \tag{4}$$

The solution entailing 'envy at the top' ($\tilde{\omega}_L > \tilde{\omega}_H$) is feasible. The firm optimally sets the workers' participation constraints to zero and must reward high-ability employees who receive the lower net wage.[12] From the participation constraints, wages can be written as follows:

$$\begin{aligned}
\omega_L^{FT} &= \tfrac{1}{2}\theta e_L^2 - \gamma e_L, \\
\omega_H^{FT} &= \tfrac{1}{2}e_H^2 - \gamma e_H + \hat{\beta}_H(\tilde{\omega}_L - \tilde{\omega}_H) = \tfrac{1}{2}e_H^2 - \underbrace{\gamma\left(\frac{1}{1+\hat{\beta}_H}e_H + \frac{\hat{\beta}_H}{1+\hat{\beta}_H}e_L\right)}_{\text{envy bonus as a decrease in labour donation}},
\end{aligned} \tag{5}$$

where superscript FT stands for the solution of full-information with 'envy at the top'. Recall that $\tilde{\omega}_i = \omega_i - \frac{1}{2}\theta_i e_i^2$; hence, the net wage of low-ability workers is $\tilde{\omega}_L = -\gamma e_L$, which is negative. Low-ability workers offer to the firm all their premium for contributing to her output. In other words, their labour donation corresponds to γe_L. Let us now consider the wage paid to high-ability workers, i.e. ω_H^{FT}. By substituting $\tilde{\omega}_L = -\gamma e_L$ into this expression, collecting $\tilde{\omega}_H$ and rearranging, we can rewrite the net wage of high-ability workers as $\tilde{\omega}_H = -\gamma\left(\frac{1}{1+\hat{\beta}_H}e_H + \frac{\hat{\beta}_H}{1+\hat{\beta}_H}e_L\right)$. As a result, labour donation of high-ability workers is equal to $\gamma\left(\frac{1}{1+\hat{\beta}_H}e_H + \frac{\hat{\beta}_H}{1+\hat{\beta}_H}e_L\right)$. Optimal contracts under full information are such that the high-ability employees' labour donation is $\gamma\left(\frac{1}{1+\hat{\beta}_H}e_H + \frac{\hat{\beta}_H}{1+\hat{\beta}_H}e_L\right) < \gamma e_H$. Intuitively, high-ability employees must be rewarded because they receive the lower net wage. This limits the firm's ability to take advantage of labour donations from high-ability workers.

Substituting wages into equation (3) and computing the FOCs with respect to e_i, we obtain the optimal effort levels illustrated in Lemma 1.

Lemma 1 (Full information with 'envy at the top')**.** *When the employer offers a contract entailing 'envy at the top', the required effort levels are:*

$$e_L^{FT} = \frac{1}{\theta} + \frac{\gamma}{\theta}\left[1 + \left(\frac{\lambda}{1-\lambda}\right)\left(\frac{\hat{\beta}_H}{1+\hat{\beta}_H}\right)\right]; \quad e_H^{FT} = 1 + \frac{\gamma}{1+\hat{\beta}_H}, \tag{6}$$

and wages are such that $\omega_H^{FT} < \omega_L^{FT}$ if γ is high enough.

In this solution, not only high-ability workers receive the lower net-wage but it is also likely that they are paid the lower wage. This occurs if the firm's mission is sufficiently important. However, as we will explain below, the mission cannot be *too important* for this solution to be feasible.

The envy cost $\hat{\beta}_H$ has a negative impact on e_H^{FT}, while it impacts positively on e_L^{FT}. If envy increases, the wage of high-ability workers must increase. To reduce envy, the employer reduces production by high-ability workers, which leads to a lower labour donation, and thus to a higher net wage. At the same time, she increases the production by low-ability workers, which increases their labour donation, and ultimately reduces their net wage. These adjustments together reduce envy. They also reduce the difference in production between high- and low-ability workers.

By offering contracts contingent on the employees' ability, the employer takes advantage of the larger labour donation from high-ability employees. However, given that under full informa-

[12] In Appendix A.1 and A.2 we show the solution of the limit cases in which the organisation has no mission ($\gamma = 0$), and in which the workers are not envious ($\beta = 0$).

tion $e_H > e_L$ goes hand by hand with $\tilde{\omega}_L > \tilde{\omega}_H$, the higher labour donation from high-ability employees is partially offset by the envy bonus they must be rewarded with. Hence, the employer faces a trade-off between asking different effort levels to employees of different types and paying the envy bonus to high-ability ones.

Condition 1. *The inequality $\tilde{\omega}_L > \tilde{\omega}_H$ holds when $\gamma < \frac{\Delta\theta(1-\lambda)\left(1+\hat{\beta}_H\right)}{\hat{\beta}_H-\Delta\theta(1-\lambda)} \equiv \gamma^F$, where $\gamma^F > 0$ is increasing in $\Delta\theta$ and decreasing in $\hat{\beta}_H$.*

According to Condition 1, different net wages and effort levels are profitable only if the mission is not too relevant or if employees' heterogeneity, $\Delta\theta$, is high enough. Intuitively, compensating high-ability employees for being envious is profitable only when their labour 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 wages (and, consequently, their labour donation) equal so as to pay a lower envy bonus to high-ability workers. In this case, the solution is 'envy free', and the corresponding effort levels are illustrated in Lemma 2, where FF stands for the solution of full-information free of envy.

Lemma 2 (Full information with 'envy free' contracts)**.** *When the employer offers 'envy free' contracts, the required effort levels are:*

$$e_L^{FF} = e_H^{FF} = \frac{1+\gamma}{\lambda+(1-\lambda)\theta} \tag{7}$$

and wages are such that $\omega_H^{FF} < \omega_L^{FF}$.

In this solution, the optimal effort is positively affected by γ, while it does not depend on the envy parameter. In Figure 1 we represent the regions of parameters where the solutions $\tilde{\omega}_L > \tilde{\omega}_H$ and $\tilde{\omega}_L = \tilde{\omega}_H$ take place in the plane $(\Delta\theta, \gamma)$. As stated in Condition 1, an increase in $\hat{\beta}_H$ reduces the area in which the solution $\tilde{\omega}_L > \tilde{\omega}_H$ is possible (second graph in Figure 1). Intuitively, as workers' concern about pay inequity increases, the employer has to provide a higher envy bonus to compensate high-ability workers. This makes extracting higher labour donations from high-ability workers less convenient for the employer. [13] Proposition 1 summarises the solution under full information.

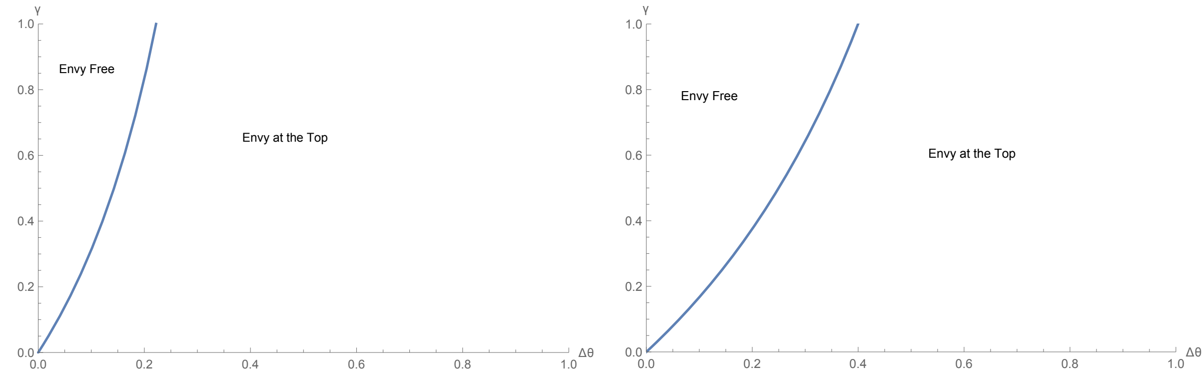
Proposition 1 (Envy under full information)**.** *When the firm observes the employees' ability, two solutions exist:*

1. *If the difference in workers' ability is large (Condition 1 holds), optimal contracts entail 'envy at the top', efforts are described in equation (6), and are such that $e_H^{FT} > e_L^{FT}$.*

2. *If the difference in workers' ability is low (Condition 1 does not hold), contracts are 'envy free', efforts are described in equation (7), and are such that $e_H^{FF} = e_L^{FF}$.*

[13] Note that, if the mission were not relevant at all, i.e. if $\gamma = 0$, envy would not play any role under full information and $\tilde{\omega}_H = \tilde{\omega}_L$ would hold; see Appendix A.2.

Figure 1: Condition 1 with $\lambda = 0.5$, and $\hat{\beta}_H = 0.25$ on the left side and $\hat{\beta}_H = 0.5$ on the right.



The fact that low-ability workers may receive higher wages in the solution with 'envy at the top' and always receive higher wages when contracts are 'envy free' shows that labour donation from high-ability workers is an important source of surplus for the employer under full information. Conversely, we will show that high-ability workers always receive higher wages under adverse selection because their labour donation is partially or totally compensated by the information rent and the possible envy bonus.

5 Mission, envy, and screening

When the employees' ability is their private information, labour donations are reduced not only because of workers' concerns for fairness, but also because of information rents to be paid for screening. The organisation maximises expected payoff (3) subject to the employees' participation and incentive compatibility constraints:

$$\begin{aligned}
&\tilde{\omega}_H + \gamma e_H - \hat{\beta}_H \max\{(\tilde{\omega}_L - \tilde{\omega}_H, 0)\} \geq 0, \\
&\tilde{\omega}_L + \gamma e_L - \hat{\beta}_L \max\{(\tilde{\omega}_H - \tilde{\omega}_L, 0)\} \geq 0, \\
&\tilde{\omega}_H + \gamma e_H - \hat{\beta}_H \max\{(\tilde{\omega}_L - \tilde{\omega}_H, 0)\} \geq \tilde{\omega}'_L + \gamma e_L - \hat{\beta}_L \max\{(\tilde{\omega}_H - \tilde{\omega}'_L, 0)\}, \\
&\tilde{\omega}_L + \gamma e_L - \hat{\beta}_L \max\{(\tilde{\omega}_H - \tilde{\omega}_L, 0)\} \geq \tilde{\omega}'_H + \gamma e_H - \hat{\beta}_H \max\{(\tilde{\omega}_L - \tilde{\omega}'_H, 0)\},
\end{aligned}$$

where $\tilde{\omega}'_L = \omega_L - \frac{1}{2}e_L^2$ and $\tilde{\omega}'_H = \omega_H - \frac{\theta}{2}e_H^2$. In the right-hand side of the incentive constraints, the worker's disutility from envy is computed by considering the difference between net wage obtained by truthfully reporting his type and net wage obtained as a mimicker. Specifically, $\tilde{\omega}'_L$ is the net wage that high-ability employees with $\theta_H = 1$ attain when they pretend to be low-ability, while $\tilde{\omega}'_H$ is the net wage that low-ability employees with $\theta_L = \theta > 1$ attain when they pretend to be high-ability workers.[14] Note that a worker might obtain a lower net wage by choosing a

[14] Rearranging the expressions for $\tilde{\omega}'_H$ and $\tilde{\omega}'_L$ we observe that:

$$\begin{aligned}
\tilde{\omega}_H &= \tilde{\omega}'_H + \frac{1}{2}\Delta\theta e_H^2 \Rightarrow \tilde{\omega}_H > \tilde{\omega}'_H; \\
\tilde{\omega}_L &= \tilde{\omega}'_L - \frac{1}{2}\Delta\theta e_L^2 \Rightarrow \tilde{\omega}_L < \tilde{\omega}'_L.
\end{aligned}$$

contract not meant for his type. If so, he might end up being envious towards colleagues of his own true type (see the right-hand sides of the incentive compatibility constraints).

We characterise the 'envy at the top' solution where $\tilde{\omega}_L > \tilde{\omega}_H$ in Subsection 5.1 and the 'envy at the bottom' solution where $\tilde{\omega}_L < \tilde{\omega}_H$ in Subsection 5.2. The 'envy free' solution where $\tilde{\omega}_L = \tilde{\omega}_H$ turns out to be always dominated under asymmetric information. For this reason, we relegate its analysis to Appendix A.14. We also characterise the pooling solution where both types of employees receive the same contract entailing 'envy at the bottom' in Subsection 5.2.1. Finally, we determine for which values of the parameters each solution is optimal.

Interestingly, the 'envy at the bottom' solution is not possible in the case of full information in which $\tilde{\omega}_L \geq \tilde{\omega}_H$ always holds. Under asymmetric information, high-ability employees receive an information rent to reveal their type and this rent can be sufficiently large to change the ordering of net wages. As a result, the 'envy at the bottom' solution may emerge.

5.1 Screening with 'envy at the top'

When the employer designs contracts in which high-ability workers receive the lower net wage ($\tilde{\omega}_L > \tilde{\omega}_H$), the unique possible solution is the one in which (IC_H) and (PC_L) are both binding. In particular, wages can be written as:

$$\omega_L^T = \frac{1}{2}\theta e_L^2 - \gamma e_L, \tag{8}$$

$$\omega_H^T = \frac{1}{2}e_H^2 - \underbrace{\gamma\left(\frac{1}{1+\hat{\beta}_H}e_H + \frac{\hat{\beta}_H}{1+\hat{\beta}_H}e_L\right)}_{\text{envy bonus as a decrease in labour donation}} + \underbrace{\frac{1}{2}\left(\frac{\Delta\theta}{1+\hat{\beta}_H}\right)e_L^2}_{\text{info rent}}, \tag{9}$$

where the superscript T stands for 'envy at the top'. Low-ability employees receive neither an information rent nor an envy bonus. In contrast, high-ability employees must here be rewarded both for receiving the lower net wage and for truthfully revealing their private information. As under full information, the envy bonus translates in a reduction of labour donation. As for the information rent paid to the high-ability employees, it is increasing in the workers' heterogeneity, similarly to the classic adverse selection model. However, the information rent is now also decreasing in the envy parameter $\hat{\beta}_H$. This implies a 'negative spillover' of the envy bonus on the information rent: as $\hat{\beta}_H$ increases, the envy bonus increases as well (because labour donation becomes lower and lower), while the information rent decreases.

