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

Rosaria Distefano*, Rossana Scebba †

Abstract

In a simple agency model of the labor market, we examine how fairness concerns affect the structure of optimal contracts. In the framework, we consider two types of workers, high and low ability, with the latter being envious and incurring a utility loss 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 always decreasing. We also find that the utility loss of the envious is higher the lower the skill heterogeneity between types.

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

JEL Classification: D03; D82; M54.

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

*(Corresponding author) Department of Economics, University of Messina, Piazza Pugliatti 1, 98122, Messina, Italy. rdistefano@unime.it https://orcid.org/0000-0002-4869-1168

†Department of Economics, University of Messina, Piazza Pugliatti 1, 98122, Messina, Italy.

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, and so different productivities. 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 loss 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. In turn, the principal 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 among workers and then the loss from 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 between the two types of workers and the magnitude of the disutility cost play a key role in determining the effect of envy on the payoffs of players. Specifically, our model predicts that, when the ability gap is relatively 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 exceeds a certain threshold, the payoff of the envied is always 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.

In the model, we also consider the effect of task complexity or difficulty (technology intensity) on the payoff of high-talented workers. The task complexity on the job may intensify or mitigate the effect of social comparison, and thus can be viewed as an alternative measure of ability heterogeneity. We interpret the slope of the effort cost function of workers as task complexity, and show that, if the job complexity is relatively small, the payoff of high-skilled workers will be first increasing and then decreasing in the envy cost, as in the case of low ability gap.[1] If the job complexity is higher, the effect of other-regarding preferences becomes less prominent, and the payoff of high-ability workers will be always decreasing.

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 envy utility loss increases as the productivity gap between worker types shrinks. The reason is that, if abilities are similar, separating the two types of workers is more 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 disutility of the envious. Therefore, a workplace with small skill heterogeneity does not mitigate the cost resulting from envy but, rather, it will raise the "pain" of enviers. In contrast, a higher skill gap leads to a decrease in both the utility loss of the envious and in the payoff of the envied.

Our 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

[1]This result is in line with Nickerson and Zenger (2008), who posit that some managers have the tendency to increase the physical and relational distance among employees to reduce social comparison costs, even at the expense of production efficiency.

not so markedly as one would expect. Being the most productive in a group of low performing and envious workers is likely to be the most undesirable situation in terms of monetary payoff (frog pond effect). Similarly, for the principal, we will show that workers with slightly different abilities, even though not completely uniform, generate higher expected profit.[2] 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 German Socio-Economic Panel Data (GSOEP). 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.

[2]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.

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 comparison 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). Envy is an emotional state that occurs when a person lacks another's superior quality or possession. This feeling is 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). 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 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).

In Aristotle's thought, envy is interpreted 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."

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. 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 (though, in the second part of the model, we briefly analyze the effect on the profit obtained by the principal of pursuing envy-reduction strategies).

The paper proceeds as follows. Section 2 introduces the setup. Section 3 characterizes the equilibrium. Section 4 reports 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. As in Manna (2016), the effort is assumed to be observable and contractible (for example, the number of hours worked in a day or week). The effort costs depend on the workers' ability, θ_i, and are 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 disutility loss for L types, which is proportional to the parameter $c \in [0, 1]$, and to the expected surplus obtained by H workers. The parameter c measures the intensity of the envy cost and it is assumed to be common knowledge.[3] Throughout the paper, it is also assumed that H types do not derive any *direct* benefit from being envied (there is no envy-enjoyment).[4]

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.

[3]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).

[4]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.

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 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 we assume that 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.[5] 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, being envious is an intrinsic characteristic of L workers, whereas 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 loss 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 they do not incur any utility loss (even if they were to choose the contract designed for L types). From the

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

participation constraint in (PC_L), it is possible to note that c 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.

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 utility loss, 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, as the principal must reward them in order to prevent mimicking. This rent is increasing in θ, so the higher the ability gap between types, the higher the surplus of H types, as is standard in asymmetric information problems.

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 $\theta < \alpha$, 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 $\theta > \alpha$, $\widehat{c}$ is negative and $\widehat{u}_H$ is decreasing for all $c \in [0,1]$.

We derive the following result.

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

Note that, since $\theta_H = 1$, on the basis of Proposition 1, the ratio between workers' abilities must be lower than α for $\widehat{u}_H$ to reach a maximum in $c \in (0,1)$. That is, when $\theta < \alpha$, that is when H types are not so much more productive than L types, 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*. When $\theta > \alpha$, 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*.

