Better to be in the same boat: Positional envy in the workplace

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Abstract

In a simple agency model of the labor market, we examine how fairness concerns affect the structure of optimal contracts when workers have different and unobservable abilities. In the framework, we assume that low-ability workers are envious and incur a utility cost whenever the more talented earn a surplus from their contracts. We focus on the equilibrium payoff of the envied and show that, when the ability gap is relatively small, it is first increasing and then decreasing in the level of envy cost borne by the envious. In contrast, when the gap is large, the payoff is monotonically decreasing. We also find that the utility loss of the envious is higher the lower the skill heterogeneity between types. Finally, we validate our theoretical results through GSOEP data.

Keywords: asymmetric information; envy; fairness; other-regarding preferences; principal-agent model.

JEL Classification: D03; D82; M54.

Declarations of interest: none

"We envy those who are near us in time, place, age, or reputation"
Aristotle.

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1 Introduction

Human beings are social by nature, and thus they weave a dense network of socioeconomic relationships in which they interact and compare themselves with each other. Many studies suggest that agents derive utility or disutility from peer comparison and care about their social rank (Postlewaite, 1998; Ball et al., 2001). In a wide range of social contexts, competition exacerbates the process of interpersonal comparison and group identification. This is particularly true in workplace settings, where relative-pay inequalities and other-regarding preferences can have substantial incentive effects, positive or negative, especially when workers are heterogeneous in their skill levels (Bolton and Ockenfels, 2000; Fehr et al., 2009; Breza et al., 2018).

This paper examines how fairness concerns can affect the structure of optimal labor contracts when workers have different inherent skills or abilities, which are their private information. We present a simple agency model with an employer (principal) and many workers (agents), distinguished into two types, low productive and high productive. Low-productive workers incur a utility cost whenever the more talented earn a surplus from their labor contracts. Namely, the more talented can impose (in our case, inadvertently) a sense of "inferiority" upon the less talented and trigger a feeling of resentment or envy. The principal cannot observe workers' ability and has to compensate the less talented for their envy cost but, at the same time, needs to pay the same reward to the more talented to avoid mimicking behavior. This will eventually increase the pay disparity between the two types of workers and the burden of envy. Unlike previous research (Desiraju and Sappington, 2007; Bartling and Von Siemens, 2010; Manna, 2016), we show that both the size of the ability gap among workers and the magnitude of the disutility cost play a key role in determining the effect of envy on the payoffs of players.

Our paper is close to that of Caserta et al. (2021), who show that being envied by colleagues may make workers better off. Our work differs in three aspects. First, we focus on the magnitude of ability heterogeneity and how it shapes the effect of envy on the payoff of the envied and on the utility cost of the envious. Second, we relate the workers' ability with the complexity of the task (or technology intensity), which is not mentioned in the paper by Caserta et al. (2021). On the job, the

task complexity may highlight or obscure skill heterogeneity among workers and thus intensify or mitigate the social comparison. Third, we empirically validate our theoretical results through the German Socio-Economic Panel Data (GSOEP).

Specifically, our model predicts that, relative to the job complexity, when the ability gap is small, the surplus of the envied is first increasing and then decreasing in the disutility cost of the envious. In contrast, when the ability gap is large, the payoff of the envied is monotonically decreasing in the envy cost. Since envy translates into a monetary reward for both types of agents, the surplus that more talented obtain depends not only on the information rent but also on the compensation needed to satisfy their incentive compatibility constraint. This conclusion holds even in the most simplifying case where high-ability workers do not directly derive any utility from being envied. As for the utility cost of the envious, we show that it increases as the productivity gap between worker types shrinks. The reason is that if abilities are similar, separating the two types is difficult and the size of information rent that the principal must give up to the more talented is relatively high. When, instead, workers are considerably different in skills, separation becomes easier, and this lowers the information rent and the cost of utility. Therefore, a workplace with small skill heterogeneity does not mitigate the cost resulting from envy but, rather, it will raise the "pain" of envious.

Our results suggest that envy is not indiscriminate but positional. It requires a certain degree of similarity between the envious and the envied. In our stylized workplace setting, envy stems from a feeling of unfairness because high-ability agents receive a wage higher than their marginal productivity and so their surplus is perceived as undeserved. The main conclusion is that envied workers may end up benefiting from the presence of envious colleagues when they are in a superior position, but not too high. This result implies that, in our model, high-productive agents would have no incentive to sort themselves into homogenous groups, as, for example, in the marriage market of Becker (1973) or in the credit market of Ghatak (1999). Individuals with high abilities will prefer a work environment where they can stand out in a team, but not so markedly as one would expect. Similarly, for the principal, we will show that workers with slightly different abilities, even though not

completely uniform, generate higher expected profit.[1] These results can have interesting empirical implications on the effects of job-skill heterogeneity and peer-group composition though, from an observational point of view, it is extremely difficult to conduct an investigation of envy feelings and dynamics in the workplace. Despite these methodological difficulties, in an attempt to validate our theoretical predictions, in the second part of the paper we present some suggestive evidence based on the GSOEP dataset. Our observations, though limited, add to the increasing empirical literature on relative-pay disparities and fairness concerns in the labor market (Mas, 2006; Card et al., 2012; Cohn et al., 2014; Song et al., 2019). For example, Mas (2006) tests the sensitivity of employee productivity to relative pay variations. By using market data from final offer arbitration for police unions in New Jersey, he shows that the performance of officers declines as wage expectations are disappointed. Card et al. (2012) conduct a randomized experiment at the University of California on peer wages revelation. They find evidence that disadvantageous pay inequality reduces job satisfaction and pushes workers to look for another job. Cohn et al. (2014) report results from a field experiment of cutting wages in Germany and report that an individual rather than a general wage reduction has a strong and negative effect on worker performance and conduct. In addition, using a longitudinal data set of the U.S. labor market, Song et al. (2019) find evidence that equity aversion may have sorting effects on the composition of the labor force within firms. Our result is consistent with that of Breza et al. (2018), who, by using data on seasonal manufacturing jobs in India, document that the ability of workers may provide a rationale for pay disparities. Indeed, they show that the higher wage of more productive workers (when the ability is observable) is perceived as fair, and thus, it does not affect production and group cohesion.

1.1 Related Literature

The effect of inequality and positional concerns has been analyzed in the literature from both sociological and economic perspectives. According to the social com-

[1]This result is supported by the empirical analysis of Song et al. (2019), in which they identify an increasing trend toward a homogeneous composition of skills in workplace settings.

parison theory, first introduced by Festinger (1954), individuals have a hardwired tendency to compare themselves with others, with the ultimate objective of improving the quality of their standard of living (Ben-Ze'ev, 1992; van de Ven et al., 2009). Fiske (2010) posits that the social comparison is intrinsically inevitable across all relational domains, and involves friends, relatives and colleagues. We confirm here that this tendency may decline as the closeness and similarities with the "target" are less prominent.