Substituting wage levels into the employer's program and computing the FOCs with respect to e_i, we obtain the optimal levels of effort illustrated in Lemma 3.

Lemma 3 (Screening with 'envy at the top')**.** *When the employer offer a screening contract*

Constraints from (PC_H) to (IC_L) are ultimately defined by the ordering of truthfully reporters' and mimickers' net compensations. In Appendix A.6 we describe the possible orderings of $\tilde{\omega}_i$ and $\tilde{\omega}'_i$, and we explain which, among them, give rise to feasible solutions.

entailing 'envy at the top', the required levels of effort are:

$$\begin{aligned} e_L^T =& \frac{(1-\lambda)(1+\hat{\beta}_H)}{\Delta\theta[1+\hat{\beta}_H(1-\lambda)]+(1+\hat{\beta}_H)(1-\lambda)} + \frac{\gamma(1+\hat{\beta}_H-\lambda)}{\Delta\theta[1+\hat{\beta}_H(1-\lambda)]+(1+\hat{\beta}_H)(1-\lambda)} < e_L^{FT}; \\ e_H^T =& 1+\frac{\gamma}{1+\hat{\beta}_H} = e_H^{FT}. \end{aligned} \tag{10}$$

High-ability workers exert the same effort as under full information, whereas 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 $\hat{\beta}_H$ has a negative impact on e_H, but its impact on e_L is positive. From the effort levels in (10) we observe that the monotonicity condition $e_H^T > e_L^T$ always holds.

From equations (8) and (9), net compensations are:

$$\tilde{\omega}_L^T = -\gamma e_L^T, \qquad \tilde{\omega}_H^T = -\gamma\left(\tfrac{1}{1+\hat{\beta}_H}e_H^T + \tfrac{\hat{\beta}_H}{1+\hat{\beta}_H}e_L^T\right) + \tfrac{1}{2}\tfrac{\Delta\theta}{1+\hat{\beta}_H}(e_L^T)^2. \tag{11}$$

Comparing labour 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 labour donations from both types of workers are lower under adverse selection. Not surprisingly, the information rent paid to high-ability employees reduces their labour donations. Moreover, in order to pay a lower information rent, the employer distorts the effort of low-ability workers downward, which also implies a reduction of labour donation from low-types.

Given that $\tilde{\omega}_L^T$ is negative, $0 > \tilde{\omega}_L^T > \tilde{\omega}_H^T$ holds, implying that both (net) labour donations are positive (see Definition 1). In particular, high-ability types' labour donation is only partially offset by their information rent and is still higher than the one of low-ability workers:

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

Rearranging the previous inequality, we obtain that the 'envy at the top' solution is feasible when the following condition is satisfied.

Condition 2. *The inequality $\tilde{\omega}_L^T > \tilde{\omega}_H^T$ holds when $\gamma(e_H^T - e_L^T) > \frac{\Delta\theta(e_L^T)^2}{2}$.*

Condition 2 states that the information rent paid to high-ability employees must be low enough to maintain $\tilde{\omega}_L^T > \tilde{\omega}_H^T$ and to let the firm take advantage of heterogeneous labour donations from the two types. In turn, the benefit from extracting a higher labour donation from high-ability employees is increasing in the relevance of the firm's mission. Substituting the effort levels into Condition 2 and solving for γ we obtain the threshold value of γ for which this solution is feasible, that we denote by $\overline{\gamma}$. Proposition 2 illustrates this result.

Proposition 2. *If $\gamma > \overline{\gamma}$, the employer offers a menu of screening contracts entailing 'envy at the top'. Contracts require the effort levels reported in Lemma 3 in exchange of the wages satisfying* *equations (8) and (9).*

The 'envy at the top' solution exists when the employer's mission γ is sufficiently high. The expression for $\overline{\gamma}$ is reported in the proof of Proposition 2 (see Section A.8).

5.2 Screening with 'envy at the bottom'

At the 'envy at the bottom' solution it must be $\tilde{\omega}_H > \tilde{\omega}_L$. We find that constraints IC_H and PC_L must be binding so that wages can be written as:

$$\omega_L^B = \frac{1}{2}\theta e_L^2 \underbrace{- \gamma\left(\frac{1}{1+\hat{\beta}_L}e_L + \frac{\hat{\beta}_L}{1+\hat{\beta}_L}e_H\right)}_{\text{increased labour donation}} + \underbrace{\frac{1}{2}\hat{\beta}_L\Delta\theta e_L^2}_{\text{envy bonus}}, \tag{12}$$

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

where the superscript B stands for solution with 'envy at the bottom'. Low-ability employees are the ones receiving the lower net wage and are thus rewarded with an envy bonus, i.e. $\frac{1}{2}\hat{\beta}_L\Delta\theta e_L^2$. As $\hat{\beta}_L$ increases so does the bonus paid to low-ability employees. However, such envy bonus is partially offset by an increase of labour donation captured by the term $\gamma\left(\frac{1}{1+\hat{\beta}_L}e_L + \frac{\hat{\beta}_L}{1+\hat{\beta}_L}e_H\right) > \gamma e_L$. High-ability employees cumulate the same envy bonus and, on top of that, they also receive their standard information rent. The envy bonus and the information rent sum up to the term $\frac{1}{2}(1+\hat{\beta}_L)\Delta\theta e_L^2$ which may partially or totally offset their labour donation γe_H.

By substituting wages (12) and (13) into the firm's program and deriving the FOCs with respect to e_i, we obtain the optimal levels of effort illustrated in Lemma 4.

Lemma 4 (Screening with 'envy at the bottom')**.** *When the employer offer a screening contract entailing 'envy at the bottom', the required levels of effort are:*

$$\begin{aligned} e_L^B =& \frac{(1-\lambda)}{(1+\hat{\beta}_L)\Delta\theta + (1-\lambda)} + \frac{\gamma(1-\lambda)}{(1+\hat{\beta}_L)[(1+\hat{\beta}_L)\Delta\theta + (1-\lambda)]} < e_L^{FT}; \\ e_H^B =& 1 + \gamma\left(\frac{\hat{\beta}_L + \lambda}{\lambda(1+\hat{\beta}_L)}\right) > e_H^{FT}. \end{aligned} \tag{14}$$

While the effort level of low-ability workers is downward distorted, high-ability employees exert a higher level of effort than under full information. The downward distortion of e_L^B is now particularly convenient because it allows the employer to reduce the envy bonus of the low-type and both the cumulated envy bonus and information rent of the high-type (see equations 12 and 13). Furthermore, the upward distortion of e_H^B allows the employer to increase labour donation from low-types and to keep labour donation from high-types as large as possible.

From equations (12) and (13), net compensations write:

$$\tilde{\omega}_L^B = -\gamma\left(\tfrac{1}{1+\hat{\beta}_L}e_L^B + \tfrac{\hat{\beta}_L}{1+\hat{\beta}_L}e_H^B\right) + \tfrac{1}{2}\hat{\beta}_L\Delta\theta(e_L^B)^2, \qquad \tilde{\omega}_H^B = -\gamma e_H^B + \tfrac{1}{2}(1+\hat{\beta}_L)\Delta\theta(e_L^B)^2. \tag{15}$$

Substituting effort levels into (15), we find that net labour donations are lower than under full information because of the 'envy bonus' 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 labour donation from low-ability types is always positive, it is possible that the total rent paid to high-ability types in equation (13) is so high that net labour donation from high-ability types becomes negative.

Condition 3. *The inequality* $\tilde{\omega}_H^B > \tilde{\omega}_L^B$ *holds when* $\gamma(e_H^B - e_L^B) < \frac{(1+\hat{\beta}_L)\Delta\theta(e_L^B)^2}{2}$.

Condition 3 states that the total rent paid to high-ability types (which contains the information rent and the 'cumulated envy bonus') must be higher than the difference in labour donations provided by the two types of workers. Comparing Condition 2 with Condition 3, we observe that at the 'envy at the bottom' solution the firm's mission is relatively unimportant and labour donations are relatively low. Substituting the expressions for the effort levels into Condition 3 and solving for γ, we obtain the threshold value of γ for which this solution is feasible, that we denote by $\underline{\gamma}$. Proposition 3 illustrates this result.

Proposition 3. *If* $\gamma < \underline{\gamma}$, *the employer offers a menu of screening contracts entailing 'envy at the bottom'. Contracts require the effort levels reported in Lemma 4 in exchange of the wages satisfying equations (12) and (13).*

The 'envy at the bottom' solution emerges when the employer's mission is not very relevant. The expression for $\underline{\gamma}$ is reported in the proof of Proposition 3 (see Section A.10).

Lemma 5 (Mutually exclusive solutions)**.** *For any* $\beta > 0$, *the 'envy at the top' and the 'envy at the bottom' solutions do not overlap.*

To prove Lemma 5, we first show that $\underline{\gamma}$ and $\overline{\gamma}$ coincide when $\beta = 0$, that also implies $\hat{\beta}_i = 0$. Then, as $\hat{\beta}_i$ is increasing in β, we compute the impact of $\hat{\beta}_i$ on the two thresholds of γ. We find that $\underline{\gamma}$ is monotonically decreasing in $\hat{\beta}_L$, whereas $\overline{\gamma}$ is monotonically increasing in $\hat{\beta}_H$. As a result, for any $\beta > 0$, the two screening solutions never overlap. The mathematical proof of this result is reported in Appendix A.11.

5.2.1 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 wage. Hence, low-ability workers accept the contract only if they are compensated with an envy bonus. The latter is set so 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:

$$\omega^P = \frac{1}{2}\theta\left(e^P\right)^2 - \gamma e^P + \underbrace{\frac{1}{2}\hat{\beta}_L\Delta\theta\left(e^P\right)^2}_{\text{envy bonus}}, \tag{16}$$

where the last term corresponds to the envy bonus 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 the optimal effort illustrated in Lemma 6.

Lemma 6 (Pooling)**.** *When the employer offers a pooling contract, which necessarily entails 'envy at the bottom', the required level of effort is:*

$$e^P = \frac{1+\gamma}{\hat{\beta}_L \Delta\theta + \theta}. \tag{17}$$

Pooling contracts are always feasible, but they are costly for the employer. This is because net labour donation from low-ability workers is zero, whereas the one from high-types is negative. Workers' utilities are such that $U_H^P > U_L^P = 0$. As an intuition, here the firm cannot benefit from the higher efforts provided by the high-ability employees. Nevertheless, the employer must pay an envy bonus to compensate low-types from exerting tasks that are more costly to them given their low productivity. In addition, the same bonus must be paid to high-types because contracts entails $\omega_H^P = \omega_L^P$. Labour donation from low-ability workers is perfectly offset by the envy bonus $\left(\tilde{\omega}_L^P = 0\right)$, while net labour donation from high-ability workers is negative $\left(\tilde{\omega}_H^P > 0\right)$.

Importantly, pooling contracts are always feasible, no matter the value of γ. The 'envy at the top' and the 'envy at the bottom' solutions are instead feasible only if Conditions 2 and 3 are respectively satisfied. In addition, the two screening solutions do not overlap for any $\beta > 0$. To derive the optimal solution for values of γ for which both screening and pooling contracts are feasible, we need to compare the organisation's payoff under the two solutions. By doing so, we obtain that profits under pooling are always dominated (see Appendix A.13). Therefore, the pooling solution is optimal only when screening solutions are not feasible. This result is illustrated in Proposition 4.

Proposition 4. *If $\underline{\gamma} \leq \gamma \leq \overline{\gamma}$, the employer offers a pooling contract that requires the effort level reported in Lemma 6 in exchange of the wage satisfying equation (16).*

The proof is based on the following steps. (i) We show that $\pi^P < \pi^T \; \forall \; \lambda, \beta, \Delta\theta$, and $\forall \gamma > \overline{\gamma}$, where π^P and π^T indicate profits in the pooling and in the 'envy at the top' solution, respectively. (ii) We show that $\pi^P < \pi^B \; \forall \; \lambda, \beta, \Delta\theta$, and $\forall \gamma < \underline{\gamma}$, where π^B indicates profits in the 'envy at the bottom' solution. (iii) Finally, we observe that when the two screening solutions are not feasible, i.e. $\underline{\gamma} \leq \gamma \leq \overline{\gamma}$, the employer offers the pooling contract as it always dominates 'envy-free' contracts (see Appendix A.14).