This result suggests that, when skill heterogeneity is small, high-ability workers benefit from being envied. This may explain why, as empirically reported by Duffy et al. (2012), high-performing workers would prefer a workplace where the ability gap among colleagues is relatively low . Whereas, when skill heterogeneity is large, envy has always a negative effect on the payoff of H types.

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

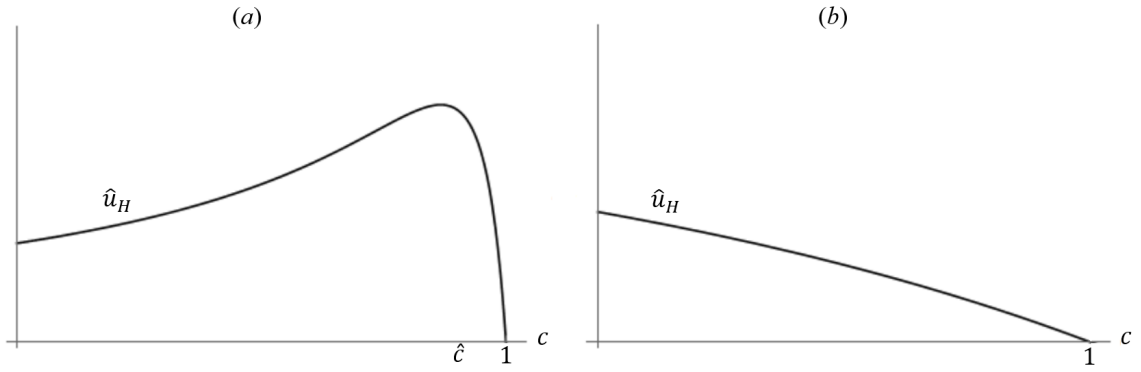

Figure 1. Payoff of high-ability workers.
a) $\theta < \alpha$. Parameters: $\mu = 0.4$, $\alpha = 2$, $\theta = 1.05$.
b) $\theta > \alpha$. Parameters: $\mu = 0.4$, $\alpha = 2$, $\theta = 5.00$.

H types downward, as $\widehat{e}_L$ is decreasing in c and in θ. When $\theta < \alpha$, and $c < \widehat{c}$, the positive effect of the incentive reward prevails, and $d\hat{u}_H/dc$ is positive. When, instead, $\theta > \alpha$, the negative effect of $\widehat{e}_L$ dominates, and $d\hat{u}_H/dc$ is negative for all $c \in (0, 1)$. In the numerical example of figure 1*a*, it is shown that, when $c > 0$, envy allows H types to obtain a payoff higher than without envy ($c = 0$). In figure 1*b*, H workers receive a payoff lower than in the case $c = 0$. 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 will want to drag down the effort level of L types. Figure 2 illustrates how the payoff of H types varies for small changes in the parameter θ.

The critical value $\widehat{c}$ depends also on the parameter α, the task complexity of the job. Our conjecture is that, when performing "easy" tasks, workers are more likely to engage in social comparison and thus envy gives rise to a larger utility loss for L workers, whereas H workers can benefit from the presence of envious peers. 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 workers, as depicted in figure 1). 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