From an economic perspective, the relevance of relative wage differentials in the labor market was already implicitly pointed out in the *General Theory*. Explicitly, Duesenberry (1952) was the first to suggest that individuals have interdependent preferences and their utility is affected by the disparity or gap between their own consumption (broadly defined) and that of a reference group. Depending on whether the target is worse or better off, the social comparison may be downward or upward. While individuals engage in downward comparison to improve their self-esteem or gain superiority over their rivals, the goal of upward comparison involves self-evaluation and self-enhancement. The potential disadvantageous position resulting from the comparison can generate feelings of inferiority, resentment, which may turn into jealousy or envy towards others (Smith and Kim, 2007). In his seminal work, Frank (1984) studies the implications of relative preferences and fairness concerns on the labor market. He suggests that, if workers care about their relative payoffs, wages may not reflect their marginal productivity. He shows that the more talented receive less than their marginal contribution, as they *directly* enjoy being the higher-net earners, whereas the less talented receive more because they need to be compensated for their positional disutility. Fehr and Schmidt (1999) develop an inequity aversion model and show that in competitive environments, such as the labor market, fairness concerns are more likely to lead to equitable outcomes when workers threaten to reduce their effort and thus the principal's material payoff. Loewenstein et al. (1989) estimate how relative payoffs affect individual utility functions and provide evidence that people dislike disadvantageous as well as advantageous inequality, though the latter effect is weaker than the former. In contrast, we will show that, thanks to the structure of the incentive scheme chosen by the principal, the more talented can benefit from their favorable position, even in the

case where they do not derive any direct utility or disutility from being envied. Itoh (2004) embeds other-regarding preferences in a standard principal-agent model and investigates the design of optimal incentive contracts. He argues that, in the presence of workers with interdependent preferences, the principal may find it profitable to offer team contracts to reduce the negative impact of envy. Similarly, Desiraju and Sappington (2007) show that, when workers are *ex-ante* different in abilities, equity concerns induce the principal to give up some rent to avoid *ex-post* inequality. Bartling and Von Siemens (2010) introduces a moral-hazard model with unlimited liability and risk-averse agents, envious whenever others receive a higher wage. They show that, since envy increases the cost of the incentive scheme, the principal will elicit cost-minimizing efforts from their agents through pooling contracts. Unlike their papers, in our setup, the principal never has the incentive to offer flat wages as they would raise the envy cost of the envious. Neilson and Stowe (2010) introduce other-regarding preferences in a principal-agent model with *ex-ante* identical workers, and conclude that piece wages push inequity-averse agents to exert a higher effort than inequity-neutral agents. In our model, workers are *ex-ante* different, and disadvantageous inequality drags down the effort of other-regarding workers.

In other models, such as Dur and Glazer (2008) and Manna (2016), workers can be envious both of their colleagues and their boss. In Dur and Glazer (2008), the solution proposed is a sharing-profit contract, which may reduce the utility loss generated by different employment roles or status. In the principal-agent model of Manna (2016), she shows that the complementary between the two types of envy can mitigate the distortion on the effort exerted by low-productive workers. In our paper, we focus on envy among peers in order to address the issue of closeness or distance, in terms of labor skills, with targets in comparable job positions.

Envy is an emotional state that occurs when a person lacks another's superior quality or possession. This feeling usually arises when the other's success threatens the self-esteem and in general the well-being of the envious (Rustemeyer and Wilbert, 2001; Grund and Sliwka, 2005).[2] In Aristotle's thought, envy is interpreted

[2]Although envy may sometimes encourage friendly competition among employees, it is often associated with undesirable consequences. The sociological literature indentifies two main behavioral patterns, malicious and benign envy (Crusius and Lange, 2014). In some circumstances, envy

as the pain caused by "those who have what we ought to have". This implies that envy can be positional, in the sense that it emerges when there is a certain level of proximity with the envied, and when their success is potentially achievable (Solnick and Hemenway, 2005). The relationship between envy and "closeness" of the reference group can also be inferred from the tenth commandment: "You shall not covet [...] anything that belongs to your neighbor". Ben-Ze'ev (1992) argues that the displeasure caused by envy strictly depends on the dichotomy between competition and comparison, and more specifically, on whether the success of our comparative stand is attainable or not. Envy may derive from a feeling of "injustice" because those similar to us, with whom we compete, have obtained something that was not so out of reach. In other words, as claimed by van de Ven and Zeelenberg (2015), it is the thought "It could have been me" that makes us want what others have. Individuals close to us but in a slightly superior position indirectly emphasize our inability more than those distant from us. Hesiod argues that "potter is furious with potter and craftsman with craftsman, and beggar is envious of beggar and singer of singer". Descartes stresses the undeserved attribute that goes along with the sentiment of envy, "We judge the others unworthy of their good."

The paper proceeds as follows. Section 2 introduces the setup. Section 3 characterizes the equilibrium. Section 4 provides some testable predictions. Section 5 concludes.

2 Setup

Consider a single-period, risk-neutral, labor-market model with a principal and many agents, distinguished in two types, high ability (H) and low ability (L). The principal offers labor contracts that specify the wage, ω_i, with $i \in \{H, L\}$, and the effort exerted, e_i. We assume that the effort is the only input needed to produce and that it is observable and contractible (for example, the number of hours worked in

can stimulate motivation and work engagement (Grant and Mayer, 2009; Tai et al., 2012), but in other (perhaps most) situations envy can lead to a series of negative consequences, such as personal aggression, sabotage or hostility towards colleagues and the organization as a whole (Silver and Sabini, 1978; Ostell, 1996; Vecchio, 2000; Cohen-Charash and Mueller, 2007; Khan et al., 2014).

a day or week). The production function exhibits constant returns to scale, so the effort represents the output produced, whose price is normalised at 1. The effort cost depends on the workers' ability, θ_i, and is equal to $\theta_i e_i^{\alpha}/\alpha$, with $\alpha > 1$. The parameter α can be interpreted as the level of task complexity or difficulty of the job position. We will show that the equilibrium effort levels are such that, for both types of workers, $e_i \in (0, 1]$, so the higher α, the lower the curvature of the cost function and thus the complexity of the task. For H workers, $\theta_H = 1$, whereas for L workers, $\theta_L = \theta > 1$. The ability gap between types is thus $\Delta\theta = \theta - 1$. Workers have a reservation wage normalized to 0.

While workers know theirs and each other's productivity, the principal only knows the proportions, μ and $1-\mu$, of H and L types in the population. So, there is a problem of asymmetric information. We assume that low-ability workers are envious of their high-ability peers whenever the latter are *expected* to receive a positive surplus from their contracts. Envy entails a cost of utility for L types, which is proportional to the parameter $c \in [0, 1]$, and to the expected surplus obtained by H workers.[3] The parameter c measures the intensity of the envy cost and it is assumed to be common knowledge.[4] Throughout the paper, it is also assumed that H types do not derive any *direct* benefit from being envied (there is no envy-enjoyment).[5]

The timing of the game is as follows. 1) Nature determines α, μ and c. 2) The principal offers labor contracts. 3) Workers choose whether to accept or not. 4) If workers accept, production takes place and wages are paid.

Benchmark: symmetric information

Had we perfect information on each worker's ability, the principal would offer two contracts such that the participation constraint of each type of worker is satisfied

[3]This formalization is adopted to simplify the analysis. In Remark 3, we show that the results continue to hold if workers compare their equilibrium payoffs.