5.3 The prevailing solution

In the previous subsection, we have determined for which relevance of the organisation's mission each solution is optimal. In sectors where the mission is important, the 'envy at the top' solution prevails. Conversely, in sectors where the mission is less relevant, the optimal solution entails 'envy at the bottom'. When the two screening solutions are not possible, the employer offers pooling contracts. To sum up, from Propositions 2, 3 and 4, optimal solutions are:

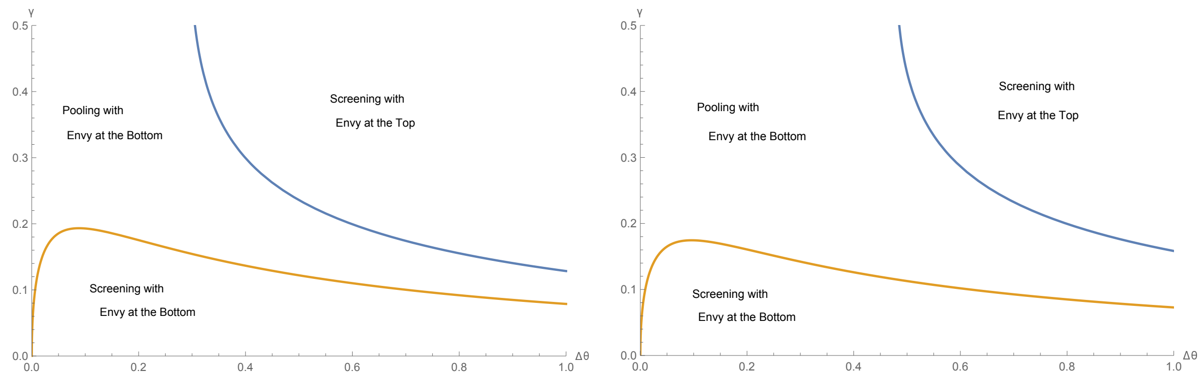
1. For $\gamma > \overline{\gamma}$, the employer offers the screening contract entailing 'envy at the top';

2. For $\gamma < \underline{\gamma}$, the employer offers the screening contract entailing 'envy at the bottom';

3. For $\underline{\gamma} \leq \gamma \leq \overline{\gamma}$, the employer offers the pooling contract.

The prevailing solutions are illustrated in Figure 2. An increase in β reduces the area in which the employer is able to implement the two screening solutions (second graph in Figure 2). This is because an increase in β has a positive impact on $\overline{\gamma}$, but a negative impact on $\underline{\gamma}$. Its effect is particularly strong in the solution with 'envy at the top'. Here, an increase in β has a negative impact on the effort exerted by the high-ability employees, and consequently on the labour donation extracted from them. Therefore, an increase in β makes offering screening contracts less profitable for the organisation. When instead $\beta = 0$, comparison costs vanish and the screening solutions with 'envy at the top' and 'envy at the bottom' coincide. Given that $\overline{\gamma} = \underline{\gamma}$ when $\beta = 0$, the pooling region disappears and the (unique) screening solution prevails, no matter the relevance of the mission and workers' heterogeneity.

Figure 2: Prevailing solution with $\lambda = 0.5$, and $\beta = 0.3$ on the left side and $\beta = 0.5$ on the right.



Shut-down policy. In our analysis, we have considered the case in which the employer offers a contract to both types of employees. However, it is worth studying whether and, in the affirmative case, under which conditions the employer finds it beneficial to exclude low-ability employees offering a contract only to high-ability ones. By excluding the low-ability employees, the employer does not pay the information rent to high-ability employees, and the envy bonus to the employees who receive a lower net wage. The down-side of this policy is that the low-ability employees are not hired and the employer cannot benefit from their production. We denote by π^{SD} the employer's benefits from excluding the low-ability workers, that is $\pi^{SD} = \frac{\lambda(1+\gamma)^2}{2}$. These benefits are increasing in both λ and γ.[15]

[15]The high-ability employees' participation constraint binds and their wage is $\omega_H = \frac{1}{2}e_H^2 - \gamma e_H$. Substituting this wage into π^{SD} and computing the FOC with respect to e_H, we obtain the contract

To study whether the employer benefits from excluding the low-ability employees, we compare π^{SD} with the employer's benefits obtained in the two screening solutions, and under pooling. When we consider the solution with envy at the top, the employer finds it beneficial to adopt a shut-down policy if λ is extremely high. As the fraction of high-ability employees increases, it becomes more costly for the employer to pay both the information rent and the envy bonus. Therefore, we find that there might exist a threshold value of λ above which the employer benefits from excluding the low-ability employees. This threshold decreases with β, γ, and θ. Similarly, we find that if λ is very high, the employer's benefits are higher with shut-down than under pooling. The threshold value of λ above which $\pi^{SD} > \pi^{P}$ is decreasing in θ and β, and does not depend on γ. When we consider the solution with envy at the bottom, the employer never benefits from the shut-down policy. With envy at the bottom, the effort of the high-ability employees is upward distorted, and an increase in the fraction λ has a positive impact on π^{B}. We find that π^{B} and π^{SD} coincide when $\lambda = 1$. As the fraction of high-ability employees decreases, both benefits go down but π^{SD} decreases faster, being always smaller than π^{B}.

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

Similarly to Desiraju and Sappington (2007), we find that both high-ability and low-ability employees can suffer from pay inequities at the optimal screening contracts. However, while in Desiraju and Sappington (2007) the output of the high-ability employees is *downward* distorted, in our setting 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 labour donation from high-ability employees without affecting the information rent and envy bonus (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 when workers have private information, eliminating all the *ex-post* inequities can be optimal in Desiraju and Sappington (2007). This difference is driven both by the presence of labour donations in our setting and by the fact that employees suffer from inequity aversion in Desiraju and Sappington (2007) (and not only from *disadvantageous* inequity aversion as in our model), implying that *all* workers must be compensated with a bonus 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

offered to high-ability employees when the employer adopts a shut-down policy:

$$e_H^{SD} = 1 + \gamma; \quad \omega_H^{SD} = \frac{1}{2}(1 - \gamma^2).$$

This contract requires high-ability employees to exert the efficient level of effort.

thus be compensated with an envy bonus. In addition, as in standard screening models, the effort of low-ability types is optimally distorted downward. This downward distortion also emerges in our model both at the 'envy at the top' and at the 'envy at the bottom' solution and is even exacerbated. To understand why, take for example the 'envy at the bottom' solution and consider again expressions (12) and (13). Since the information rent and the two envy bonuses 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.

Our model also predicts that when neither screening with 'envy at the top' nor screening with 'envy at the bottom' is a feasible solution, a pooling contract is implemented. Since low-ability workers have larger effort costs, a pooling contract necessarily implies 'envy at the bottom' and requires that both types of workers receive the envy bonus. This contrasts with the before mentioned literature on fairness concerns where screening is always possible. The fact that the organisation must rely on a pooling contract for intermediate values of the relevance of the mission offers some interesting policy implications. It suggests that wage compression can be the unique option in some instances, and that wage compression alone does not eliminate comparison costs.

6 Alternative specification of the envy term

In this section, we consider an alternative specification of the employees' envy term that does not depend on the workers' ability, but only on the terms appearing in the contracts, namely on ω_i and e_i, with $i = L, H$.[16] Specifically, employees now compare the wage net of (a share of) the required effort: $\tilde{\omega}_i = \omega_i - ke_i$, where $k \in [0, 1]$ represents the weight workers attach to the effort when making social comparisons. When $k = 0$ envy solely depends on wages, whereas the cases with $k \in (0, 1]$ indicate situations in which workers perceive wages as weakly more relevant than effort. Interpreting e_i as the number of hours of work required by the contract, with this specification workers compare wages net of the working time (for example full-time versus part-time) irrespective of how demanding this working time is for the employee, which in turn would depend on their ability.

We derive optimal contracts under this specification in the appendix, while we report the main results of the analysis below. Proposition 5 illustrates the different solutions obtained under this alternative specification of the envy term when there is asymmetric information on ability. The solution with 'envy at the top' is denoted with $\check{\omega}_i^T$ and $\check{e}_i^T$, whereas the solution with 'envy at the bottom' is $\check{\omega}_i^B$ and $\check{e}_i^B$, $i = L, H$. Similarly to our baseline model, which solution prevails depends on the relevance of the organisation's mission.

Proposition 5 (Envy without ability under screening)**.** *When the employer does not observe the employees' ability and envy does not depend on ability, three solutions exist:*

1. *For $\gamma > \frac{1}{2}(\check{e}_H^T + \check{e}_L^T) - k \equiv \check{\gamma}^T$, the employer offers screening contracts entailing 'envy at the top';*

[16] We would like to thank an anonymous referee for making this suggestion.

2. *For $\gamma < \frac{1}{2}(\check{e}_H^B + \check{e}_L^B) - k \equiv \check{\gamma}^B$, the employer offers screening contracts entailing 'envy at the bottom';*

3. *For $\check{\gamma}^B \leq \gamma \leq \check{\gamma}^T$, the employer offers a pooling contract that is also 'envy free'.*

Proposition 5 highlights that our chief results are robust to considering an alternative specification of the employees' envy term that does not depend on the parameter θ_i. In the appendix, we report the levels of effort in the three solutions. Substituting them in the previous inequalities, we obtain the two threshold values of γ as functions of the exogenous parameters. The 'envy at the top' solution prevails in sectors where mission is important. In contrast, in sectors where mission is less relevant, the optimal solution entails 'envy at the bottom'. Finally, when the two screening solutions are not feasible, the employer offers pooling contracts.

Akin to our baseline, an increase in β makes offering screening contracts less profitable for the organisation, reducing the areas for which we have the two screening solutions. Mathematically, $\check{\gamma}^T$ is increasing in β, while $\check{\gamma}^B$ is decreasing in β, implying that these solutions do not overlap. When instead $\beta = 0$, comparison costs vanish and the screening solutions with 'envy at the top' and 'envy at the bottom' coincide. Specifically, when $\beta = 0$, $\check{\gamma}^T \equiv \check{\gamma}^B$ holds, the pooling region disappears and the (unique) screening solution prevails, no matter the relevance of the mission γ. Interestingly, the pooling solution is 'envy free' under this specification. Indeed, given that productivity does not enter the envy term, when the same contract is offered to the two workers' types, net salaries are identical and the envy term disappears. The pooling solution is always possible, but dominated by the two screening solutions.

It is possible to note that the conditions on the relevance of the mission γ for which these solutions are feasible now also depend on the new parameter k. An increase in k makes the solution with 'envy at the top' more likely. Interestingly, we find that if $k = 1$ the effort levels in the solution with 'envy at the top' are such that the first inequality in Proposition 5 always holds. As a result, there would be a unique screening solution that entails 'envy at the top'.

7 Testable predictions and empirical evidence

Our theoretical model shows that, irrespective of the relevance of the mission, under adverse selection the most talented workers exert more effort and receive a higher wage. More importantly, it shows that, in sectors where the mission is highly relevant, high-ability workers suffer a disutility loss due to envy. Hence, the model delivers two main testable predictions:

1. High-ability employees will receive a higher wage and work for a larger amount of hours than their low-ability colleagues;

2. In organisations where mission is important, high-ability employees will perceive their wage as less fair than low-ability employees.

In this section, we present two pieces of evidence that are consistent with our theoretical analysis. One is based on the well-established German Socio-Economic Panel data (GSOEP), a representative panel study of the resident population in Germany. The other is an anonymous survey we conceived that was sent to scholars in the departments of Economics and Business of some of the leading public universities in Spain. The academic workplace is a suitable environment to test our theoretical predictions as public universities have the double mission of producing and spreading new knowledge through academic research and transmitting such knowledge to students. In addition, quantitative measures of scholars' productivity exist.

While the details of the two surveys are presented in Appendix B, in what follows we describe the key variables of the analysis, the main tests that we run, and results that we obtain.

The German Socio-Economic Panel data. The 2005 wave of the German Socio-Economic Panel data (GSOEP) contains questions on workers' fairness considerations and reliable proxies for workers ability. In particular, there is the following question on fairness: *Is the income that you earn at your current job fair, from your point of view?* We create a dummy variable called Fairness that takes value 1 if employees answer yes to the previous question, and 0 otherwise. This will be our dependent variable. To identify those sectors in which the organisation's mission plays a prominent role, we follow Besley and Ghatak (2005) who define mission-oriented organisations as those firms providing collective goods as education, health care, and defence. The GSOEP data provide information on employees who work in these sectors considering both public and private firms.[17]

In total 9,144 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 the regressions, we control for gender, age, education, sectors, occupations, firms' size, type of contract (short- or long-term), and whether employees are white or blue collar.[18]

We first consider Prediction 1 studying the impact of ability on income and working hours. We use the number of working hours as a proxy for the observable and contractible effort level. The OLS estimating equations can be written as:

$$\begin{aligned}\text{Log Income} =& \alpha_0 + \alpha_1(\text{ability}) + \varepsilon;\\ \text{Log Working Hours} =& \gamma_0 + \gamma_1(\text{ability}) + \hat{\varepsilon},\end{aligned}$$

where α_0 and γ_0 are the intercepts, α_1 and γ_1 are the coefficients of ability, and ε and $\hat{\varepsilon}$ are the error terms. We find that irrespective of the sectors that we analyse, high-ability employees receive a higher wage and work more hours than low-ability employees. In particular, we find that, for a one unit increase in the scale of productivity, the gross income increases by 4 percent, while the amount of working hours increases by 1.9 percent. We follow the same analysis for mission-oriented organisations and we find similar results: for a one unit increase in the scale of productivity, the gross income increases by 6 percent, while the amount of working hours

[17]The data also include a wide range of information on individual and household characteristics, like employment, education, earnings, and personal attitudes. Detailed information about the GSOEP can be found at http://www.diw.de/en/soep.

[18]See Table 7 in the appendix for more details on the independent variables of our analysis.

increases by 2.8 percent. Table 1 illustrates these results.

Table 1: Prediction 1. The variable Log Income measures the gross labour income during the month prior to the interview, while the variable Log Working Hours measures the number of hours per week in the contract. The table reports the OLS coefficients.

	Entire Sample		Mission-oriented organisations	
	Log Income (1)	Log Working Hours (2)	Log Income (3)	Log Working Hours (4)
Ability	0.04***	0.019***	0.06***	0.028***
	(0.008)	(0.005)	(0.015)	(0.010)
Controls	Yes	Yes	Yes	Yes
Constant	6.09***	5.67***	6.21***	5.59***
	(0.113)	(0.066)	(0.14)	(0.093)
N	9,144	9,144	2,723	2,723
R^2	0.46	0.21	0.44	0.17

*** Denotes significance at the 1 percent level, ** at the 5 percent level, and * at the 10 percent level.
We consider all the controls.
Standard errors are reported in parentheses and clustered at the occupation level.