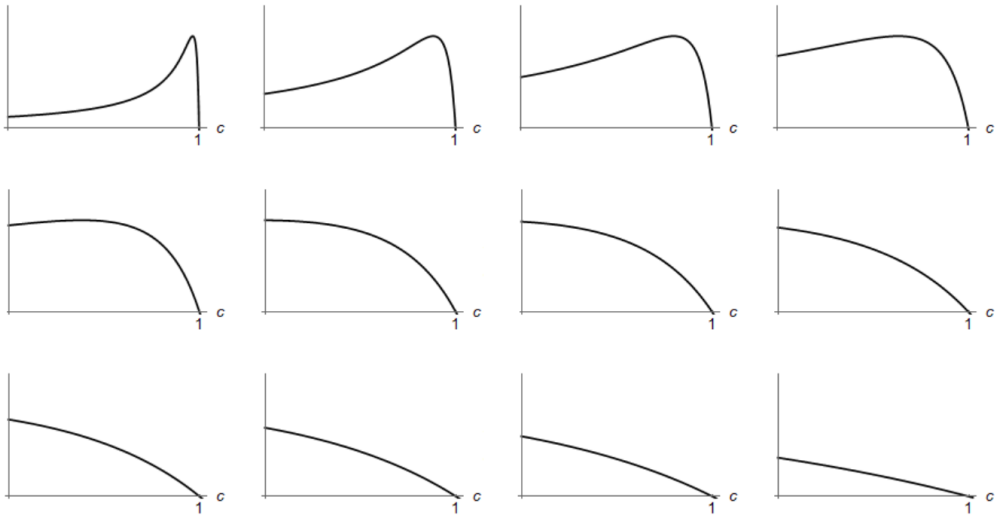

Figure 2. Payoff of the high-skilled workers for variations in θ. Ranging from 1.02 to 5.

less difficult the task, the higher the value for which the function $\widehat{u}_H$ reaches the maximum. Besides, the sign of $d\hat{u}_H/dc$ 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 $d\hat{e}_L^{\alpha}/d\alpha > 0$. As in Proposition 1, if $\alpha < \theta$, then the first effect dominates, and $d\hat{u}_H/dc$ is negative for any c, as in figure 3*a*. If $\alpha > \theta$, then the positive effect on the effort of L types prevails, and $d\hat{u}_H/dc$ is positive, provided $c < \widehat{c}$, as in figure 3*b*. This result suggests that task complexity is equivalent, in its effects, to skill heterogeneity. The intuition is that easy tasks can emphasize the productivity discrepancies between worker types, whereas difficult tasks may make skill heterogeneity less relevant. Figure 4 shows the payoff of high skilled for small variations in the parameter α.

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

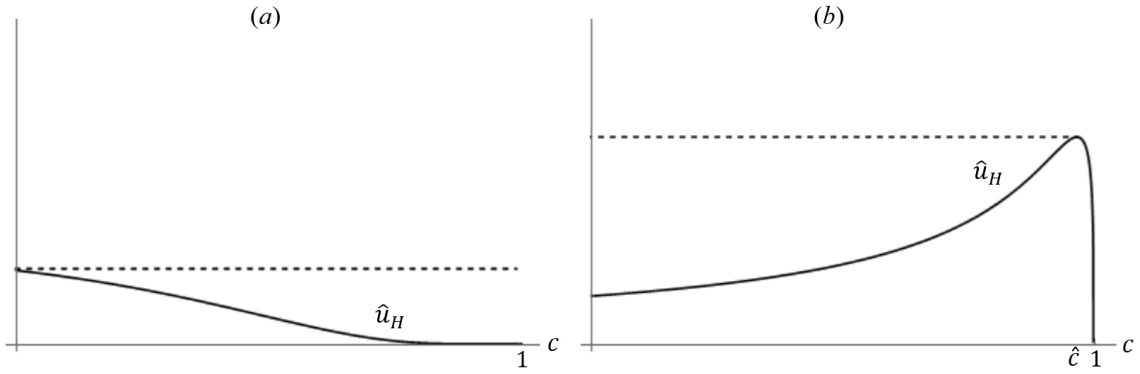

Figure 3. Payoff of high-ability workers.
a) $\theta < \alpha$. Parameters: $\mu = 0.4$, $\theta = 1.05$, $\alpha = 1.05$.
b) $\theta > \alpha$. Parameters: $\mu = 0.4$, $\theta = 1.05$, $\alpha = 5.00$.

decreasing in θ.

Proposition 2. *In equilibrium, the utility loss 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 5*a*. 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, and the ability gap is larger, the impact of social comparison is weaker. That is, this time higher surplus of H workers is perceived as a "fair" reward, and the utility loss of L workers is lower, as in figure 5*b*.

In words, figures 5*a* shows the utility loss 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 5*b* shows the loss 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.