[4]This assumption is standard in this type of literature (see, for example, Caserta et al. 2021, Manna, 2016, and Dur and Glazer, 2008). Although envy cannot be measured directly, the empirical and experimental studies use some proxies to estimate the magnitude of its effects (see, for example, Smith et al., 1999).

[5]This assumption is made to simplify the analysis. A direct, positive effect of envy on the well-being of H types would strengthen the qualitative results.

with equality. The equilibrium contract would be such that the payoff of low-ability and high-ability agents, under the contracts (ω_L, e_L) and (ω_H, e_H), are

$$u_L(\omega_L, e_L) = \omega_L - \tfrac{\theta}{\alpha} e_L^{\alpha} = 0, \quad \text{and} \tag{1}$$

$$u_H(\omega_H, e_H) = \omega_H - \tfrac{1}{\alpha} e_H^{\alpha} = 0, \tag{2}$$

yielding $\omega_H = e_H^{\alpha}/\alpha$ and $\omega_L = \theta e_L^{\alpha}/\alpha$.

The principal's expected profit (on the average worker) is

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

where the return is equal to the effort exerted by workers.

By replacing ω_H and ω_L in (3), and taking the first-order conditions, the full-information effort levels are

$$e_L^{FB} = \left(\tfrac{1}{\theta}\right)^{\sigma} \quad \text{and} \quad e_H^{FB} = 1,$$

with $\sigma = 1/(\alpha - 1)$ and with $e_L^{FB} < e_H^{FB}$. The first-best wages are

$$\omega_L^{FB} = \tfrac{1}{\alpha\theta^{\sigma}}, \quad \text{and} \quad \omega_H^{FB} = \tfrac{1}{\alpha},$$

with $\omega_L^{FB} < \omega_H^{FB}$.

The expected profit of the principal is

$$\pi = \tfrac{(\alpha-1)[\theta^{-\sigma}(1-\mu)+\mu]}{\alpha} \equiv \pi^{FB}.$$

Welfare is the sum of the utility of both types of workers, weighted for their fraction in the population, and the principal's profit. If the workers' ability is observable, agents receive a wage equal to their marginal productivity, so that the only surplus produced is the principal's profit. So, the full-information welfare W^{FB} is equal to π^{FB}.

When workers' ability is *ex-ante* observable, full-information contracts do not

yield any contract rent for H workers, so that no envy feeling arises for L types.[6] The higher wage of high-ability workers is simply the "fair" reward for the higher effort they exert.

3 Equilibrium

With asymmetric information, the principal can offer one of three contract types: incentive-compatible separating contracts; pooling (flat-wage) contracts; screening contracts to H workers (keeping L types out). In what follows, we analyze the first type of offer and then we show that the other two are less profitable for the principal.

If abilities are unobservable, the effect of envy is such that the participation constraints of L and H agents, under the separating contracts (ω_L, e_L) and (ω_H, e_H), can be written as:

$$u_L(\omega_L, e_L) = \omega_L - \tfrac{\theta}{\alpha} e_L^{\alpha} - c \cdot \max\{0, u_H(\omega_H, e_H)\} \geq 0; \qquad (PC_L)$$

$$u_H(\omega_H, e_H) = \omega_H - \tfrac{1}{\alpha} e_H^{\alpha} \geq 0. \qquad (PC_H)$$

In (PC_L), envy entails a utility cost, which is proportional to the parameter c and to the surplus H types receive from their contract.

The incentive compatibility constraints are:

$$u_L(\omega_L, e_L) = \omega_L - \tfrac{\theta}{\alpha} e_L^{\alpha} \geq \omega_H - \tfrac{\theta}{\alpha} e_H^{\alpha} = u_L(\omega_H, e_H); \qquad (IC_L)$$

$$u_H(\omega_H, e_H) = \omega_H - \tfrac{1}{\alpha} e_H^{\alpha} \geq \omega_L - \tfrac{1}{\alpha} e_L^{\alpha} = u_H(\omega_L, e_L). \qquad (IC_H)$$

As said, H types are not envious, nor they derive utility from being envied. Hence, if H workers obtain a surplus, this gives rise to an envy cost for L workers even in the case the latter were to accept the contract (ω_H, e_H). So, in both right- and left-hand side of (IC_L), the envy-cost terms simplify. In (IC_H), H workers do not incur any utility loss (even if they were to choose the contract designed for L types). From the participation constraint in (PC_L), it is possible to note that c

[6] In Manna (2016), even under full information, workers may feel envy towards the principal.

cannot be larger than 1, otherwise L agents would receive a surplus higher than H types and the latter would prefer the contract (ω_L, e_L).

In this class of incentive problems, the binding constraints are the participation constraint of the "low" type and the incentive constraint of "high" type (in the Appendix we show that the other constraints are satisfied in equilibrium). Hence, from the binding (PC_L) and (IC_H), and from the first-order conditions of the principal's profit function in (3), the equilibrium effort levels are

$$e_L = \left[\frac{(1-\mu)(1-c)}{\theta - c(1-\mu) - \mu}\right]^{\sigma} \equiv \widehat{e}_L \quad \text{and} \quad e_H = 1 = e_H^{FB} \equiv \widehat{e}_H,$$

where $\widehat{e}_L > 0$, as $\theta > 1$, and $\widehat{e}_L < e_L^{FB}$.

If L workers had no fairness concerns, that is if $c = 0$, the effort of L types would be $\widehat{e}_L = (1-\mu)/(\theta - \mu)$, lower than e_L^{FB}. If the envy cost is positive, there is a further distortion in the effort of L types. In addition, the more envious L workers are, the lower their equilibrium effort, as $d\hat{e}_L/dc < 0$. At the extreme, $\widehat{e}_L = 0$ when $c = 1$. In contrast, the effort of H types does not depend on c and is equal to the full-information level.

Lemma 1. *In equilibrium, fairness concerns reduce the effort of low-ability workers further than in standard imperfect information cases.*

This result is supported empirically by Cornelißen et al. (2011), who find that when the higher income of the target group is perceived as unfair, workers shirk at work by increasing absenteeism.

The equilibrium wages are:

$$\omega_L = \tfrac{\theta - c}{\alpha(1-c)} \cdot \widehat{e}_L^{\alpha} \equiv \widehat{\omega}_L; \tag{4}$$

$$\omega_H = \tfrac{1}{\alpha} + \tfrac{\Delta\theta}{\alpha(1-c)} \cdot \widehat{e}_L^{\alpha} \equiv \widehat{\omega}_H. \tag{5}$$

In the wage in (4), L workers are compensated for their envy cost, and the compensation is increasing in c. The higher the envy cost, the higher the material rent the principal has to give up. In (5), H workers obtain an information rent and the same material rent paid to L types, as the principal must reward them in order

to prevent mimicking.