To test Prediction 2, we analyse whether more talented employees in mission-oriented organisations tend to find their income as less fair than their less talented colleagues. To do that, we consider the interaction effect between ability and mission-oriented organisations. The OLS estimating equation can be written as:

$$\text{Fairness} = \beta_0 + \beta_1(\text{ability}) + \beta_2(\text{MO organisation}) + \beta_3(\text{ability*MO organisation}) + \epsilon,$$

where β_0 is the intercept, β_1 is the coefficient of ability, β_2 is the coefficient of the MO organisation, β_3 is the coefficient of the interaction term between these two independent variables, and ϵ is the error term. In Table 2 we report the coefficients of the OLS regressions. However, since our dependent variable Fairness is a dummy that takes value 0 or 1, we also use the Logit model.[19] In Table 2 we report the coefficients and odds ratio of the Logit model. While Columns 1, 2 and 3 only consider ability and only control for the employees' occupation and firms' size, Columns 4, 5 and 6 consider all the independent variables. Table 2 shows that, when both high- and low-ability employees are considered, workers in mission-oriented organisations consider their income as more fair than workers in other organisations. However, this effect is less pronounced for high-ability workers, as the coefficients of the interaction effect between ability and mission-oriented organisations have the negative sign. These coefficients are statistically significant at the 1 percent level, supporting our theoretical results.[20] To provide an interpretation of the

[19] Similar results are obtained with a Probit model and are available upon request.

[20] An alternative procedure to test Prediction 2 is to only consider mission-oriented organisations and

magnitude of the effects, we report the odds ratio of the Logit model (Columns 3 and 6). We find that for a one unit increase in the scale of ability when employees work in mission-oriented organisations, the odds of fair income versus no fair income are 0.83 times lower, given all the other variables constant.[21]

We conclude by acknowledging the limitations of the GSOEP data to test our theory. Specifically, workers' productivity is self-assessed and, more importantly, the question on fairness is very general and workers may interpret it in a way that is not in line with our theoretical model.[22] Yet, the analysis indicates that our theoretical predictions are not rejected by the GSOEP data.

study the impact of ability on fairness. The results are qualitatively the same and Prediction 2 is confirmed.

[21] Table 2 also shows that temporary workers are more likely to perceive their wage as unfair than permanent workers. Furthermore, education impacts negatively on the perceived fairness, while age has a positive but small impact on it.

[22] In particular, looking at the question on fairness, it is not clear whether the comparison is about colleagues in the same unit/firm or about workers in other firms or sectors.

Table 2: Prediction 2. The table reports the OLS coefficients, and the coefficients and odds ratio of the Logit model. While Columns 1, 2 and 3 only consider our measure of ability and control for the employees' occupation, Columns 4, 5 and 6 consider all the independent variables.

	Dependent Variable: Fairness					
	(1) OLS	(2) Logit	(3) Odds Ratio	(4) OLS	(5) Logit	(6) Odds Ratio
Ability	-0.002	-0.009	0.99	-0.007	-0-348	0.97
	(0.008)	(0.037)	(0.807)	(0.001)	(0.037)	(0.036)
MO organisations	0.228***	1.08***	2.94***	0.26***	1.21***	3.36***
	(0.077)	(0.36)	(1,06)	(0.096)	(0.439)	(1.48)
Interaction Effect	-0.039***	-0.18***	0.83***	-0.038***	-0.18***	0.83***
Ability*MO organisations	(0.014)	(0.065)	(0.054)	(0.014)	(0.065)	(0.054)
Age				0.001***	0.006***	1.006***
				(0.000)	(0.002)	(0.002)
Education				-0.05***	-0.27***	0.76***
				(0.016)	(0.078)	(0.056)
Male				0.002	0.011	1.012
				(0.013)	(0.064)	(0.065)
White collar				0.002	0.013	1.01
				(0.017)	(0.08)	(0.08)
Short-term contract				-0.11***	-0.49***	0.61***
				(0.033)	(0.138)	(0.084)
Firm's Size	Yes	Yes	Yes	Yes	Yes	Yes
Sector	Yes	Yes	Yes	Yes	Yes	Yes
Occupation	Yes	Yes	Yes	Yes	Yes	Yes
Constant	0.68***	0.77***	2.16***	0.76***	1.31***	3.72***
	(0.048)	(0.22)	(0.047)	(0.075)	(0.336)	(1.25)
N	9,144	9,144	9,144	9,144	9,144	9,144
R^2	0.0014			0.0355		
Pseudo R^2		0.0011	0.0011		0.029	0.029

*** Denotes significance at the 1 percent level, ** at the 5 percent level, and * at the 10 percent level.

Standard errors are reported in parentheses and are clustered at the occupation level.

Survey in the Academic Workplace. One of our motivating examples refers to the academic workplace (see Footnote 1). More talented academics may be burdened with more difficult tasks and it is possible that they thus perceive the allocation of teaching and administrative duties in their department as unfair. Academics who receive more demanding tasks can feel demotivated and exploited by their departments if they believe that their work dedication is always higher than that of their colleagues. As we believe that the academic workplace is the perfect environment to test our two key predictions, we created a survey that was sent to all 735 scholars affiliated with the departments of Economics and Business of a selected group of leading public universities in Spain.[23] The scholars were contacted via their institutional e-mails and asked to respond to an anonymous survey on job attitude and satisfaction in the academic workplace. Overall, 188 scholars took the Survey (the 25.6%), and 156 scholars (the 21.2%) responded to all the relevant questions. The response rate is relatively high and comparable to the response rate in many other nongovernmental surveys.[24]

The survey includes socio-demographic questions (like gender and age), as well as work-related questions, that allow us to measure the length of tenure, job position, and scholars' productivity. The respondents were asked to report how many papers they had published in international peer-reviewed journals in the last five years. We use the answer to this question as the chief measure of scholars' productivity.[25] Importantly, our survey asked respondents to what degree they personally agreed with the following statement.

- Considering the time and resources I personally dedicate to teaching, research, and administrative duties, I regard what I earn as fair compared to what my colleagues in my department or section earn.

Respondents could choose one of the following answers: (i) Strongly agree; (ii) Agree; (iii) Neither agree nor disagree; (iv) Disagree; (v) Strongly disagree. If scholars responded Disagree or Strongly disagree to this question, they were also asked to answer to a follow-up question to specify the reason why they disagreed to the previous statement. In particular, they had to specify whether they earned too much or too little compared to what their colleagues earn considering the time and effort dedicated to teaching, research, and administrative duties, or whether they had other reasons to disagree that must be specified. Almost the 30% of scholars (46 over 156) do not consider what they earn as fair compared to what their colleagues in the department earn given their dedication on teaching, research, and administrative duties. Of these 46 scholars, 23.72% (37 over 156) believe they earn too little as compared to their colleagues in the department. We use the answers to these questions to measure envy. In particular, we

[23] The list of universities is provided in the appendix.

[24] Card et al. (2012) investigate the effect of disclosing information on peers' salaries on workers' job satisfaction. To do so, they also created a survey that was sent to employees at three campuses of the University of California, getting over the 20 percent of responses. Unfortunately, we could not make use of their dataset as it contains no information on employees' productivity.

[25] Other studies use the number of publications as a proxy for scholars' productivity, e.g., Way et al. (2019). In our survey, there are also other possible measures of productivity, e.g., the quality of publication and the number of grants received in the past five years, that turn out to be strongly correlated with the number of recently published papers. Details of the survey are provided in the appendix.

create a dummy (*UnfairWage*) that takes value 1 if respondents believe that they earn too little as compared to their colleagues in the department given the effort exerted in teaching, research, and administrative duties. This variable is meant to capture the essence of our envy term in the model.

We also asked respondents to what degree they personally agree to the following two statements concerning the fairness of the allocation of their administrative duties and teaching workload.

- Considering my personal administrative workload and that of my colleagues, I regard the allocation of administrative duties in my department or section as fair.
- Considering my personal teaching workload and that of my colleagues, I regard the allocation of teaching duties in my department or section as fair.

We create two additional dummies that measure the scholars' unfairness perception regarding the allocation of administrative duties (*UnfairAD*) and teaching workload (*UnfairT*). UnfairAD takes value 1 if respondents believe that their administrative workload is excessive as compared to that of their colleagues in the department, and 0 otherwise; UnfairT takes value 1 if respondents believe that their teaching workload is excessive as compared to that of their colleagues in the department, and 0 otherwise.[26]

In all the regressions, we control for gender, age, and type of position (i.e., whether the position is permanent or not). Being strongly correlated with age, tenure is not included as a control variable. Specifically, the correlation coefficient between tenure and age is 0.79. Standard errors are clustered at the university level.

We first consider Prediction 1 studying the impact of ability on working hours and net income.[27] The results are illustrated in Table 3. We find that scholars who publish more papers work more hours and receive a higher wage. In particular, we find that, for a one unit increase in the scale of productivity, the net income increases by 24 percent, while the amount of working hours increases by 16 percent. Both effects are statistically significant. To test Prediction 2, we analyse whether more productive scholars are more likely to report unfair situations than their less productive colleagues. To do so, we use Logit models where our dependent variables are the three measures of unfairness. In Table 4, we report the coefficients and odds ratio of the Logit model. We find that high-ability scholars believe that their administrative and teaching workload is excessive, and that they earn too little as compared to their colleagues in the department, as the signs of these coefficients are all positive. The coefficient of UnfairAD is statistically significant at the 10 percent level, whereas the coefficient of UnfairWage is significant at the 1 percent level. To provide an interpretation of the magnitude of the effects, we report the odds ratio of the Logit model (Columns 4 and 6). We find that for a one unit increase in the scale of ability, the odds of no fair administrative duties versus fair administrative duties (no fair

[26]The distribution of answers are reported in the appendix.

[27]The OLS estimating equations are similar to those provided to test Prediction 1 using the German Socio-Economic Panel data. In our survey, the respondents use predetermined ranges to answer the questions on working hours and net income. This is why we do not need the log of these variables.

Table 3: Prediction 1. The variable Income measures the net income during the last month, while the variable Working Hours measures the number of hours scholars report to work on average per week. The table reports the OLS coefficients.

	Working hours	Income
Productivity	0.16**	0.24***
	(0.07)	(0.05)
Male	0.47**	0.53**
	(0.14)	(0.19)
Age	−0.17*	0.16
	(0.08)	(0.17)
Permanent	0.39	1.49***
	(0.29)	(0.11)
Constant	2.88***	0.95**
	(0.38)	(0.34)
N	156	156
R^2	0.17	0.52

*** Denotes significance at the 1 percent level, ** at the 5 percent level,
and * at the 10 percent level.
Standard errors are reported in parentheses and are clustered at the university level.

overall versus fair overall) are 1.18 (1.23) times higher, given all the other variables constant. In line with our theoretical results, we find that, in public universities (that can be considered as mission-oriented organisations), academics that are more active in research are also more involved in administrative and teaching duties, and perceive their salary net of effort as unfair more often than their less-productive colleagues.

8 Concluding remarks

Despite receiving higher monetary compensations than their less talented colleagues, productive workers may 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 productive colleagues. Our suggestive evidence indicates that this may the case in those sectors where mission is relevant.

Our theoretical model offers a possible explanation for this phenomenon which is based on the interplay between employees' fairness concern and labour donation. Our analysis suggests that the ability of a mission-oriented organisation to extract labour donation from her most productive employees is undermined by workers' fairness concerns. This is particularly true when the workers' ability is not observable so that screening contracts must be designed. In her

Table 4: Prediction 2. The table reports the Logit coefficients (Columns 1, 2, and 3) and the odds ratio (Columns 4, 5, and 6).

	UnfairAD (1)	UnfairT (2)	UnfairWage (3)	UnfairAD (4)	UnfairT (5)	UnfairWage (6)
Productivity	0.16*	0.09	0.21***	1.18*	1.09	1.23***
	(0.09)	(0.11)	(0.07)	(0.11)	(0.12)	(0.09)
Male	0.24	-0.09	-0.74	1.27	0.92	0.48
	(0.35)	(0.50)	(0.52)	(0.44)	(0.46)	(0.25)
Age	-0.11	-0.11	-0.23	0.89	0.89	0.79
	(0.13)	(0.24)	(0.22)	(0.11)	(0.22)	(0.17)
Permanent	0.93	-0.09	-0.75	2.53	0.91	0.47
	(0.68)	(0.63)	(0.77)	(1.72)	(0.57)	(0.23)
Constant	−2.51***	−2.03***	−0.62	0.08***	0.13***	0.54
	(0.36)	(0.56)	(0.77)	(0.03)	(0.07)	(0.42)
N	156	156	156	156	156	156
Pseudo R^2	0.05	0.01	0.09	0.05	0.01	0.09

*** Denotes significance at the 1% level, ** at the 5% level, * at the 10% level.
Standard errors are reported in parentheses and are clustered at the university level.

attempt to extract labour donation from the most talented workers, the employer is constrained by the envy bonus 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 shaped by the relevance of the organisation's mission.

The difficult trade-off between addressing workers' fairness concerns and rewarding the most talented employees has been investigated before in the case of standard firms. Our paper complements previous works by analysing the issue from the perspective of a mission-oriented organisation willing to extract labour donations from high-performing employees. Our model shows that the most talented employees suffer some disutility loss because of envy in organisations whose mission is important. In addition, it predicts that envy limits the employer's ability to screen workers. Specifically, the employer must rely on pooling contracts whenever the relevance of the mission is neither high nor low. In different words, envy reduces both the employer's power to extract labour donation and to separate workers with different abilities. von Siemens (2011) has already shown that firms can use both contractual and organisational measures to reduce social comparison costs. In particular, the organisation could increase attention towards her 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, 2019, for models investigating recognition and delegation, respectively). Or the organisation could move from spot towards relational using homogeneous formal contract terms to eliminate social comparison, while relying on informal private agreements to optimally differentiate among employees (Contreras and Zanarone, 2017). In our setting, wage compression is not enough to eliminate envy because pooling contracts entail 'envy at the bottom', while 'envy free' contracts require equal *net* wages and are always a dominated strategy for the employer. More generally, the model shows that, in the absence of informal private agreements, separating contracts always dominate both pooling and 'envy-free' contracts. Thus, explicitly rewarding workers' talent remains the firm's best practice, whenever it is feasible, even if it implies some social comparison costs.