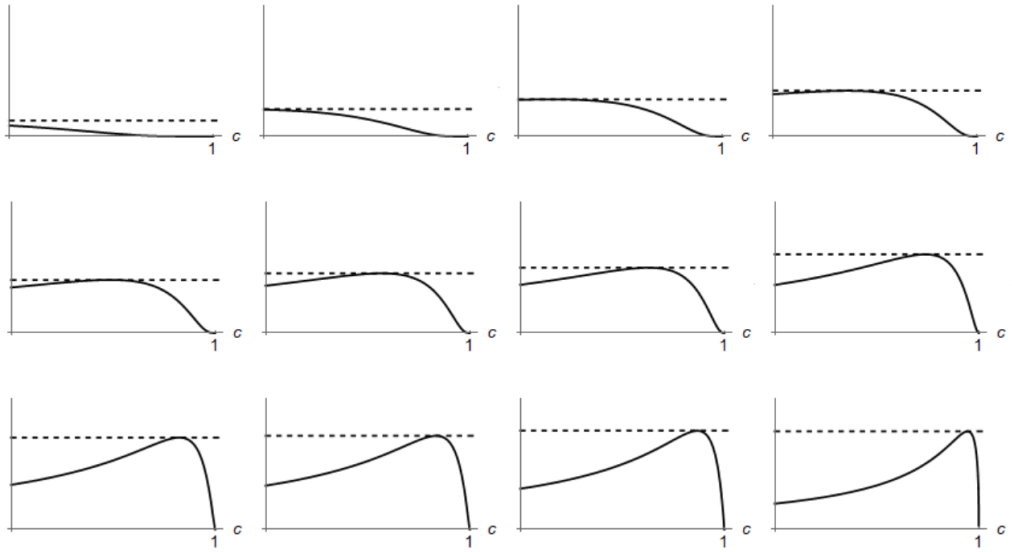

Figure 4. Payoff of the high-skilled workers for variations in α. Ranging from 1.05 to 5.

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. As for the ability gap between worker types, the principal's profit is decreasing in θ, as $d\widehat{\pi}/d\theta < 0$. This because, for any level of the envy cost, c, the higher the skill heterogeneity, the higher the information rent and the envy compensation paid to workers. This implies that the principal would prefer to hire workers with the lowest degree of heterogeneity.[6]

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

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

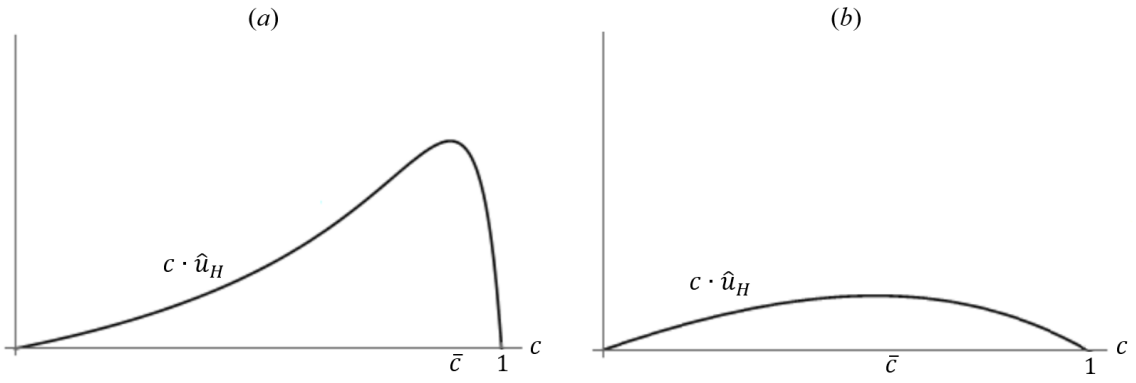

Figure 5. Disutility from envy.
a) $\theta < \alpha$. Parameters: $\mu = 0.4$, $\alpha = 2$, $\theta = 1.05$,.
b) $\theta > \alpha$. Parameters: $\mu = 0.4$, $\alpha = 2$, $\theta = 3.05$.

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. As we will discuss in the following subsection, 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. 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 the contract, 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.[7]

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

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

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

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

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

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

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 $\theta < \alpha$, 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 $\theta > \alpha$, 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.

3.1 Envy-reduction strategy

In this section, we assume that the principal can introduce envy-reduction activities to mitigate the envy cost of low-productive workers.[8] A large literature suggests that employers can achieve significant advantages by creating a "pleasant" work environment for their employees (Langlieb and Kahn, 2005). Many empirical studies report that interpersonal relationships among workers increase motivations and job satisfaction, as a friendly workplace can elicit cohesion, support, and information sharing among employees (Riordan and Griffeth, 1995; Krueger and Schkade, 2008; Chiaburu and Harrison, 2008; Mas and Moretti, 2009). For instance, Berman et al. (2002) survey US managers and find evidence that they actively promote social activities among workers and encourage both horizontal and vertical communications. The authors also show that these strategies have beneficial effects on employee performance. Bandiera et al. (2010) add that these effects depend on workers' ability. Specifically, while having high-ability colleagues can foster job productivity, having