The equilibrium payoff of L and H workers are:

$$\widehat{u}_L(\omega_L, e_L) = 0; \tag{6}$$

$$\widehat{u}_H(\omega_H, e_H) = \tfrac{\Delta\theta}{\alpha(1-c)} \cdot \widehat{e}_L^{\alpha} \equiv \widehat{u}_H. \tag{7}$$

The payoff of H is positive for each $c \in (0,1)$, with a maximum for

$$c = 1 - \tfrac{\Delta\theta}{(1-\mu)(\alpha-1)} \equiv \widehat{c}.$$

It can be shown that, if $\theta/\alpha < 1$, the critical value $\widehat{c}$ is above zero and below one when $\mu < (\alpha-\theta)/(\alpha-1)$, where the right-hand side of this inequality is positive. The second-order condition evaluated at $\widehat{c}$ is negative. The function $\widehat{u}_H$ is thus increasing for $c < \widehat{c}$ and decreasing for $c > \widehat{c}$. As $d\hat{c}/d\theta = -1/(1-\mu)(\alpha-1) < 0$, this means that, when skill heterogeneity increases, the critical value for which the function $\widehat{u}_H$ reaches a maximum decreases. If $\theta/\alpha > 1$, $\widehat{c}$ is negative and $\widehat{u}_H$ is monotonically decreasing in $c \in [0,1]$.

We derive the following result.

Proposition 1. *In equilibrium, the payoff of H workers is:*
1) *first increasing and then decreasing in c if* $\theta/\alpha < 1$*;*
2) *always decreasing in c if* $\theta/\alpha > 1$*.*

The ratio between the ability of L workers and the complexity of the job both types perform, θ/α, may be interpreted as an objective measure of workers' skills. On the basis of Proposition 1, when $\theta/\alpha < 1$, the function $\widehat{u}_H$ reaches a maximum in $c \in (0,1)$. That is, when H types are not so much more productive than L, relatively to their task, the payoff in (7) is increasing in the interval $c \in [0, \widehat{c}]$ and decreasing in $c \in [\widehat{c}, 1]$, as depicted in figure 1*a*. Whereas, when $\theta/\alpha > 1$, that is, when H types are relatively much more productive than L types, the critical value $\widehat{c}$ is negative, and $\widehat{u}_H$ is decreasing for all $c \in [0,1]$, as in figure 1*b*.

Previous works, like Manna (2016), Barigozzi and Manna (2020) and Caserta et al. (2021), assume a quadratic form of the effort cost (in our setup, if $\alpha = 2$, the effect of envy on the payoff of H types would only depend on the ability gap between

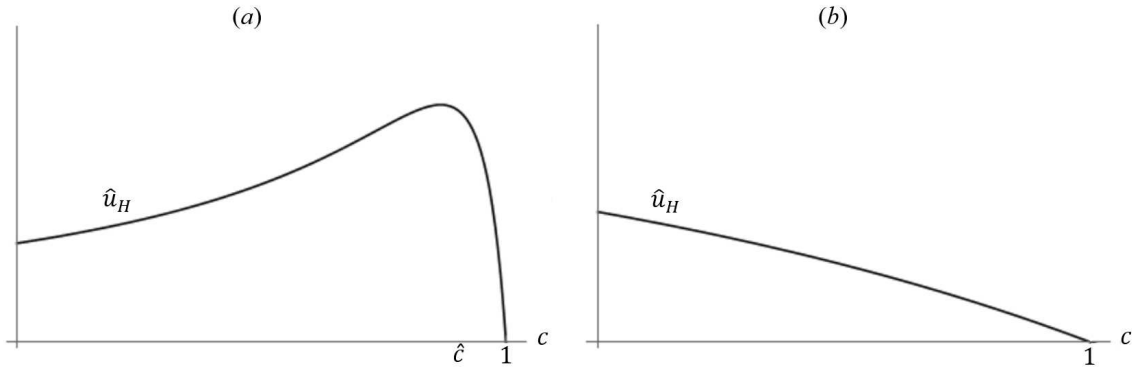

Figure 1. Payoff of high-ability workers.
a) $\theta/\alpha < 1$. Parameters: $\mu = 0.4$, $\alpha = 2$, $\theta = 1.05$.
b) $\theta/\alpha > 1$. Parameters: $\mu = 0.4$, $\alpha = 2$, $\theta = 5.00$.

workers). In our equilibrium, $\widehat{e}_L < \widehat{e}_H = 1$, so the two effort levels are both contained in the interval $(0, 1]$, so the higher α, the lower the task difficulty (the effort function becomes flatter). Since $d\hat{c}/d\alpha = \Delta\theta/(1-\mu)(\alpha-1)^2 > 0$, the less difficult the task, the higher the value for which the function $\widehat{u}_H$ reaches the maximum. This result suggests that, when performing "easy" tasks, ability heterogeneity is less prominent and workers are more likely to engage in social comparison. In such a case, while envy gives rise to a higher utility cost for L workers, H workers benefit from the presence of envious peers. On the contrary, difficult tasks may make skill heterogeneity less relevant and soften the peer comparison. In such a case, envy has a negative effect on the payoff of H types. This may explain why, as empirically reported by Duffy et al. (2012), high-performing workers prefer a workplace where the ability gap among colleagues is low.

To understand the shape of the payoff of H workers, note that in the function $\widehat{u}_H$ in (7), an increase in c, as well as in θ, pushes upward the first term, $\Delta\theta/\alpha(1-c)$. This represents the incentive effect, consisting in the ability reward. The second term, $\widehat{e}_L^{\alpha}$, is the equilibrium effort of L types. Their effort pushes the payoff of H types downward as $\widehat{e}_L$ is decreasing in c and in θ. When $\theta/\alpha < 1$ and $c < \widehat{c}$, the positive effect of the incentive reward prevails, and $d\hat{u}_H/dc$ is positive. When, instead, $\theta/\alpha > 1$, the negative effect of $\widehat{e}_L$ dominates, and $d\hat{u}_H/dc$ is negative for all $c \in (0, 1)$. From equation (7), it follows that the information rent the principal pays

to H types is increasing in $\widehat{e}_L$, and this explains why, in equilibrium, the principal wants to drag down the effort level of L types. Figure 2 illustrates how the payoff of H types varies for small changes in the ratio θ/α.

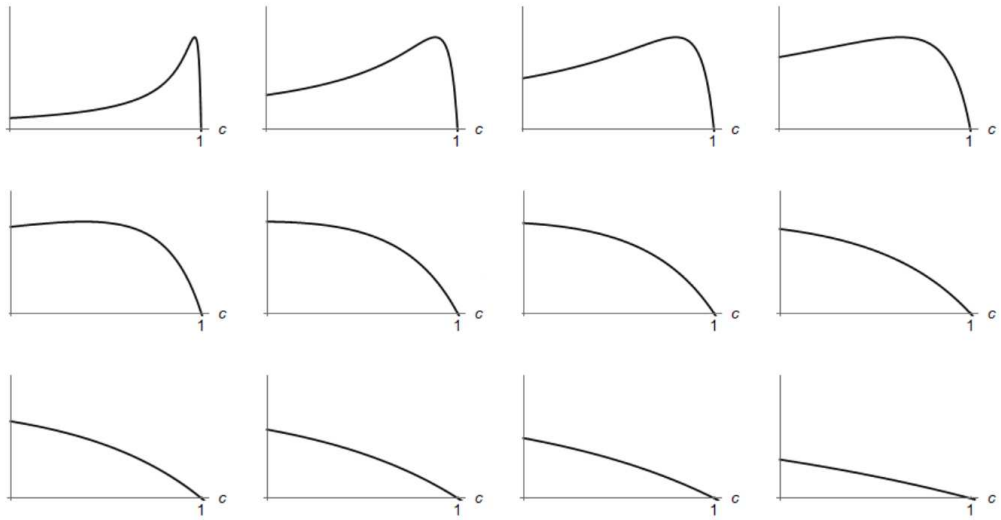

Figure 2. Payoff of the high-skilled workers for variations in θ/α. Ranging from 0.5 to 2.5.