To make our theoretical analysis tractable, in our model we have assumed that employees' intrinsic motivation is uniform across all workers who only differ with respect to their ability. If employees were heterogeneous in their intrinsic motivation too, the employer would screen fairness-concerned workers with respect to both ability and motivation. This setting would be closer to the one developed by Barigozzi and Burani (2016) in which the authors study bidimensional screening of workers differing in both ability and motivation, but they do not consider workers' fairness concerns. Because of the failure of the single-crossing condition, in Barigozzi and Burani (2016) a multiplicity of equilibria exist. Specifically, different types of fully separating contracts coexist with different types of semipooling, pooling contracts and contracts with exclusion. Adding workers' fairness concerns would dramatically increase the cases to study. In particular, we expect similar types of equilibria to emerge with the additional distinction between 'envy at the top' and 'envy at the bottom' solutions. This obviously exacerbates the problem of multiplicity of equilibria, making predictions and policy implications extremely difficult to derive.

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A Appendix

A.1 Full information with mission but no fairness concerns

We consider the case in which $\gamma > 0$, while $\beta = 0$. 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:

$$e_L = \frac{1+\gamma}{\theta}, \quad \omega_L = \frac{1-\gamma^2}{2\theta}; \qquad e_H = 1+\gamma, \quad \omega_H = \frac{1-\gamma^2}{2}. \tag{A1}$$

Given that fairness concerns have no bite here, the unique solution entails $\tilde{\omega}_L > \tilde{\omega}_H$. Specifically, net compensations are:

$$\tilde{\omega}_H = -\gamma e_H \quad \text{and} \quad \tilde{\omega}_L = -\gamma e_L, \tag{A2}$$

so that the difference between labour donations is the highest as possible.

Notice that the assumption $0 \leq \gamma \leq 1$ implies that labour 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 $\tilde{\omega}_H = \tilde{\omega}_L = 0$ and no worker suffers from envy. Optimal contracts are:

$$e_L = \frac{1}{\theta}, \quad \omega_L = \frac{1}{2\theta}; \qquad e_H = 1, \quad \omega_H = \frac{1}{2}. \tag{A3}$$

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 labour donation. □

A.3 Proof of Lemma 1

We first show that the solution in which $\tilde{\omega}_H > \tilde{\omega}_L$ is not possible under full information. When $\tilde{\omega}_H > \tilde{\omega}_L$, workers' utilities are:

$$\begin{aligned} U_H &= \omega_H - \tfrac{1}{2}e_H^2 + \gamma e_H, \\ U_L &= \omega_L - \tfrac{1}{2}\theta e_L^2 + \gamma e_L - \hat{\beta}_L(\tilde{\omega}_H - \tilde{\omega}_L). \end{aligned}$$

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

$$\begin{aligned} \omega_H &= \tfrac{1}{2}e_H^2 - \gamma e_H, \\ \omega_L &= \tfrac{1}{2}\theta e_L^2 - \gamma e_L + \hat{\beta}_L(\tilde{\omega}_H - \tilde{\omega}_L). \end{aligned}$$

Substituting $\tilde{\omega}_L$ and $\tilde{\omega}_H$ in ω_L and rearranging:

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

So that

$$\tilde{\omega}_H = -\gamma e_H \quad \text{and} \quad \tilde{\omega}_L = -\gamma\left(\tfrac{1}{1+\hat{\beta}_L}e_L + \tfrac{\hat{\beta}_L}{1+\hat{\beta}_L}e_H\right).$$

Hence, $\tilde{\omega}_H > \tilde{\omega}_L$ requires $-\gamma e_H > -\gamma\left(\tfrac{1}{1+\hat{\beta}_L}e_L + \tfrac{\hat{\beta}_L}{1+\hat{\beta}_L}e_H\right)$, which can be rewritten as $e_L > e_H$. The previous inequality will be verified ex-post. Substituting the wages into the principal's maximisation problem we obtain:

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

First order conditions with respect to effort levels are:

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

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 $\tilde{\omega}_H > \tilde{\omega}_L$.

Suppose now that $\tilde{\omega}_H < \tilde{\omega}_L$. Workers' utilities are:

$$\begin{aligned} U_H &= \omega_H - \tfrac{1}{2}e_H^2 + \gamma e_H - \hat{\beta}_H(\tilde{\omega}_L - \tilde{\omega}_H), \\ U_L &= \omega_L - \tfrac{1}{2}\theta e_L^2 + \gamma e_L. \end{aligned}$$

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

$$\begin{aligned} \omega_L &= \frac{1}{2}\theta e_L^2 - \gamma e_L, \\ \omega_H &= \frac{1}{2}e_H^2 - \gamma e_H + \hat{\beta}_H(\tilde{\omega}_L - \tilde{\omega}_H). \end{aligned} \tag{A4}$$

Net compensations for the two types of agents are:

$$\tilde{\omega}_L = -\gamma e_L \quad \text{and} \quad \tilde{\omega}_H = -\gamma\left(\frac{1}{1+\hat{\beta}_H}e_H + \frac{\hat{\beta}_H}{1+\hat{\beta}_H}e_L\right).$$

From the previous expressions, one can easily check that $\tilde{\omega}_H < \tilde{\omega}_L < 0$ if and only if $e_H > e_L$, that we will verify ex-post. Substituting the expressions for $\tilde{\omega}_L$ and $\tilde{\omega}_H$, we get the wages:

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

We can now substitute the wages into the principal's payoff:

$$\pi = \lambda\left[e_H - \frac{1}{2}e_H^2 + \gamma\left(\frac{1}{1+\hat{\beta}_H}e_H + \frac{\hat{\beta}_H}{1+\hat{\beta}_H}e_L\right)\right] + (1-\lambda)\left[e_L - \frac{1}{2}\theta e_L^2 + \gamma e_L\right]. \tag{A5}$$

First order conditions with respect to the effort levels are:

$$\begin{aligned} \frac{\partial\pi}{\partial e_L} :& \lambda\left[\frac{\hat{\beta}_H}{1+\hat{\beta}_H}\gamma\right] + (1-\lambda)\left[1-\theta e_L+\gamma\right] = 0 \;\Leftrightarrow\; e_L^{FT} = \frac{1}{\theta} + \frac{\gamma}{\theta}\left[1+\left(\frac{\lambda}{1-\lambda}\right)\left(\frac{\hat{\beta}_H}{1+\hat{\beta}_H}\right)\right]; \\ \frac{\partial\pi}{\partial e_H} :& \lambda\left[1-e_H+\frac{\gamma}{1+\hat{\beta}_H}\right] = 0 \;\Leftrightarrow\; e_H^{FT} = 1 + \frac{\gamma}{1+\hat{\beta}_H}. \end{aligned}$$

Substituting the optimal effort levels into $\tilde{\omega}_L$ and $\tilde{\omega}_H$, we find that the inequality $\tilde{\omega}_L > \tilde{\omega}_H$ is satisfied if $\gamma < \frac{\Delta\theta(1-\lambda)\left(1+\hat{\beta}_H\right)}{\hat{\beta}_H - \Delta\theta(1-\lambda)}$ (Condition 1). We can finally compute optimal wages and the principal's payoff by substituting e_L^{FT} and e_H^{FT} into equations (A4) and (A5). It can be either $w_L^{FT} < w_H^{FT}$ or the opposite. □

A.4 Proof of Lemma 2

When Condition 1 is not satisfied, the firm optimally sets $e_H = e_L = e$ so that $\tilde{\omega}_L = \tilde{\omega}_H$. Then, the wages are:

$$\omega_L = \tfrac{1}{2}\theta e^2 - \gamma e \quad \text{and} \quad \omega_H = \tfrac{1}{2}e^2 - \gamma e, \quad \text{with } \omega_H < \omega_L. \tag{A6}$$

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

$$\pi = \lambda\left[e - \frac{1}{2}e^2 + \gamma e\right] + (1-\lambda)\left[e - \frac{1}{2}\theta e^2 + \gamma e\right]. \tag{A7}$$

First order conditions with respect to the effort levels are:

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

We can finally compute optimal wages and the principal's payoff by substituting e^{FF} into equations (A6) and (A7). □

A.5 Proof of Proposition 1

The proof of Proposition 1 follows directly from Lemma 1 and Lemma 2. □

A.6 Feasible solutions with screening

Depending on the ordering of net compensations of truthfully reporters and mimickers, we can distinguish between 6 different cases (see Table 5) which, in turn, generate three classes of solutions. In particular, from Case 1 one derives the class of solutions in which $\tilde{\omega}_L > \tilde{\omega}_H$, from Cases 1 and 6 one derives the class of solutions in which $\tilde{\omega}_L = \tilde{\omega}_H$, finally, from Case 2 to 6 one derives the class of solutions in which $\tilde{\omega}_L < \tilde{\omega}_H$. 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 5, depending on the binding constraints. Even if the number of solutions is potentially large, only four different types of solutions turn out to be feasible.

Table 5: Depending on the ordering of net compensations of truthfully reporters and mimickers, we can distinguish between 6 different cases.

Cases	Conditions
Case 1	$\tilde{\omega}'_L > \tilde{\omega}_L \geq \tilde{\omega}_H > \tilde{\omega}'_H$
Case 2	$\tilde{\omega}_H > \tilde{\omega}'_H \geq \tilde{\omega}'_L > \tilde{\omega}_L$
Case 3	$\tilde{\omega}_H > \tilde{\omega}'_L > \tilde{\omega}'_H > \tilde{\omega}_L$
Case 4	$\tilde{\omega}'_L > \tilde{\omega}_H > \tilde{\omega}'_H > \tilde{\omega}_L$
Case 5	$\tilde{\omega}_H > \tilde{\omega}'_L > \tilde{\omega}_L > \tilde{\omega}'_H$
Case 6	$\tilde{\omega}'_L > \tilde{\omega}_H \geq \tilde{\omega}_L > \tilde{\omega}'_H$

Specifically, one can show that, in Case 1, only two solutions are possible: (i) the one such that $\tilde{\omega}_L > \tilde{\omega}_H$ with binding constraints IC_H and PC_L (presented in Subsection 5.1 in the main text) and (ii) the solution such that $\tilde{\omega}_L = \tilde{\omega}_H$ with binding constraint IC_H (presented in Subsection A.14). Cases 2 and 3 turn out to be equivalent, the only possible solution here entails $\tilde{\omega}_L < \tilde{\omega}_H$ with binding constraints IC_H and PC_L (this solution is presented in Subsection 5.2). Finally, one can show that all 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 presented in Subsection 5.2.1.

A.7 Proof of Lemma 3

Let us consider Case 1 of Table 5: $\tilde{\omega}'_L > \tilde{\omega}_L > \tilde{\omega}_H > \tilde{\omega}'_H$. We can rewrite the participation and incentive constraints in the following way:

$$\begin{aligned}
&\omega_L - \frac{\theta}{2}e_L^2 + \gamma e_L \geq 0, \\
&\omega_H - \frac{1}{2}e_H^2 + \gamma e_H - \hat{\beta}_H(\tilde{\omega}_L - \tilde{\omega}_H) \geq 0, \\
&\omega_L - \frac{\theta}{2}e_L^2 + \gamma e_L \geq \omega_H - \frac{\theta}{2}e_H^2 + \gamma e_H - \hat{\beta}_H(\tilde{\omega}_L - \tilde{\omega}'_H), \\
&\omega_H - \frac{1}{2}e_H^2 + \gamma e_H - \hat{\beta}_H(\tilde{\omega}_L - \tilde{\omega}_H) \geq \omega_L - \frac{1}{2}e_L^2 + \gamma e_L.
\end{aligned}$$

We derive the monotonicity condition by adding (IC_L) and (IC_H):

$$-\frac{\theta}{2}e_L^2 + \gamma e_L - \frac{1}{2}e_H^2 + \gamma e_H - \hat{\beta}_H(\tilde{\omega}_L - \tilde{\omega}_H) \geq -\frac{\theta}{2}e_H^2 + \gamma e_H - \hat{\beta}_H(\tilde{\omega}_L - \tilde{\omega}'_H) - \frac{1}{2}e_L^2 + \gamma e_L,$$

which can be rewritten as:

$$e_H \geq \frac{e_L}{\sqrt{1 + \hat{\beta}_H}}, \tag{A8}$$

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

$$\omega_H - \frac{1}{2}e_H^2 + \gamma e_H - \hat{\beta}_H(\tilde{\omega}_L - \tilde{\omega}_H) = \frac{1}{2}\theta e_L^2 - \gamma e_L - \frac{1}{2}e_L^2 + \gamma e_L,$$

which also implies that $U_H = \frac{1}{2}\Delta\theta e_L^2$. Therefore, PC_H is satisfied. We can now rewrite IC_L as:

$$\begin{aligned}
\omega_L &\geq \frac{1}{2}\theta e_L^2 - \gamma e_L + \frac{1}{2}e_H^2 - \gamma e_H + \hat{\beta}_H(\tilde{\omega}_L - \tilde{\omega}_H) + \frac{1}{2}\Delta\theta e_L^2 - \frac{1}{2}\theta e_H^2 + \gamma e_H - \hat{\beta}_H(\tilde{\omega}_L - \tilde{\omega}_H) \\
\omega_L &\geq \frac{1}{2}\theta e_L^2 - \gamma e_L - \frac{1}{2}\Delta\theta[e_H^2(1 + \hat{\beta}_H) - e_L^2] \\
U_L &\geq -\frac{1}{2}\Delta\theta[e_H^2(1 + \hat{\beta}_H) - e_L^2].
\end{aligned}$$