[8]See Caserta et al. (2021) for envy manipulation by high-skilled workers.

low-ability colleagues can reduce it, but the first effect dominates the second. Chen et al. (2016) show that firms with a high-quality workplace better resist periods of economic distress. This is because friendship among workers increases risk tolerance, which prompts innovation investments. Another possible strategy for the principal may be trying to make the attributes and rewards of high-skilled workers less visible or even secret, as argued in the paper by Bebchuk and Fried (2003).[9]

In terms of our model, if the principal follows an envy-reduction strategy, the aim is reducing the envy cost, c, incurred by L workers. We assume that the envy cost can be reduced by the factor $\delta \in (0,1)$, at the cost of $\beta\delta^2/2$, with $\beta > 0$, and that the activity of envy "manipulation" is observable by all workers.

The principal's expected profit under the envy-reduction strategy can be rewritten as

$$\pi = \mu(e_H - \omega_H) + (1-\mu)(e_L - \omega_L) - \tfrac{\beta\delta^2}{2}. \tag{9}$$

The incentive constraints of H types is the same as in (IC_H), whereas the participation constraint of L workers is

$$u_L(\omega_L, e_L) = \omega_L - \tfrac{\theta}{\alpha} e_L^{\alpha} - c(1-\delta)\max\{0, u_H(\omega_H, e_H)\} \geq 0. \qquad (PC_L^{ER})$$

From the binding (PC_L^{ER}) and (IC_H), and from the first-order conditions of (9), the equilibrium effort levels are

$$e_L = [1 - \tfrac{\Delta\theta}{\theta - c(1-\delta)(1-\mu) - \mu}]^{\sigma} \equiv e_L^{ER} \quad \text{and} \quad e_H = 1 = e_H^{FB}.$$

The effort of H workers is not distorted compared to the first best, whereas the effort of L workers is lower and decreasing in the manipulation activity, as $de_L^{ER}/d\delta < 0$. However, the strategy of envy-reduction increases the effort of L workers, as $e_L^{ER} > \widehat{e}_L$.

The equilibrium wages are:

$$\omega_L = \tfrac{\theta - c(1-\delta)}{\alpha[1-c(1-\delta)]} \cdot \left(e_L^{ER}\right)^{\alpha} \equiv \omega_L^{ER}; \tag{10}$$

$$\omega_H = \tfrac{1}{\alpha} + \tfrac{\Delta\theta}{\alpha[1-c(1-\delta)]} \cdot \left(e_L^{ER}\right)^{\alpha} \equiv \omega_H^{ER}. \tag{11}$$

[9]However, it is important to stress that this type of strategies may easily prove to be ineffective or even backfire, as it may lead workers to form wrong beliefs and estimates about the abilities and compensation of high-skilled colleagues. The same may be true of other types of envy-reduction activities.

The equilibrium payoffs of L and H workers are:

$$u_L(w_L^{ER}, e_L^{ER}) = 0;$$
$$u_H(w_H^{ER}, e_H^{FB}) = \frac{\Delta\theta}{\alpha[1-c(1-\delta)]} \cdot \left(e_L^{ER}\right)^{\alpha} \equiv u_H^{ER}.$$

The payoff of H types is positive for each $c \in (0,1)$ and $\alpha > 1$, with maximum at

$$c = \frac{\alpha(1-\mu)+\mu-\theta}{(\alpha-1)(1-\mu)(1-\delta)} \equiv c^{ER}.$$

The results of Proposition 1 applies to this extension. If $\theta < \alpha$, c^{ER} is positive, and the payoff of H workers is first increasing and then decreasing in c. Besides, $dc^{ER}/d\delta > 0$, so the value for which the function u_H^{ER} reaches a maximum is increasing in the envy-reduction activity. If $\theta > \alpha$, then c^{ER} is negative and the utility of H types is always decreasing in c.

It can be shown that the equilibrium principal's profit with envy manipulation is always positive[10], and is larger than the separating profit when the envy cost, c, is relatively high. Figure 6 shows a numerical example. The parameters are $\mu = 0.4$, $\alpha = 2$, $\delta = 0.4$, $\theta = 1.2$, $\beta = 0.2$, and $\pi^{ER} > \widehat{\pi}$ when $c > 0.40$. Note that H workers can also benefit from the activities of envy manipulation carried out by the principal (in the numerical, this happens when $c > 0.80$).