The sign of $d\hat{u}_H/dc$ also depends on α. An increase in α produces two opposite effects on the function (7). The first is a reduction in the incentive reward, and the second is an increase in $\widehat{e}_L^{\alpha}$, as $d\hat{e}_L^{\alpha}/d\alpha > 0$. If $\theta/\alpha < 1$, then the positive effect on the effort of L types prevails, and $d\hat{u}_H/dc$ is positive, provided $c < \widehat{c}$. If $\theta/\alpha > 1$, then the negative effect dominates, and $d\hat{u}_H/dc$ is negative for any c.

The envy cost incurred by L is $c \cdot \widehat{u}_H$, which is positive for all $c \in [0,1]$, and reaches a critical value for $c = 1 - \Delta\theta/[\alpha\theta - (\alpha-1)\mu - 1] \equiv \bar{c}$ (the second-order condition, evaluated at $\bar{c}$ is negative). In addition, $\bar{c}$ is below 1 and above 0 when $\mu > (\alpha\theta - 1)/(\alpha - 1)$, where this threshold is positive if $\theta > 1/\alpha$, which is always satisfied as $\alpha > 1$ and $\theta > 1$ by assumption. It can also be shown that $\bar{c}$ is decreasing in θ and $d\bar{c} \cdot \widehat{u}_H(\bar{c})/d\theta < 0$, so the envy disutility of L workers, evaluated at $\bar{c}$, is decreasing in θ.

Proposition 2. *In equilibrium, the total cost due to envy of L workers decreases as the skill heterogeneity increases.*

We can interpret this result as follows. When agents have similar abilities, the social comparison becomes more salient. Namely, L workers will perceive the positive payoff received by their slightly superior H colleagues as "unfair", and suffer a substantially higher disutility, as shown in the numerical example of figure 3a. In turn, the principal has to pay a higher envy compensation to both types of agents to satisfy (PC_L) and (IC_H). This explains why, when the ability gap is low, the positive effect of the incentive compensation prevails and $d\hat{u}_H/dc > 0$ for all $c < \widehat{c}$. As θ increases, the ability gap is larger and the impact of social comparison is weaker. That is, this time higher surplus of H workers is perceived as a "fair" reward, and the total cost due to envy of L workers is lower, as in figure 3b.

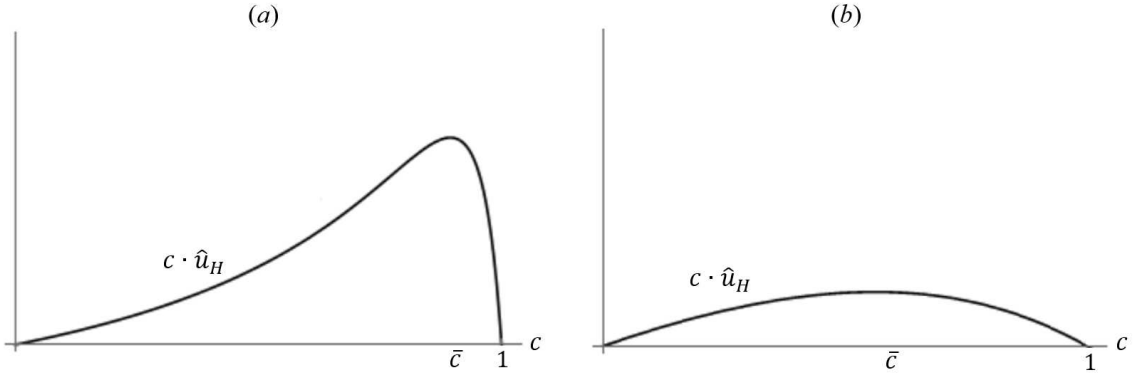

Figure 3. Total cost due to envy.
a) $\theta/\alpha < 1$. Parameters: $\mu = 0.4$, $\alpha = 2$, $\theta = 1.05$,.
b) $\theta/\alpha > 1$. Parameters: $\mu = 0.4$, $\alpha = 2$, $\theta = 3.05$.

In words, figure 3a shows the utility cost deriving from the feeling associated with the van de Ven and Zeelenberg's "It could have been me", that is the resentment due to the success that other people have, although their ability is somewhat comparable. In contrast, figure 3b shows the disutility from what it can be synthesized as the individual thought "I wish it could be me", that is the desire to have what people with very distant abilities or skills possess.

The equilibrium profit of the principal is

$$\pi = \tfrac{\alpha-1}{\alpha}[\mu + (1-\mu)\widehat{e}_L] \equiv \widehat{\pi}, \tag{8}$$

which is positive for all $c \in [0,1]$ and decreasing in c. An increase in envy produces

two effects, both negative, on the principal's profit. It reduces the effort of the envious and increases the compensation needed not only to satisfy their participation constraint but also the incentive constraint of the envied. As $d^2\widehat{\pi}/dc^2 < 0$, envy has an increasingly negative effect on the expected profit. For similar reasons, the principal's profit is decreasing in the ability gap between worker types, as $d\widehat{\pi}/d\theta < 0$.[7] This because, for any level of the envy cost c, the higher the skill heterogeneity, the lower the effort exerted by L types and the higher the information rent paid to H. This implies that the principal would prefer to hire workers with the lowest degree of heterogeneity. As expected, envy leads to a social welfare loss, increasing in c. For a given envy cost, welfare (per average worker) is the sum of the payoff of H types and the principal's profit,

$$W(c) = \mu \cdot \widehat{u}_H + \widehat{\pi} = \frac{\mu\Delta\theta(\widehat{e_L})^{\alpha}}{\alpha(1-c)} + \frac{\mu+(\alpha-1)(1-\mu)\widehat{e}_L}{\alpha}.$$

Welfare under asymmetric information but without envy ($c = 0$) is

$$W(0) = \frac{\alpha-1}{\alpha}\left[\mu - (1-\mu)\left(\frac{1-\mu}{\theta-\mu}\right)^{\sigma}\right] + \frac{\mu\Delta\theta}{\alpha}\left(\frac{1-\mu}{\theta-\mu}\right)^{\alpha\sigma}.$$

It can be shown that the difference $W(0) - W(c)$ is positive and increasing in c. Compared to the full-information case discussed above, we have that $W^{FI} > W(0) > W(c)$ thus, envy causes a further loss of efficiency to welfare already twisted by information asymmetries.

In our model, relative-pay inequalities reduce both the productivity of other-regarding workers and the profit of the principal, especially when agents have slightly different abilities. This provides a rationale for the aim of many employers at creating a friendly work environment. Many studies suggest that interpersonal relationships and reciprocal support among workers can mitigate the detrimental effects of envy. In a different direction, other studies, as for example Nickerson and Zenger (2008) and Obloj and Zenger (2017), show that increasing the structural distance among differently rewarded employees can reduce fairness concerns and increase productivity.