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, wages are:

$$\begin{aligned}
\omega_L^T &= \frac{1}{2}\theta e_L^2 - \gamma e_L, \\
\omega_H^T &= \frac{1}{2}e_H^2 - \gamma\left(\frac{1}{1 + \hat{\beta}_H}e_H + \frac{\hat{\beta}_H}{1 + \hat{\beta}_H}e_L\right) + \frac{1}{2}\frac{\Delta\theta}{1 + \hat{\beta}_H}e_L^2.
\end{aligned} \tag{A9}$$

Substituting wages into the employer's profits, we get:

$$\begin{aligned}\pi^T = \;& \lambda\left[e_H^T - \frac{1}{2}(e_H^T)^2 + \gamma\left(\frac{\hat{\beta}_H}{1+\hat{\beta}_H}e_L^T + \frac{1}{1+\hat{\beta}_H}e_H^T\right) - \frac{1}{2}\Delta\theta(e_L^T)^2\right] \\ +\;& (1-\lambda)\left[e_L^T - \frac{\theta}{2}(e_L^T)^2 + \gamma e_L^T\right].\end{aligned} \tag{A10}$$

First order conditions are:

$$\begin{aligned}\frac{\partial \pi}{\partial e_L^T} &: \lambda\left(\frac{\hat{\beta}_H}{1+\hat{\beta}_H}\gamma - \frac{1}{1+\hat{\beta}_H}\Delta\theta e_L^T\right) + (1-\lambda)(1-\theta e_L^T + \gamma) = 0; \\ \frac{\partial \pi}{\partial e_H^T} &: \lambda\left(1 - e_H^T + \frac{\gamma}{1+\hat{\beta}_H}\right) = 0.\end{aligned}$$

The required levels of effort are those provided in Lemma 3. By substituting them into equations (A9) and (A10), we obtain the wages and the principal's payoff. □

A.8 Proof of Proposition 2

We find the threshold value of γ, that we denote by $\overline{\gamma}$, above which the screening contract solution with envy at the top is feasible. Under envy at the top, Condition 2 must be satisfied. By substituting the optimal effort levels provided in Lemma (3) into Condition 2, we find that:

$$\gamma > \frac{(1+\hat{\beta}_H)\left[\sqrt{1 - a\left[2\left(1+2b\Delta\theta\right) - a\left(1+\frac{2\Delta\theta}{1+\beta}\right)\right]} - [1 - a(1+b\Delta\theta)]\right]}{2 - b(1+\hat{\beta}_H)(2+b\Delta\theta)} \equiv \overline{\gamma},$$

where

$$a = \frac{(1+\hat{\beta}_H)(1-\lambda)}{\Delta\theta[1+\hat{\beta}_H(1-\lambda)] + (1+\hat{\beta}_H)(1-\lambda)} > 0 \quad \text{and} \quad b = \frac{(1-\lambda+\hat{\beta}_H)}{\Delta\theta[1+\hat{\beta}_H(1-\lambda)] + (1+\hat{\beta}_H)(1-\lambda)} > 0.$$

The denominator of $\overline{\gamma}$ is positive if:

$$\Delta\theta > \frac{(1+\hat{\beta}_H)(1-\lambda+\hat{\beta}_H)}{4(1-\hat{\beta}_H\lambda+\hat{\beta}_H)^2}\left[\sqrt{\hat{\beta}_H^2(3-2\lambda)^2 + (1-\lambda)^2 + 2\hat{\beta}_H(5-\lambda-2\lambda^2)} - [1-\lambda-\hat{\beta}_H(3-2\lambda)]\right] \equiv \hat{\Delta\theta}.$$

The heterogeneity in terms of ability has to be sufficiently high so that the denominator is positive. At the same time, $\Delta\theta < 1$ if $\hat{\beta}_H$ is not too high. The numerator of $\overline{\gamma}$ is instead positive if:

$$\begin{aligned}&\sqrt{1 - a\left[2\left(1+2b\Delta\theta\right) - a\left(1+\frac{2\Delta\theta}{1+\hat{\beta}_H}\right)\right]} > 1 - a(1+b\Delta\theta), \\ &a^2\Delta\theta\left[\frac{2 - b(1+\hat{\beta}_H)(2+b\Delta\theta)}{1+\hat{\beta}_H}\right] > 0,\end{aligned}$$

that is always the case for any $\Delta\theta \in (\hat{\Delta\theta}, 1)$. □

A.9 Proof of Lemma 4

In both Cases 2 and 3 of Table 5, the incentive and participation constraints writes:

$$\omega_L - \frac{\theta}{2}e_L^2 + \gamma e_L - \hat{\beta}_L(\tilde{\omega}_H - \tilde{\omega}_L) \geq 0,$$
$$\omega_H - \frac{1}{2}e_H^2 + \gamma e_H \geq 0,$$
$$\omega_L - \frac{\theta}{2}e_L^2 + \gamma e_L - \hat{\beta}_L(\tilde{\omega}_H - \tilde{\omega}_L) \geq \omega_H - \frac{\theta}{2}e_H^2 + \gamma e_H,$$
$$\omega_H - \frac{1}{2}e_H^2 + \gamma e_H \geq \omega_L - \frac{1}{2}e_L^2 + \gamma e_L - \hat{\beta}_L(\tilde{\omega}_H - \tilde{\omega}_L').$$

We compute the implementability condition by adding (IC_L) and (IC_H):

$$-\frac{\theta}{2}e_L^2 + \gamma e_L - \hat{\beta}_L(\tilde{\omega}_H - \tilde{\omega}_L) - \frac{1}{2}e_H^2 + \gamma e_H \geq -\frac{\theta}{2}e_H^2 + \gamma e_H - \frac{1}{2}e_L^2 + \gamma e_L - \hat{\beta}_L(\tilde{\omega}_H - \tilde{\omega}_L),$$

which can be rewritten as:

$$e_H \geq e_L\sqrt{1+\hat{\beta}_L}. \tag{A11}$$

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 ω_H, we find that: $\frac{1}{2}\Delta\theta e_L^2(1+\hat{\beta}_L) > 0$. Therefore, PC_H is satisfied. We can rewrite IC_L as:

$$\omega_L \geq \frac{1}{2}\theta e_L^2 - \gamma e_L + \hat{\beta}_L(\tilde{\omega}_H - \tilde{\omega}_L) + \frac{1}{2}e_H^2 + \frac{1}{2}\Delta\theta e_L^2(1+\hat{\beta}_L) - \frac{1}{2}\theta e_H^2.$$

Substituting ω_L, the previous inequality can be rewritten as:

$$\frac{1}{2}\theta e_L^2 - \gamma e_L + \hat{\beta}_L(\tilde{\omega}_H - \tilde{\omega}_L) \geq \frac{1}{2}\theta e_L^2 - \gamma e_L + \hat{\beta}_L(\tilde{\omega}_H - \tilde{\omega}_L) + \frac{1}{2}e_H^2 + \frac{1}{2}\Delta\theta e_L^2(1+\hat{\beta}_L) - \frac{1}{2}\theta e_H^2.$$

After some simple computations, we find that

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

Hence, IC_L is satisfied from Condition A11. When PC_L and IC_H bind, wages are:

$$\begin{aligned} \omega_L^B &= \frac{1}{2}\theta e_L^2 - \gamma\left(\frac{1}{1+\hat{\beta}_L}e_L + \frac{\hat{\beta}_L}{1+\hat{\beta}_L}e_H\right) + \frac{1}{2}\hat{\beta}_L\Delta\theta e_L^2, \\ \omega_H^B &= \frac{1}{2}e_H^2 - \gamma e_H + \frac{1}{2}(1+\hat{\beta}_L)\Delta\theta e_L^2. \end{aligned} \tag{A12}$$

Substituting wages into the employer's profits, we get:

$$\begin{aligned} \pi^B = \;& \lambda\left[e_H^B - \frac{1}{2}(e_H^B)^2 + \gamma e_H^B - \frac{1}{2}(1+\hat{\beta}_L)\Delta\theta(e_L^B)^2\right] \\ +\;& (1-\lambda)\left[e_L^B - \frac{\theta}{2}(e_L^B)^2 + \gamma\left(\frac{1}{1+\hat{\beta}_L}e_L^B + \frac{\hat{\beta}_L}{1+\hat{\beta}_L}e_H^B\right) - \frac{\hat{\beta}_L}{2}\Delta\theta(e_L^B)^2\right]. \end{aligned} \tag{A13}$$

First order conditions are:

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

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

The required levels of effort are those provided in Lemma 4. By substituting them into equations (A12) and (A13), we obtain the wages and the principal's payoff. □

A.10 Proof of Proposition 3

We find the threshold value of γ, that we denote by $\underline{\gamma}$, below which the screening contract solution with envy at the bottom is feasible. Under envy at the bottom, Condition 3 must be satisfied. By substituting the optimal effort levels provided in Lemma 4 into Condition 3, we find that:

$$\gamma < \frac{(1+\hat{\beta}_L)\left[\sqrt{\lambda[2\beta\Delta\theta c^2 + \lambda(1-c)^2]} - \lambda(1-c-\Delta\theta c^2)\right]}{2\hat{\beta}_L + \lambda[2-c(2+\Delta\theta c)]} \equiv \underline{\gamma},$$

where

$$c = \frac{1-\lambda}{\Delta\theta(1+\hat{\beta}_L)+1-\lambda} > 0.$$

The denominator of $\underline{\gamma}$ is positive if:

$$2\hat{\beta}_L + 2\lambda(1-c) > \lambda\Delta\theta c^2.$$

After some simple computations, we get the following inequality:

$$2\hat{\beta}_L + \frac{\lambda}{[\Delta\theta(1+\hat{\beta}_L)+1-\lambda]^2}\left[2\Delta\theta^2(1+\hat{\beta}_L)^2 + (1-\lambda)\Delta\theta[2(1+\hat{\beta}_L)-(1-\lambda)]\right] > 0,$$

that is always satisfied for any value of the parameters. The numerator of $\underline{\gamma}$ is instead positive if:

$$\sqrt{\lambda[2\hat{\beta}_L\Delta\theta c^2 + \lambda(1-c)^2]} > \lambda(1-c-\Delta\theta c^2).$$

After some algebra, we get the following inequality:

$$\frac{2\hat{\beta}_L}{\lambda} + \frac{\Delta\theta}{[\Delta\theta(1+\hat{\beta}_L)+1-\lambda]^2}\left[2\Delta\theta(1+\hat{\beta}_L)^2 + 2(1+\hat{\beta}_L)(1-\lambda) - (1-\lambda)^2\right] > 0,$$

that always holds for any value of the parameters. As a result, $\underline{\gamma} > 0$ as both the numerator and the denominator are always positive. □

A.11 Proof of Lemma 5

We first note that if employees were not envious towards their colleagues, i.e. $\beta = 0 \Rightarrow \hat{\beta}_i = 0$,

$$\overline{\gamma} = \underline{\gamma} = \frac{(1-\lambda)^2}{\Delta\theta + \theta - \lambda^2}.$$

As $\hat{\beta}_i$ is increasing in β, we compute the impact of $\hat{\beta}_H$ on $\overline{\gamma}$ and the one of $\hat{\beta}_L$ on $\underline{\gamma}$. We find that an increase in $\hat{\beta}_H$ has a positive impact on $\overline{\gamma}$, whereas an increase in $\hat{\beta}_L$ has a negative impact on $\underline{\gamma}$, for any value of the parameters. Mathematically, the derivative of $\overline{\gamma}$ with respect to $\hat{\beta}_H$ is:

$$\begin{aligned}\frac{\partial\overline{\gamma}}{\partial\hat{\beta}_H} = \; & \frac{\overline{\gamma}}{(1+\hat{\beta}_H)} + \overline{\gamma}\frac{b(2+\Delta\theta\hat{\beta}_H) + 2(1+\hat{\beta}_H)(1+\Delta\theta b)]\frac{\partial b}{\partial\hat{\beta}_H}}{2 - b(1+\hat{\beta}_H)(2+b\Delta\theta)} + \left(1+\hat{\beta}_H\right)\left[1 - a(1+b\Delta\theta)\right] \\ \times & \left[\frac{2\left[1 - a\left(1+\frac{\Delta\theta}{1+\hat{\beta}_H}\right)\right]\frac{\partial a}{\partial\hat{\beta}_H} + a\left[2\Delta\theta\left(\frac{a}{(1+\hat{\beta}_H)^2} + \frac{\partial b}{\partial\hat{\beta}_H}\right) - \left(1+\frac{2\Delta\theta}{1+\hat{\beta}_H}\right)\frac{\partial a}{\partial\hat{\beta}_H}\right]}{2\sqrt{1 - a\left[2\left(1+2b\Delta\theta\right) - a\left(1+\frac{2\Delta\theta}{1+\hat{\beta}_H}\right)\right]}\left[2 - b(1+\hat{\beta}_H)(2+b\Delta\theta)\right]}\right],\end{aligned}$$

where

$$\begin{aligned}\frac{\partial a}{\partial\hat{\beta}_H} &= \frac{\Delta\theta(1-\lambda)\lambda}{[\Delta\theta[1+\hat{\beta}_H(1-\lambda)] + (1+\hat{\beta}_H)(1-\lambda)]^2} > 0; \\ \frac{\partial b}{\partial\hat{\beta}_H} &= \frac{[\Delta\theta + \theta(1-\lambda)]\lambda}{[\Delta\theta[1+\hat{\beta}_H(1-\lambda)] + (1+\hat{\beta}_H)(1-\lambda)]^2} > 0.\end{aligned}$$

We find that $\frac{\partial\overline{\gamma}}{\partial\beta} > 0$. This is because the first and the second terms are always positive as $2 - b(1+\hat{\beta}_H)(2+b\Delta\theta) > 0$ from Appendix A.8. Moreover, we find that they are big enough to outweigh the third term that is not always positive.