This conclusion is in line with Dur and Sol (2010), in which managers may prefer to mix workers and use team incentives to promote altruism and cohesion. And, with Larkin et al. (2012), where compensation schemes based on worker seniority or group performance can mitigate the psychological costs caused by wage comparison.

4 Testable predictions

The theoretical analysis suggests that, in the presence of envious colleagues, high-performing employees may suffer a reduction in their net income as the magnitude of the skill heterogeneity among employees increases. In this section we test the following prediction delivered from the model:

[10] $\pi^{ER} = \frac{[1-c(1-\delta)][\mu(\alpha-1)+\alpha(1-\mu)e_L^{ER}]-[\theta-c(1-\delta)(1-\mu)-\mu](e_L^{ER})^{\alpha}}{\alpha[1-c(1-\delta)]} > 0.$

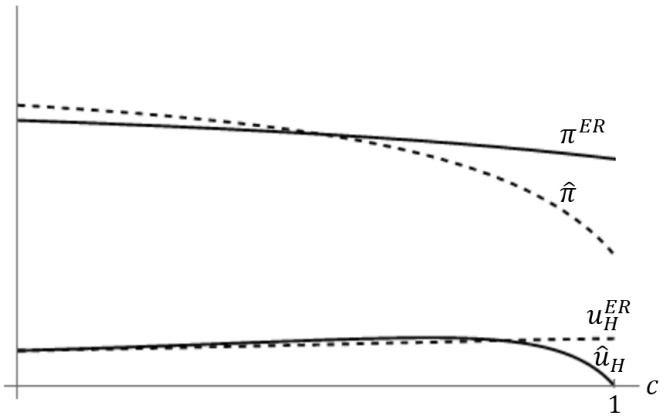

Figure 6. Equilibrium with envy-reduction interventions.
Parameters: $\mu = 0.4$, $\alpha = 2$, $\delta = 0.4$, $\theta = 1.2$, $\beta = 0.2$

"In the presence of disadvantageous fairness concerns, the size of the ability gap negatively affects the net earning of workers."

We use data retrieved from the German Socio-Economic Panel Study (GSOEP), a representative annual panel survey of private households in Germany. The SOEP questionnaires collect data at the household level as well as at the individual level and cover a broad array of topics of interest for research in social and behavioral sciences.[11] We follow a large body of research that exploits GSOEP data to study issues related to individual comparison on income (Ferrer-i Carbonell, 2005; Vendrik and Woltjer, 2007; Clark et al., 2008). More recently, Barigozzi and Manna (2020) use GSOEP data to empirically verify their theoretical results on workplace envy in mission-oriented organizations.

Using individual data from the 2019 wave of the *Work and employment* module, we identify some variables that proxy workers' ability gap and fairness concerns. We derive the variable *ability* by taking the average of the answers – ranging from 1 (does not describe me at all) to 7 (describes me perfectly) – given over three statements

[11] About 15,000 households and 30,000 individuals have been surveyed since the GSOEP establishment. The survey has been running annually since 1984, and represents an unique source of high-quality micro data on employment, income, well being, education and household composition.

that capture the respondents' overall job-related skill (*"I see myself as someone who is effective and efficient in completing tasks"; "I see myself as someone who does a thorough job"; "I see myself as someone who comes up with new ideas"*). Then, we obtain the variable *ability_gap*, a measure of the size of ability heterogeneity among workers, as the absolute value difference between each worker's *ability* and the median value of *ability* by sector and occupation.

In the 2019 GSOEP individual questionnaire, there is also a question on how fair individuals consider their own net earnings: *"If you think about your current net income, would you say that it is just, considering the type of work you do, or that it is unjustly high or low?"* The scale of answers ranges from -5 (unjustly low) to 5 (unjustly high), and centers on 0 (just). From this question, we create the variable $fairness$, which proxies the presence of inequity concerns related to one's net earnings. We argue that the perception of receiving an unjustly low net income is a good proxy for disadvantageous inequity aversion, and thus, an antecedent of envy. Since we aim at investigating how the emergence of envious feelings interacts with ability heterogeneity and determines the effect on net income, we attempt to disentangle the impact of *ability_gap* in relation to employees' fairness considerations. We split the GSOEP dataset into two subsamples. The first subsample ($N = 4538$) consists of workers who exhibit disadvantageous fairness concerns – i.e., $fairness \in [-5, -1]$ – whereas the second ($N = 3351$) includes those who claim to receive either just or unjustly high net earnings – $fairness \in [0, 5]$.