[7] $\frac{d\widehat{\pi}}{d\theta} = -\frac{1-\mu}{\alpha(\theta-\mu)}\left[\frac{1-\mu}{\alpha(\theta-\mu)}\right]^{\sigma} < 0.$

This is consistent with the idea that closeness and similarity are crucial moderators of the comparative process.

Remark 1: Shut down of L workers.
The principal can in theory find it profitable to modify the contract terms so that (PC_H) is binding and only H workers apply for the job. In this case, $\omega_H = e_H^{\alpha}/\alpha$, so H types do not derive any surplus, and the principal's profit is $\pi = \mu(e_H - \omega_H) = \mu(e_H - e_H^{\alpha}/\alpha)$. From the first-order condition, the equilibrium effort level is $e_H = 1 = e_H^{FB}$, and the wage $\omega_H = 1/\alpha = \omega_H^{FB}$. Under the contract $(\omega_H^{FB}, e_H^{FB})$, L workers would not accept to participate, as $u_L(\omega_H^{FB}, e_H^{FB}) = -(\theta - 1)/\alpha < 0$. The equilibrium profit of the principal is $\pi = \mu(e_H^{FB} - \omega_H^{FB}) = \mu(\alpha - 1)/\alpha$. As mentioned before, in order to IC_H be satisfied, c is assumed to be below 1. Thus, it is possible to prove that the difference between the separating profit in (8) and the expected profit with only H workers is

$$\widehat{\pi} - \tfrac{\mu(\alpha-1)}{\alpha} = \tfrac{(\alpha-1)(1-\mu)}{\alpha} \cdot \widehat{e}_L > 0,$$

so for the principal it is never profitable to screen out L workers.[8]

Remark 2: Pooling equilibrium.
If the principal offers flat wages under the pooling contract (ω, e), from the binding (PC_L), the wage is $\omega = (\theta - c)\, e^{\alpha}/\alpha(1 - c)$ and the equilibrium effort is $e = [(1 - c)/(\theta - c)]^{\sigma}$. The payoff H workers obtain is

$$u_H(\omega, e) = \tfrac{\Delta\theta}{\alpha(1-c)} e^{\alpha} \equiv u_H^P. \tag{9}$$

Since $e > \widehat{e_L}$, then the payoff u_H^P is higher than that under separating. This causes to L workers a higher utility cost due to envy and to the principal a higher rent to pay to both types.

[8] Of course, an equilibrium in which a contract is offered just to L types is not possible in this framework.

The principal's profit is

$$\pi = \frac{\alpha-1}{\alpha}\left(\frac{1-c}{\theta-c}\right)^{\sigma} \equiv \pi^{P}. \tag{10}$$

It can be shown that the difference between the profit under separating contracts in (8) and π^P is

$$\widehat{\pi} - \pi^{P} = \frac{\alpha-1}{\alpha}\left[\mu + (1-\mu)\widehat{e_L} - \left(\frac{1-c}{\theta-c}\right)^{\sigma}\right],$$

which is positive for all $c \in [0,\, 1]$. So, the principal will never offer flat wages.

Remark 3: Envy and net wage comparison.
In our setup, we assume that the envy loss of L workers depends on the surplus obtained by H workers from their contracts. But, as shown by Manna (2016) and Barigozzi and Manna (2020), envy can also be triggered by the comparison of the payoffs that both types receive in equilibrium. Under this alternative specification, the envy cost would be $c \cdot max\{0, \widetilde{\omega}_H - \widetilde{\omega}_L\}$, where $\widetilde{\omega}_H = \omega_H - 1/\alpha e_H^{\alpha}$ and $\widetilde{\omega}_L = \omega_L - \theta/\alpha e_L^{\alpha}$. The equilibrium payoff of H types would be

$$u_H = \frac{(1+c)\Delta\theta}{\alpha}\left(\frac{1-\mu}{\Delta\theta+\theta-\mu}\right)^{\alpha\sigma} \equiv \widetilde{u}_H,$$

positive for each $c \in (0, 1)$, with a maximum at $\widetilde{c} = [\alpha(1-\mu) + \mu - \theta]/\Delta\theta > \widehat{c}$ (the second-order condition, evaluated at $\widetilde{c}$, is negative). Similarly to the case analyzed in the main model, the sign of $\widetilde{c}$ depends on the ability gap between employees. If $\theta/\alpha < 1$, the critical value $\widetilde{c}$ is above zero, and below one when $\mu < (\alpha-\theta)/(\alpha-1)$, where the right-hand side of this inequality is positive. The function $\widetilde{u}_H$ is thus increasing for $c < \widetilde{c}$ and decreasing for $c > \widetilde{c}$. Whereas, if $\theta/\alpha > 1$, then $\widetilde{c}$ is negative and the payoff of H types is decreasing for all $c \in [0, 1]$. Therefore, the results of Proposition 1 above would hold and our qualitative results would remain unchanged.

4 Testable predictions

The previous section analyzes optimal labor contracts in the presence of imperfect information and fairness concerns. The results show that fairness concerns reduce the effort of low-ability workers and that the magnitude of skill heterogeneity is crucial for determining the effects of envy on players' payoffs. Specifically, when skill heterogeneity is relatively high, envy reduces the net earning of more talented workers and the disutility it imposes on those who experience it.

From the theoretical analysis, the following predictions can be drawn:

1. Fairness concerns lower the effort of low-ability workers.

2. When the ability gap is high:

    a) Fairness concerns adversely affect the net income of high-ability workers.

    b) Workers perceive their income as more fair.

We follow the literature on other-regarding preferences (Ferrer-i Carbonell, 2005; Vendrik and Woltjer, 2007; Clark et al., 2008), which implements data from GSOEP to investigate the effect of income comparison on individual well-being. The GSOEP is a multidisciplinary dataset, including subjective attitudes and personality traits not common in other surveys.[9] More recently, Barigozzi and Manna (2020) used GSOEP data to provide evidence of workplace envy in mission-oriented organizations.

The 2013 wave asks individuals the following question on fairness perceptions: "*Is the income that you earn at your current job just, from your point of view?*" We create a dummy variable called Unfairness that takes a value of 1 if respondents answer no and 0 otherwise. In the regressions, we control for job variables, like full-time, working class, firm size, contract duration, occupation, and industry sectors, and personal characteristics, like gender, age, marital status, number of children in the household and region. Table 1 reports a detailed description of the variables.

[TABLE 1 HERE]

[9]For a detailed description of the dataset see Wagner et al. (2007).

To test the first prediction and study the effect of inequity perceptions on worker behavior, we follow Cornelißen et al. (2011), who use the number of days of sick leave to proxy the observable effort. As specified by the authors, absenteeism due to illness is preferable to other measures of effort, such as working hours, since it does not entail any labor income reduction.[10] In the set of control variables, we also include education and gross income. In addition, we consider variables related to health status, such as medical visits and health satisfaction, and personal attitudes, such as laziness, risk-taking tendency, job insecurity, and political views, that can affect absenteeism. We estimate the following regression:

$$\log Absenteeism_i = \alpha_0 + \alpha_1 Unfairness_i + \alpha_2 \boldsymbol{X}_i + \epsilon_i, \tag{11}$$

where α_1 is the coefficient of Unfairness, and $\boldsymbol{X}_i$ is the vector of control variables.