The derivative of $\underline{\gamma}$ with respect to $\hat{\beta}_L$ is:

$$\begin{aligned}\frac{\partial\underline{\gamma}}{\partial\hat{\beta}_L} = \; & -\underline{\gamma}\left[\frac{2}{2\hat{\beta}_L + \lambda[2 - c(2+\Delta\theta c)]}\left(\frac{1}{\lambda} - (1+\Delta\theta c)\frac{\partial c}{\partial\hat{\beta}_L}\right) - \frac{1}{1+\hat{\beta}_L}\right] + \\ & -\left[\frac{\lambda(1 - c - \Delta\theta c^2)(1+\hat{\beta}_L)}{[2\hat{\beta}_L + \lambda(2 - c(2+\Delta\theta c))][\sqrt{\lambda(2\hat{\beta}_L\Delta\theta c^2 + \lambda(1-c)^2)}]}\right]\left[-\lambda(1-c)\frac{\partial c}{\partial\hat{\beta}_L} + \Delta\theta c\left(c + 2\beta\frac{\partial c}{\partial\hat{\beta}_L}\right)\right],\end{aligned}$$

where

$$\frac{\partial c}{\partial\hat{\beta}_L} = -\frac{\Delta\theta(1-\lambda)}{[\Delta\theta(1+\hat{\beta}_L) + (1-\lambda)]^2} < 0.$$

We find that $\frac{\partial\underline{\gamma}}{\partial\hat{\beta}_L} < 0$. In this case, we have two terms. It is simple to show that the first term is always negative as $\frac{\partial c}{\partial\hat{\beta}_L} < 0$. Moreover, we find that it is sufficiently big to outweigh the second term that is not always negative.

Since $\overline{\gamma}$ and $\underline{\gamma}$ move in opposing directions as $\hat{\beta}_i$ (or β) increases, these two solutions never overlap. $\square$

A.12 Proof of Lemma 6

A pooling contract entails $e_H = e_L = e^P$ and $\omega_H = \omega_L = \omega^P$. Low-ability types receive a lower net wage and must be rewarded with an envy bonus. The participation constraint of low-ability types binds when:

$$\omega^P - \frac{\theta}{2}\left(e^P\right)^2 + \gamma e^P - \hat{\beta}_L(\tilde{\omega}_H - \tilde{\omega}_L) = 0.$$

This assures that both types are willing to accept the contract. Since $\tilde{\omega}_H - \tilde{\omega}_L = \frac{1}{2}\Delta\theta\left(e^P\right)^2$, we can rewrite the previous equation as:

$$\omega^P = \frac{1}{2}\theta\left(e^P\right)^2 - \gamma e^P + \frac{1}{2}\hat{\beta}_L\Delta\theta\left(e^P\right)^2. \tag{A14}$$

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

$$\begin{aligned}\pi^P =& \lambda\left[e^P - \frac{\theta}{2}\left(e^P\right)^2 + \gamma e^P - \frac{\hat{\beta}_L\Delta\theta}{2}\left(e^P\right)^2\right] + (1-\lambda)\left[e^P - \frac{\theta}{2}\left(e^P\right)^2 + \gamma e^P - \frac{\hat{\beta}_L\Delta\theta}{2}\left(e^P\right)^2\right]\\ \pi^P =& e^P - \frac{\theta}{2}\left(e^P\right)^2 + \gamma e^P - \frac{\hat{\beta}_L\Delta\theta}{2}\left(e^P\right)^2.\end{aligned} \tag{A15}$$

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

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

Substituting the effort e^P into (A14), we obtain the wage:

$$\omega^P = \frac{1}{2}\frac{(1+\gamma)(1-\gamma)}{\hat{\beta}_L\Delta\theta + \theta}.$$

Finally, the employer's payoff is obtained by substituting e^P into equation (A15). □

A.13 Proof of Proposition 4

In this section, we want to show that the employer will implement the solution with pooling contracts only when neither of the two screening solutions is feasible. To show this, we compare the employer's payoff obtained under pooling with those obtained in the two screening solutions. With pooling contracts, the employer obtains the following payoff:

$$\pi^P = \frac{(1+\gamma)^2}{2(\hat{\beta}_L\Delta\theta + \theta)}. \tag{A16}$$

If $\gamma > \overline{\gamma}$ so that there is screening with 'envy at the top', she obtains:

$$\pi^T = \frac{\lambda(1+\hat{\beta}_H+\gamma)^2}{2(1+\hat{\beta}_H)^2} + \frac{[(1+\hat{\beta}_H)(1+\gamma) - (1+\hat{\beta}_H+\gamma)\lambda]^2[(1+\hat{\beta}_H)\theta(1-\lambda) + (1-\hat{\beta}_H)\Delta\theta\lambda]}{2(1+\hat{\beta}_H)[(1+\hat{\beta}_H)\theta(1-\lambda) + \Delta\theta\lambda]^2}, \tag{A17}$$

while if $\gamma < \underline{\gamma}$ so that there is screening with 'envy at the bottom', she obtains:

$$\pi^B = \frac{1}{2(1+\hat{\beta}_L)^2}\left[\frac{[(1+\hat{\beta}_L+\gamma)\lambda+\hat{\beta}_L\gamma]^2}{\lambda}+\frac{(1-\lambda)^2(1+\hat{\beta}_L+\gamma)^2}{\hat{\beta}_L\Delta\theta+\theta-\lambda}\right]. \tag{A18}$$

Since $\overline{\gamma} > \underline{\gamma}$ the two screening solutions never overlap. Furthermore, we find that $\pi^T > \pi^P$ and $\pi^B > \pi^P$. To see this, note that while π^P is decreasing λ, both π^T and π^B are increasing in it. When the employer is able to distinguish between the two types of employees offering them screening contracts, her payoff will be higher as the fraction of high-ability employees increases. Now, if λ goes to 0, $\pi^T = \pi^B = \pi^P$. Then, for any $\lambda > 0$, $\pi^T > \pi^P$ and $\pi^B > \pi^P$. □

A.14 Screening with 'envy-free' contracts

The solution where net compensations are equal requires IC_H to be binding (while no PC is binding at this solution). By imposing $\tilde{\omega}_L = \tilde{\omega}_H$ and by setting IC_H binding, the solution entails:

$$\gamma(e_H - e_L) = \frac{1}{2}\Delta\theta e_L^2. \tag{A19}$$

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. The optimal envy-free contracts are such that:

$$e_L^F = \frac{2\gamma}{1+\sqrt{\theta}}, \quad e_H^F = \frac{2\gamma\sqrt{\theta}}{1+\sqrt{\theta}}, \qquad \omega_L^F = \omega_H^F = \omega^F = \frac{2\theta\gamma^2}{\left(1+\sqrt{\theta}\right)^2}, \tag{A20}$$

where the superscript F stays for envy-free. One can easily check that the effort levels in (A20) satisfy condition (A19) and are such that $e_H^F > e_L^F$. This solution implies that net compensations are zero ($\tilde{\omega}_L = \tilde{\omega}_H = 0$). As a consequence, irrespective of the model's parameters, the screening solution with envy-free contracts is always feasible. However, given that labour donations are zero and the utilities of both types of employees are strictly positive $(U_H > U_L > 0)$, this solution is very costly for the employer. Indeed, by comparing employer's payoffs we find that this solution is always dominated. □

A.15 Proof of Proposition 5

In all feasible solutions, both (IC_H) and (PC_L) are binding. The proof of this result is similar to the one provided in Lemmas 3 and 4, and we skip it here for brevity. In what follows, we illustrate the optimal contracts for the three solutions under asymmetric information and how we determine the conditions for which these solutions are feasible.

The solution with 'envy at the top'. Wages can be written in the following way:

$$\breve{\omega}_L^T = \frac{\theta}{2}(\breve{e}_L^T)^2 - \gamma\breve{e}_L^T; \quad \breve{\omega}_H^T = \frac{1}{2(1+\hat{\beta}_H)}(\breve{e}_H^T)^2 + \frac{k\hat{\beta}_H-\gamma}{1+\hat{\beta}_H}\breve{e}_H^T + \left(\frac{(\Delta\theta+\hat{\beta}_H\theta)\breve{e}_L^T - 2\hat{\beta}_H(k+\gamma)}{2(1+\hat{\beta}_H)}\right)\breve{e}_L^T.$$

Substituting wages into the employer's function, we get:

$$\begin{aligned}\breve{\pi}^T =&\lambda\left[\breve{e}_H^T-\left(\frac{1}{2(1+\hat{\beta}_H)}(\breve{e}_H^T)^2+\frac{k\hat{\beta}_H-\gamma}{1+\hat{\beta}_H}\breve{e}_H^T+\left(\frac{(\Delta\theta+\hat{\beta}_H\theta)\breve{e}_L^T-2\hat{\beta}_H(k+\gamma)}{2(1+\hat{\beta}_H)}\right)\breve{e}_L^T\right)\right]\\ &+(1-\lambda)\left[\breve{e}_L^T-\left(\frac{\theta}{2}(\breve{e}_L^T)^2-\gamma\breve{e}_L^T\right)\right].\end{aligned} \tag{A21}$$

First order conditions are:

$$\begin{aligned}\frac{\partial\breve{\pi}^T}{\partial\breve{e}_L^T}&:\quad\lambda\left(\frac{(\Delta\theta+\hat{\beta}_H\theta)\breve{e}_L^T-\hat{\beta}_H(k+\gamma)}{(1+\hat{\beta}_H)}\right)+(1-\lambda)\left(1-\theta\breve{e}_L^T+\gamma\right);\\ \frac{\partial\breve{\pi}^T}{\partial\breve{e}_H^T}&:\quad\lambda\left[1-\left(\frac{1}{1+\hat{\beta}_H}\right)\breve{e}_H^T-\frac{k\hat{\beta}_H-\gamma}{1+\hat{\beta}_H}\right].\end{aligned}$$

The required levels of effort are:

$$\breve{e}_L^T=\frac{(1+\gamma)(1+\hat{\beta}_H-\lambda)-\hat{\beta}_H(1-k)}{\theta(1+\hat{\beta}_H)-\lambda};\quad \breve{e}_H^T=1+\gamma+\hat{\beta}_H(1-k). \tag{A22}$$

The solution with 'envy at the top' occurs when high-ability employees receive a lower net wage than their low-ability colleagues, i.e., $\breve{\omega}_L^T-k\breve{e}_L^T>\breve{\omega}_H^T-k\breve{e}_H^T$. This is the case when γ is sufficiently high. We denote by $\breve{\gamma}^T$ the threshold value of γ above which the screening contract with envy at the top is feasible, that is:

$$\gamma>\frac{1}{2}(\breve{e}_H^T+\breve{e}_L^T)-k\equiv\breve{\gamma}^T.$$

Substituting the effort levels into the previous expression, we find the threshold as a function of the parameters, and we verify that the envy at the top solution holds when γ is above the threshold value $\breve{\gamma}^T$ that is increasing in $\hat{\beta}_H$. This implies that an increase in $\hat{\beta}_H$ reduces the region of the parameters for which this solution is feasible.

The solution with 'envy at the bottom'. Wages can be written in the following way:

$$\breve{\omega}_L^B=\frac{\theta+\hat{\beta}_L\Delta\theta}{2(1+\hat{\beta}_L)}(\breve{e}_L^B)^2+\frac{(k\hat{\beta}_L-\gamma)}{(1+\hat{\beta}_L)}\breve{e}_L^B+\frac{\hat{\beta}_L}{2(1+\hat{\beta}_L)}(\breve{e}_H^B)^2-\frac{\hat{\beta}_L(k+\gamma)}{(1+\hat{\beta}_L)}\breve{e}_H^B;\quad \breve{\omega}_H^B=\frac{1}{2}(\breve{e}_H^B)^2-\gamma\breve{e}_H^B+\frac{\Delta\theta}{2}(\breve{e}_L^B)^2.$$

Substituting wages into the employer's function, we get:

$$\begin{aligned}\breve{\pi}^B =&\lambda\left[\breve{e}_H^B-\left(\frac{1}{2}(\breve{e}_H^B)^2-\gamma\breve{e}_H^B+\frac{\Delta\theta}{2}(\breve{e}_L^B)^2\right)\right]\\ &+(1-\lambda)\left[\breve{e}_L^B-\left(\frac{\theta+\hat{\beta}_L\Delta\theta}{2(1+\hat{\beta}_L)}(\breve{e}_L^B)^2+\frac{(k\hat{\beta}_L-\gamma)}{(1+\hat{\beta}_L)}\breve{e}_L^B+\frac{\hat{\beta}_L}{2(1+\hat{\beta}_L)}(\breve{e}_H^B)^2-\frac{\hat{\beta}_L(k+\gamma)}{(1+\hat{\beta}_L)}\breve{e}_H^B\right)\right].\end{aligned} \tag{A23}$$

First order conditions are:

$$\frac{\partial \breve{\pi}^B}{\partial \breve{e}_L^B}: \quad -\lambda\left(\Delta\theta \breve{e}_L^B\right) + (1-\lambda)\left[1 - \left(\frac{\theta + \hat{\beta}_L \Delta\theta}{(1+\hat{\beta}_L)}\breve{e}_L^B + \frac{(k\hat{\beta}_L - \gamma)}{(1+\hat{\beta}_L)}\right)\right];$$

$$\frac{\partial \breve{\pi}^B}{\partial \breve{e}_H^B}: \quad \lambda\left(1 - \breve{e}_H^T + \gamma\right) + (1-\lambda)\left[-\left(\frac{\hat{\beta}_L}{(1+\hat{\beta}_L)}\right)\breve{e}_H^B + \frac{\hat{\beta}_L(k+\gamma)}{(1+\hat{\beta}_L)}\right].$$

The required levels of effort are:

$$\breve{e}_L^B = \frac{[1+\gamma+\hat{\beta}_L(1-k)](1-\lambda)}{\theta(1+\hat{\beta}_L) - \hat{\beta}_L - \lambda}; \quad \breve{e}_H^B = \frac{\lambda(1+\gamma) + \hat{\beta}_L(\lambda+\gamma) + k\hat{\beta}_L(1-\lambda)}{\lambda + \hat{\beta}_L}. \tag{A24}$$

The solution with 'envy at the bottom' occurs when low-ability employees receive a lower net wage than their high-ability colleagues, i.e., $\breve{\omega}_H^B - k\breve{e}_H^B > \breve{\omega}_L^B - k\breve{e}_L^B$. This is the case when γ is sufficiently low. We denote by $\breve{\gamma}^B$ the threshold value of γ below which the screening contract with envy at the bottom is feasible, that is:

$$\gamma < \frac{1}{2}(\breve{e}_H^B + \breve{e}_L^B) - k \equiv \breve{\gamma}^B.$$

Substituting the effort levels into the previous expression, we find the threshold as a function of the parameters. As in our baseline model, the envy at the bottom solution holds when γ is a lower than a threshold value that is decreasing in $\hat{\beta}_L$. It is easy to observe that when $\beta = 0$ the thresholds $\breve{\gamma}^B$ and $\breve{\gamma}^T$ coincide. An increase in β reduces the area in which these two screening solutions are feasible and, as a result, they never overlap as in our baseline.