We estimate the following equation:

$$net\_income = \beta_0 + \beta_1(ability\_gap) + X + \varepsilon, \tag{12}$$

where β_0 is the intercept, β_1 is the coefficient of *ability_gap*, X denotes the vector of control variables, and ε is the error term. The control variables account for each worker's age, gender, years of education, whether the respondent is a white or blue-collar employee, duration of the contract, size of the company where employed, occupation according to ISCO codes, and industry sector according to the NACE classification.[12]

[12]Table 2 provides a detailed description of the variables used in our model.

To test the prediction suggested by our theoretical findings, we consider whether the presence of disadvantageous inequity concerns affects the impact of ability heterogeneity on net income. Specifically, we expect β_1, the coefficient of *ability_gap*, to be negative and statistically different from zero only when considering the subsample of individuals with an envious disposition. This would imply that the magnitude of the skill gap does influence employees' net income, but only when disadvantageous fairness considerations are present. Table 1 displays the estimated OLS coefficients.

Table 1: Estimation results

	Dependent variable: Net income			
	Disadvantageous fairness concerns		No disadvantageous fairness concerns	
	(1)	(2)	(3)	(4)
Ability gap	-50.4*	-55.3*	-54.0	-77.6
	(24.6)	(24.3)	(46.1)	(45.1)
Age		10.7***		11.1***
		(1.33)		(1.89)
Male		648.6***		877.7***
		(37.1)		(69.6)
Education years		46.6***		74.3***
		(7.08)		(15.1)
White collar		-9.93		-21.4
		(54.3)		(54.5)
Short term		-494.3***		-240.2
		(114.5)		(226.0)
Company size	YES	YES	YES	YES
Occupation	YES	YES	YES	YES
Sector	YES	YES	YES	YES
Constant	1302.1***	120.6	1666.3***	-322.8
	(307.9)	(403.3)	(147.2)	(441.2)
Observations	4538	4538	3351	3351
R^2	0.371	0.463	0.355	0.414

In parentheses standard errors clustered at the occupation level.
* Denotes significance at the 10% level, ** at the 5% level, and *** at the 1% level.

Specifications 1-2 confirm that *ability_gap* has a significant and negative impact on net income when individuals display envious tendencies. The result appears to be consistent when accounting for a subset of control variables (company size, occupation, and sector) as well as when considering the full set of controls. More specifically, the coefficients of *ability_gap* are both statistically significant at the 10% level, and equal to -50.4 and -55.3.

Specifications 3-4 replicate the previous analysis on the subsample of respondents who do not have disadvantageous inequity aversion, and show that while maintaining a negative sign, the estimated coefficient of *ability_gap* ceases to be significant. The findings across the different specifications corroborate our hypothesis on the potential benefit on workers' net earnings arising from disadvantageous fairness concerns, provided a low ability heterogeneity. Thus, high-ability workers are better off *"in the same boat"* with the envious and less-talented colleagues.

We acknowledge the limitations of our empirical analysis. The variables *ability*, and that of *ability_gap*, have been extrapolated from the responses given over self-assessed – and thus, highly subjective – questions. Moreover, equating the presence of disadvantageous inequity aversion to the individual claim that one's net income is unfairly low may be questionable. Nonetheless, our estimates appear to be consistent with the model, providing empirical support for our theoretical findings.

Table 2: Variables description

Net income	Amount of income after deduction of taxes, social security, and unemployment and health insurance, earned in the the month prior the interview.
Ability gap	Absolute value difference between each respondent's *ability* and the median *ability* by sector and occupation.
Age	Age of the respondent.
Male	Dummy variable equal to 1 (0) if the respondant is male (female).
Education years	Number of years of education.
White collar	Dummy variable equal to 1 (0) if the respondant is a white-collar (blue-collar) worker.
Short-term contract	Dummy variable equal to 1 (0) if the worker has a temporary (permanent) employment contract.
Occupation	Occupation is controlled by a set of 10 dummy variables according to the 4-digit ISCO (International Standard Classification of Occupations) codes.
Sector	Sector is controlled by a set of 21 dummy variables according to the 2-digit NACE Rev. 2 codes (Nomenclature des statistiques des activités économiques de la Communauté européenne - Statistical Classification of Economic Activities in the European Community).

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 utility loss 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 loss 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

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

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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