In Table 2, the coefficients of the OLS estimation. Since our dependent variable is a count variable that takes on nonnegative integer values, we also use the Poisson estimation. The results show that fairness concerns significantly increase the number of days of sick leave. Specifically, the estimates suggest that workers who perceive their income as unfair have 6% more days of sick leave than those with no fairness concerns. While Columns 1 and 2 do not consider any control variables, Columns 3 and 4 include health-related variables, which leave the estimates unchanged. In Columns 5 and 6, we also control for personal characteristics and job variables, which do not affect the statistical significance of the Unfairness coefficient at the 0.01 level. Thus, inequity considerations have a strong impact on worker behavior.

[TABLE 2 HERE]

To test the other predictions and analyze how skill heterogeneity among workers regulates the effect of fairness concerns on labor income and inequity perceptions, we derive the variable Ability Gap as the difference between the years of education of each worker and the average of the sector in absolute value. From the theoretical results, when skill heterogeneity is high, we should observe a negative effect of fairness

[10] In Germany, workers have six weeks of paid sick leave and are not required to present a fit note for the first three days.

concerns on the income of high-ability workers. For this purpose, we account for the interaction between Ability Gap and Unfairness, which is our key variable in the following OLS regression

$$\log Income_i = \beta_0 + \beta_1 Ability\ Gap_i + \beta_2 Unfairness_i + \beta_3 Interaction_i + \beta_4 \boldsymbol{Z}_i + \varepsilon_i, \qquad (12)$$

where β_1 is the coefficient of Ability Gap, β_2 is the coefficient of Unfairness, β_3 is the coefficient of the interaction between Ability Gap and Unfairness, and $\boldsymbol{Z}_i$ is the vector of controls. Table 3 presents the outcomes of our analysis. The interaction term is negative and statistically significant in all specifications. In column 1, we control for firm size, occupation, sector, and region, whereas, in columns 2 and 3, we include personal characteristics and job variables. The estimates show that while the coefficient of Fairness has either no or low significant effect on labor income, it becomes statistically significant at the 0.01 level when considered jointly with ability heterogeneity. This means that, when the ability heterogeneity among workers is high, inequity perceptions lower the labor income. This result is consistent with our theoretical prediction, according to which the effect of envy on workers' payoff depends on the magnitude of the ability gap observed.

[TABLE 3 HERE]

To test the last prediction and study the effect of ability heterogeneity on fairness perceptions, we estimate the following OLS regression

$$Unfairness_i = \gamma_0 + \gamma_1 Ability\ Gap_i + \gamma_2 \boldsymbol{Z}_i + u_i, \qquad (13)$$

where γ_1 is the coefficient of Ability Gap and $\boldsymbol{Z}_i$ is the vector of controls.

Since Unfairness is a dummy variable, in Table 4, we present the results of the Logit estimation and the odds ratio. In Columns 1, 2, and 3, we control for firm size, sector, occupation, and region, whereas in Columns 4, 5, and 6, we add personal characteristics and job variables. The coefficient of Ability Gap is negative and statistically significant at the 0.05 level in all the specifications. This means that, when the ability heterogeneity is high, workers perceive their income as more fair. The odds ratios in columns 3 and 6 suggest that for a unit increase in the skill

heterogeneity observed, the odds of Unfairness compared to no inequity perceptions is 0.97 times lower, keeping all the other controls invariant.

[TABLE 4 HERE]

We acknowledge the limitations of our empirical analysis. The variable on fair income perceptions is questionable and may result not in line with our model. Nonetheless, the estimates appear to validate our predictions, providing empirical support for our theoretical results.

5 Conclusions

When agents have other-regarding preferences, wage differences may not reflect the true disparity in the productivity among workers. In this paper, we contribute to the literature on inequity aversion by investigating the effect of pay-rent structures on contract design. We examine the upward social comparison in a principal-agent model with asymmetric information on worker abilities, and our results suggest that skill heterogeneity is pivotal to define the effect of envy on the structure of optimal incentive schemes. Specifically, we show that the total cost caused by envy is higher (lower) when skill heterogeneity is low (high). The intuition behind this result is that skill similarity may emphasize the "inferiority" of low-performing workers, as they can perceive as undeserved the surplus that their slightly more talented colleagues earn. By contrast, when heterogeneity is high, low-skilled workers are less likely to feel inferior and thus may judge the surplus as a fair reward. Since the cost turns into compensation for both types of agents, this result explains why the payoff of the more talented can be first increasing and then decreasing in the envy cost of the less talented. This conclusion holds when the ability gap among worker types is lower than a certain threshold. Whereas, when the gap is large, envy always translates into a reduction of well-being for the more talented.

The literature on managerial and organizational strategies suggests that wage compression, pay secrecy, and office relocation policies can mitigate the costs deriving from interpersonal conflicts. On this topic, Cohen-Charash and Mueller (2007)

posit that secrecy about labor contract terms actually reduces envy and harmful behavior. Nickerson and Zenger (2008) argue that social comparison and envy among employees may lead managers to make inefficient productive decisions. Ockenfels et al. (2015) find evidence that, in countries and sectors where legal rules impose the disclosure of employment contracts, wage compression is a widespread practice used to minimize the cost of interpersonal comparisons. Finally, other studies show that fairness concerns can arise also in non-market activities, as in Barigozzi and Manna (2020) who show that, in mission-oriented organizations, envy in the workplace depresses labor donations and volunteering from employees.

Appendix

If PC_L is binding, then

$$\omega_L = \tfrac{\theta}{\alpha} e_L^{\alpha} + c \cdot \max\{0, u_H(\omega_H, e_H)\}.$$

Replacing ω_L in IC_H, it follows that

$$\omega_H - \tfrac{1}{\alpha} e_H^{\alpha} \geq \tfrac{\theta}{\alpha} e_L^{\alpha} + c \cdot \max\{0, u_H(\omega_H, e_H)\} - \tfrac{1}{\alpha} e_L^{\alpha}.$$

From the binding IC_H, then

$$\omega_H = \tfrac{1}{\alpha} e_H^{\alpha} + \tfrac{\Delta\theta}{\alpha} e_L^{\alpha} + c \cdot \max\{0, u_H(\omega_H, e_H)\}.$$

Thus, H workers obtain the marginal cost of their productivity, the information rent, and the envy compensation of L types to avoid mimicking behavior. So, $\omega_H > 1/\alpha e_H^{\alpha}$, which means that PC_H is slack. As for the incentive constraint of L workers, keeping PC_L and IC_H binding, then IC_L becomes

$$c \cdot \max\{0, u_H(\omega_H, e_H)\} > \tfrac{1}{\alpha} e_H^{\alpha} + \tfrac{\Delta\theta}{\alpha} e_L^{\alpha} + c \cdot \max\{0, u_H(\omega_H, e_H)\} - \tfrac{\theta}{\alpha} e_H^{\alpha}.$$

After simplifying and rearranging, we obtain

$$\frac{\Delta\theta}{\alpha}e_H^{\alpha} > \frac{\Delta\theta}{\alpha}e_L^{\alpha},$$

which is always true in equilibrium, since $\widehat{e}_H^{\alpha} > \widehat{e}_L^{\alpha}$. So, if PC_L and IC_H are binding, the other constraints, PC_H and IC_L, are satisfied as well.