Pooling solution with 'envy free'. Under pooling, the employer offers the same contract to both types of employees, i.e., $\breve{e}_H = \breve{e}_L = \breve{e}^P$ and $\breve{\omega}_H = \breve{\omega}_L = \breve{\omega}^P$. As a result, this solution is also envy free. The wage paid to both types of employees is:

$$\breve{\omega}^P = \frac{\theta}{2}(\breve{e}^P)^2 - \gamma\breve{e}^P.$$

Substituting the wage into the employer's benefits, we get:

$$\breve{\pi}^P = \breve{e}^P - \left(\frac{\theta}{2}(\breve{e}^P)^2 - \gamma\breve{e}^P\right). \tag{A25}$$

First order condition is:

$$\frac{\partial \breve{\pi}^P}{\partial \breve{e}^P}: (1+\gamma) - \theta\breve{e}^P.$$

The required effort, the wage, and the employer's benefits are:

$$\breve{e}^P = \frac{1+\gamma}{\theta}; \quad \breve{\omega}^P = \frac{1-\gamma^2}{2\theta}; \quad \breve{\pi}^P = \frac{(1+\gamma)^2}{2\theta}.$$

By comparing $\tilde{\pi}^P$ with those obtained in the two screening solutions, we find that the pooling solution is always dominated and will be used only when two screening solutions are not feasible. □

B Suggestive evidence

B.1 The German Socio-Economic Panel data

The German Socio-Economic Panel data (GSOEP) include a wide range of information on individual and household characteristics, like employment, education, earnings, and personal attitudes. Our key variables are fairness concerns, employees' ability, and the sector of employment which captures the relevance of the employer's mission.

Mission-oriented organisations. We need to identify those sectors in which the organisation's mission plays a prominent role and employees enjoy some non-monetary benefits from their job. Following Besley and Ghatak (2005), we define mission-oriented organisations as those firms providing collective goods as education, health care, and defence. The GSOEP data provide information on employees who work in the education, health care, public administration, and defence sectors considering both public and private firms. We refer them as mission-oriented organisations (MO).[28] Such organisations contain a total of 2,723 individuals representing almost the 30% of the entire sample. Most part of employees are women, 65.74% against the 34.26% of men. While the 47.7% of men holds a university degree, only the 35.80% of women does. The average age is 43 years.

Only 821 workers out of 2,723 are civil servants and work in public firms. To show that our results are not driven by the peculiarity of public firms included in mission-oriented organisations, as a robustness check, we exclude civil servants and restrict the analysis to private firms' employees. Our results continue to hold and are available upon request.

Data on perceived income fairness. In the 2005 wave of the survey there is the following question: *Is the income that you earn at your current job fair, from your point of view?* The same question is used by Falk et al. (2017) who study the relationship between unfair pay and health. We create a dummy variable called Fairness that takes value 1 if employees answer yes to the previous question, and 0 otherwise. This will be our dependent variable. The distribution of answers are reported in Table 6. More than 30% of employees believe that the income they earn in their job is not fair. Results are similar if we consider the entire sample of the population or if we restrict the sample to employees in mission-oriented organisations.

[28] By using the German Socio-Economic Panel, Dur and van Lent (2018) show that employees who work in these sectors are more altruistic. Following Becker et al. (2012) and Dur and Zoutenbier (2015), they measure altruism by the response to the question: *How important do you find it to be there for others currently?*

Table 6: Distribution of answers about employees' fairness concerns. In the 2005 wave of the GSOEP, we find the following question: *Is the income that you earn at your current job fair, from your point of view?*

	Entire Sample		Mission-oriented organisations	
Income Fair	Frequency	Percentage	Frequency	Percentage
Yes	6,178	67,56	1,858	68,23
No	2,966	32.44	865	31.77
Total	9,144	100	2,723	100

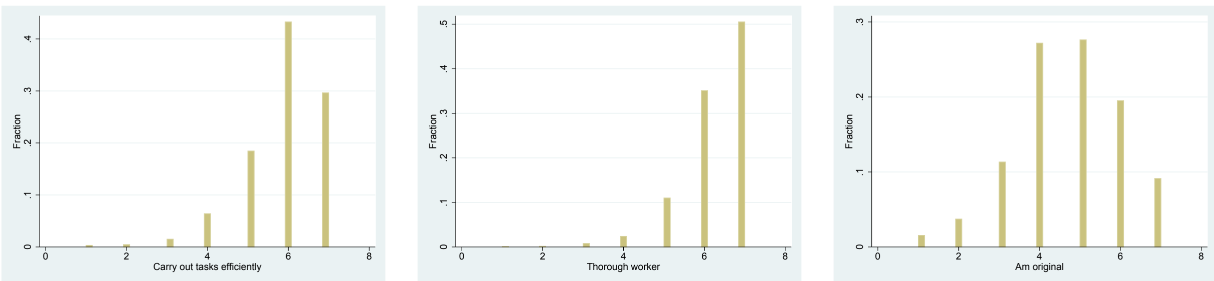
Data on perceived employees' ability. The same wave also includes the following statements:

- *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". 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.[29]

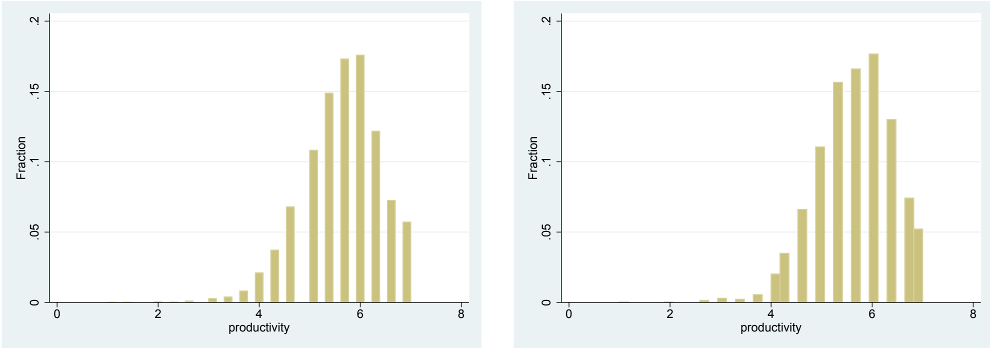
Figure 3 shows the distributions of responses to each of the three statements. The first graph in Figure 4 shows the average responses over the three statements for the entire population, while the second graph shows the average responses in mission-oriented organisations.

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



[29]Since these data are self-reported, a possible objection is that people could lie when they answer these questions on ability. 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 behaviour is close to the expected truthful distribution. This result suggests that participants have a large cost of lying.

Figure 4: The histograms show the average responses over the three statements on perceived ability in 2005 for the entire population (on the left) and only for mission-oriented organisations (on the right).



Control variables. Table 7 provides the details of the independent variables of our analysis. Work experience (or tenure) at the firm is not included as a control variable since it is strongly correlated with age. Specifically, the correlation coefficient between work experience at the firm and age is 0.57.

Table 7: Description of independent variables.

Ability	Average responses over the three statements on perceived ability
Mission-oriented organisations	Dummy variable: 1= Education, Health Care, Public Adminstration and Defence.
Male	Dummy variable: 1=male.
Age	
Education	Dummy variable: 1= degree.
White-collar	Dummy variable: 1=white-collar, 0=blue-collar.
Short-term contract	Dummy variable: 1=short-term contract, 0=long-term.
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.
Size	Firm size is controlled by 3 dummy variables. Firms with less than 20 employees serve as a baseline.
Occupation	Occupations correspond to the ISCO code. It is controlled by 9 dummies.

B.2 Survey in the Academic Workplace

We created a survey on job attitude and satisfaction in the academic workplace that was sent to scholars in the departments of Economics and Business of the following universities: the University of Alicante, the University Autonoma de Barcelona, the University of Barcelona, the University Carlos III, the University of Girona, the University of Lleida, the University Pompeu Fabra, and the University Rovira i Virgili.

The survey includes socio-demographic questions (like gender and age), as well as work-related questions, that allow us to measure the length of tenure, job position, and scholars' productivity. Most part of scholars are men, 63.46% (99 over 156) against the 36.54% of women (57 over 156). These numbers seem to reflect the reality in the academic workplace in Spain (see *She Figures 2018* report by the European Commission, 2019). Half of our respondents have between 43-57 years, around the 34% of scholars have less than 43 years, and the rest has more than 57 years. The 64% of respondents have a permanent position and, on average, have spent 15 years at their current university. The 12.18% (19 over 156) of the respondents has a teaching position, 23.72% (37 over 156) are postdocs or Assistant professors, 35.26% (55 over 156) are Associate professors, and 28.85% (45 over 156) are Full professors.

To measure scholars' productivity, we asked them how many papers they had published in the last five years in international peer-reviewed journals. There are also other possible measures of productivity that are strongly correlated with this one on which we focus. In particular, we also asked them how many of the papers published in the last five years were in the first or second quartile of their field of research. The correlation coefficient between these two questions is 0.80. However, as in the latter question we lose some observations, we focus on the former one. Our measure of productivity is also strongly correlated with the number of referee reports scholars did in the last year (the correlation coefficient is 0.64), with the number of grants received as principal investigator or as member of the team (the correlation coefficients are 0.36 and 0.45, respectively). By using our measure of productivity, we also find that for a one unit increase in the scale of productivity, the odds of having editorial responsibilities in one or more international peer-reviewed journals and of holding in the present or in the past a fellowship (like Marie Curie, Ramon i Cajal) are 1.31 and 1.27 times higher, respectively, given all the other variables constant. For all these reasons, we believe that the number of publication is a good proxy for academic research productivity.

Table 8 summarizes the distribution of answers for the questions about the amount of working hours per week and net salary during the month prior to the interview. Regarding the amount of working hours per week, we asked them to answer the following questions: How many hours do you work during a normal week? In this respect, we explicitly asked them to disregard the recent exceptional period triggered by the Covid-19.

Table 8: Distribution of answers about working hours per week and net salary per month.

Working hours per week	Freq.	%	Net salary last month	Freq.	%
< 20	9	5.77	$< 1.400,00$ euros	17	10.90
21-30	13	8.33	$1.400,00 - 2.000,00$ euros	22	14.10
31-40	42	26.92	$2.001,00 - 2.600,00$ euros	26	16.67
41-50	57	36.54	$2.601,00 - 3.200,00$ euros	27	17.31
51- 60	29	18.59	$3.201,00 - 3.800,00$ euros	30	19.23
> 60	6	3.85	$> 3.800,00$ euros	34	21.79

In our survey, we asked the following important questions on fairness:

1. To what degree do you personally agree with the following statement? Considering my personal administrative workload and that of my colleagues, I regard the allocation of administrative duties in my department or section as fair.
   - Strongly agree;
   - Agree;
   - Neither agree nor disagree;
   - Disagree;
   - Strongly disagree.
2. If you answered Disagree or Strongly Disagree to the previous question, it is because
   - Your administrative workload is excessive as compared to that of your colleagues in your department;
   - Your administrative workload is too little as compared to that of your colleagues in your department;
   - Other reasons (please specify).
3. To what degree do you personally agree with the following statement? Considering my personal teaching workload and that of my colleagues, I regard the allocation of teaching duties in my department or section as fair.
   - Strongly agree;
   - Agree;
   - Neither agree nor disagree;
   - Disagree;
   - Strongly disagree.
4. If you answered Disagree or Strongly Disagree to the previous question, it is because

- Your teaching workload is excessive as compared to that of your colleagues in your department;
- Your teaching workload is too little as compared to that of your colleagues in your department;
- Other reasons (please specify).

5. To what degree do you personally agree with the following statement? Considering the time and resources I personally dedicate to teaching, research, and administrative duties, I regard what I earn as fair compared to what my colleagues in my department or section earn.

    - Strongly agree;
    - Agree;
    - Neither agree nor disagree;
    - Disagree;
    - Strongly disagree.

6. If you answered Disagree or Strongly Disagree to the previous question, it is because

    - You earn too much as compared to your colleagues in your department given the effort exerted in teaching, research, and administrative duties;
    - You earn too little as compared to your colleagues in your department given the effort exerted in teaching, research, and administrative duties;
    - Other reasons (please specify).

We find that almost the 27% (42 over 156) of scholars do not regard the allocation of administrative duties in their department as fair. Furthermore, the 22.44% of scholars (35 over 156) believe that their administrative duties are excessive compared to their colleagues in the department. The percentage falls down to 15.38 (24 over 156) when we consider the first question regarding their teaching duties. Of these 24 scholars, 18 believe that their teaching workload is excessive as compared to that of your colleagues in your department. The dummies UnfairAD, UnfairT, and UnfairWage are positively correlated: the correlation coefficient between UnfairAD and UnfairT is 0.19, between UnfairAD and UnfairWage is 0.17, and between UnfairT and UnfairWage is 0.41. The main results of our regressions and the corresponding tables are reported in the main text.