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Table 1. Variables description.

Variable	Description
Absenteeism	Number of sick days in 2013.
Log Income	Log of labor income.
Medical Visits	Number of medical visits in 2013.
Health Satisfaction	Self reported satisfaction with health (0 - 10).
Age	Age in years.
Gender	1 if male.
Children	Number of children in the household.
Marital Status	1 if married.
Education	Years of education.
Full Time	1 if full-time contract.
White Collar	1 if white collar.
Short Term	1 if short term contract.
Training	1 if no preliminary training is required for the job position.
Firm Size	Set of 7 dummy variables according to the firm size reported.
Occupation	Set of 10 dummy variables according to the ISCO code.
Sector	Set of 57 dummy variables according to the NACE code.
Region	Set of 16 dymmy variables for German states.
Personal Attitudes	Set of the following 4 variables:
Lazy	Self reported laziness (1 - 7).
Leftist	1 if the respondent supports German Left Parties.
Job Security	1 if the respondent is afraid to lose the job.
Risk Propensity	Self reported risk propensity (1 - 10).

Table 2. Estimation results: Days of sick leave and fairness percepations.

Dependent Variable: (log) Absenteeism	(1) OLS	(2) Poisson	(3) OLS	(4) Poisson	(5) OLS	(6) Poisson
Unfairness	0.202***	0.0894***	0.212***	0.0892***	0.147***	0.0617***
	(0.0323)	(0.0140)	(0.0334)	(0.0138)	(0.0224)	(0.00952)
Health Status						
Medical Visits			0.0199***	0.00596***	0.0195***	0.00597***
			(0.00239)	(0.000894)	(0.00238)	(0.000809)
Health Satisfaction			-0.113***	-0.0490***	-0.111***	-0.0486***
			(0.0101)	(0.00385)	(0.0103)	(0.00386)
Personal Characteristics						
Age					0.00742***	0.00316***
					(0.00243)	(0.00101)
Gender					-0.0572	-0.0211
					(0.0479)	(0.0203)
Children					-0.0423**	-0.0224**
					(0.0196)	(0.00905)
Marital Status					-0.104**	-0.0410**
					(0.0450)	(0.0189)
Education					-0.0594*	-0.0256*
					(0.0310)	(0.0134)
Job Variables						
Gross Income (1000s Euros)					-0.00110*	-0.000541*
					(0.000642)	(0.000302)
Full Time					0.0884	0.0391
					(0.0559)	(0.0246)
White Collar					0.0274	0.00583
					(0.0460)	(0.0196)
Short Term					0.0232	0.00436
					(0.166)	(0.0651)
Training					0.0713	0.0301
					(0.0530)	(0.0228)
Constant	2.160***	0.770***	2.765***	1.049***	2.209***	1.272***
	(0.0284)	(0.0131)	(0.0907)	(0.0351)	(0.451)	(0.122)
Observations	3,730	3,730	2,838	2,838	2,748	2,748
R-squared	0.008		0.145		0.229	
Personal Attitudes	No	No	No	No	Yes	Yes
Firm Size	No	No	No	No	Yes	Yes
57 Sector dummies	No	No	No	No	Yes	Yes
10 Occupation dummies	No	No	No	No	Yes	Yes
16 Region dummies	No	No	No	No	Yes	Yes

***, ** and * indicate significance at the 1%, 5% and 10% level.
SE clustered by sector in parentheses.

Table 3. Estimation results: Labor income and interaction between fairness perceptions and ability heterogeneity.

Dependent Variable: Unfairness	(1)	(2)	(3)
Unfairness	-0.0165	-0.0187	-0.0437*
	(0.0263)	(0.0266)	(0.0255)
Ability Gap	0.00879	0.0105	0.0189***
	(0.00736)	(0.00703)	(0.00570)
Interaction	-0.0536***	-0.0507***	-0.0445***
	(0.0130)	(0.0134)	(0.0130)
Personal Characteristics			
Age		-0.00124	-0.00172
		(0.00178)	(0.00174)
Gender		0.00445	0.137***
		(0.0214)	(0.0228)
Children		-0.0471***	-0.0300**
		(0.0119)	(0.0122)
Marital Status		0.431***	0.434***
		(0.0373)	(0.0380)
Job Variables			
Full Time			0.333***
			(0.0354)
White Collar			-0.102***
			(0.0221)
Short Term			-0.222***
			(0.0580)
Training			0.308***
			(0.0505)
Constant	9.952***	9.629***	9.093***
	(0.154)	(0.155)	(0.175)
Observations	9,729	9,729	9,675
R-squared	0.210	0.260	0.312
Firm Size	Yes	Yes	Yes
57 Sector dummies	Yes	Yes	Yes
10 Occupation dummies	Yes	Yes	Yes
16 Region dummies	Yes	Yes	Yes

***, ** and * indicate significance at the 1%, 5% and 10% level.
SE clustered by sector in parentheses.

Table 4. Estimation results: Fairness perceptions and ability heterogeneity.

Dependent Variable: Unfairness	(1) OLS	(2) Logit	(3) Odds Ratio	(4) OLS	(5) Logit	(6) Odds Ratio
Ability Gap	-0.00571**	-0.0250**	0.975**	-0.00593**	-0.0263**	0.974**
	(0.00269)	(0.0119)	(0.0116)	(0.00295)	(0.0133)	(0.0130)
Personal Characteristics						
Age				-0.000458	-0.00211	0.998
				(0.000564)	(0.00256)	(0.00256)
Gender				0.0171	0.0727	1.075
				(0.0152)	(0.0692)	(0.0745)
Children				-0.00108	-0.00625	0.994
				(0.00511)	(0.0232)	(0.0230)
Marital Status				-0.00131	-0.00714	0.993
				(0.0123)	(0.0555)	(0.0551)
Job Variables						
Full Time				0.0944***	0.426***	1.530***
				(0.0161)	(0.0741)	(0.113)
White Collar				-0.0240	-0.106	0.900
				(0.0164)	(0.0713)	(0.0642)
Short Term				0.221***	0.958***	2.605***
				(0.0368)	(0.165)	(0.430)
Training				-0.0335**	-0.147**	0.863**
				(0.0136)	(0.0582)	(0.0502)
Constant	-0.192***	-1.236***	0.291***	-0.276***	-1.573***	0.207***
	(0.0553)	(0.123)	(0.0358)	(0.0612)	(0.151)	(0.0313)
Observations	9,749	9,738	9,738	9,693	9,682	9,682
R-squared	0.058			0.070		
Firm Size	Yes	Yes	Yes	Yes	Yes	Yes
57 Sector dummies	Yes	Yes	Yes	Yes	Yes	Yes
10 Occupation dummies	Yes	Yes	Yes	Yes	Yes	Yes
16 Region dummies	Yes	Yes	Yes	Yes	Yes	Yes

***, ** and * indicate significance at the 1%, 5% and 10% level.
SE clustered by sector in parentheses.