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Abstract: How does job assignment to positions with different surplus affect fairness concerns? We experimentally examine agents' fairness concerns in a three-person ultimatum game in which all agents are asked to complete a general knowledge quiz before being assigned to a high-stake or low-stake position. We disentangle two possible channels through which job assignment impacts fairness concerns, wage differences and the principal's intentions, by comparing cases in which the job assignment is determined randomly or by the principal. The knowledge quiz, which mimics performance evaluation, signifies the distinction between the two cases as it provides a basis on which the principal can make the assignment decision. We find that the principal's intentions significantly impact fairness concerns of the agents assigned to the low-stake position, but wage differences themselves do not. We elaborate on managerial implications of our findings.

Keywords: job assignment, fairness concerns, experiment, ultimatum game, wage differences, intentions

JEL codes: C91, C92, J31, J71

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1. Introduction

An employer assigns a job to an employee in an organization, where the job creates surplus to be split between the employer and the employee. The employee receives a portion of the surplus as a wage offered by the employer, and the employer captures the remainder, the surplus minus the wage, as a contribution to his profit. The employer often assigns different jobs to different employees, where surplus created by one job tends to be different from surplus created by another job. As an example, consider an employer who has two vacant sales positions, where one position serves a geographical area with wealthy customers and the other position serves an area with average customers. A salesperson assigned to the former position tends to create a larger surplus and hence also to receive a higher wage, compared to a salesperson assigned to the latter position, creating a reference point (Kahneman and Tversky, 1979).[1] The salespersons compare their wages, taking into account their own positions and the way they were assigned to them. The comparison may lead to fairness concerns, which often affect the performance of organizations in important ways, e.g., deteriorate customer service behaviors and cooperation with fellow employees.[2,3]

Differences in wages, caused by heterogeneity in job positions, are not the only possible channel through which job assignment can affect fairness concerns. According to the attribution theory in social psychology, people have a tendency to attribute failure and unfavorable outcomes to external circumstances and other people (also known as the self-serving bias; see e.g., Mezulis et al, 2004). A disgruntled employee might thus attribute being assigned to the job position with a small surplus to the employer's intentions, making intentions another possible channel through which job assignment leads to fairness concerns.

How does job assignment to positions with different surplus affect fairness concerns? In what follows we study how wages, caused by assignment to job positions with different

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[1] For example, in Citi Bank, the "Personal Banker" and "Relation Manager" positions, both operating in sales, have essentially the same job description. A Relation Manager is a personal banker for wealthier and privileged bank customers and sells more lucrative products. The distinction between the positions is, for example, reflected in the key accountabilities described in job advertisements; see https://jobs.citi.com/job/sydney/personal-banker-retail-banking/287/15581913 for Personal Bankers and https://jobs.citi.com/job/sydney/service-relationship-manager/287/14007768 for Relation Managers.

[2] Bettencourt and Brown (1997) study contact employees in service companies and find positive relationships between employee fairness perceptions and their prosocial service behaviors (customer service behaviors and cooperation with fellow employees).

[3] Ho and Su (2009) elaborate in detail on wide economic implications of fairness concerns, from wage compression, through "pattern" bargaining (sequential bargaining with multiple parties) to constraining monopoly's ability to price discriminate. In the current paper, we primarily focus on fairness concerns in labor markets. See also Brockner's (2006) discussion about how employees, who feel that they are not treated procedurally fairly by their companies, tend to retaliate against the company, hurting its productivity.

surplus, and assignment procedures (that allow us to turn on and turn off the intentions) interact to create employees' fairness concerns (also referred to peer-induced fairness; Ho and Su, 2009). Given that wage differences are often driven by job differences, we distinguish between job-driven wage differences themselves and the perceived principal's intentions revealed by the assignment decision as possible channels through which they originate. Such a distinction will enable us to generate insights crucial for constructing principal-agent models with increased empirical validity and prediction power.

A comprehensive analysis of conditions under which each possible channel does or does not lead to fairness concerns requires observing behavior of the employer and employees in counterfactual situations that are unlikely to be present in happenstance data or obtained through a field experiment. We therefore investigate our research question in a controlled laboratory experiment. To mimic the key features of heterogeneous positions in the workplace that are relevant for horizontal fairness concerns, we adopt a three-person ultimatum game with unequal stakes, in which the employer (henceforth the principal) assigns one employee (henceforth agent) to a higher stake (representing a larger surplus) and the other agent to a lower stake (representing a smaller surplus).[4] This setup enables us to create situations in which the high-stake position tends to yield higher wages and the low-stake position tends to yield lower wages, affecting horizontal fairness concerns of agents assigned to positions with different stakes. Employing the three-person ultimatum game allows us to control for the stake sizes that our participants encounter and unambiguously measure fairness concerns to answer our research question.

As we explain in detail in Section 3, we approximate the horizontal fairness concerns by the sensitivity of an agent's minimum acceptable offer (MAO) ratio (the ratio of the agent's MAO to the size of own stake) to the other agent's offer ratio (the ratio of the offer that the principal made to the other agent to the other agent's stake size). MAO delineates what an agent considers fair and unfair, independently of the actual principal's behavior. A higher MAO ratio implies that more offers are considered unfair. The agent is willing to forego a monetary gain to punish the principal if the offer is lower than MAO. Higher sensitivity means that the agent cares more about the other agent's offer ratio when the agent decides whether to accept the principal's offer, implying the agents' stronger horizontal fairness concerns.

[4] Ho and Su (2009) also use a three-person ultimatum game to explore fairness concerns; in their setup the stake size is kept constant.

In this setup, we unambiguously identify two conjectured channels through which job assignment can affect horizontal fairness concerns: wage differences and the principal's intention revealed by job assignment. A key novelty of our experiment is disentangling these two channels. To this end, we compare the case of principal assignment, where the agents are assigned to their respective positions by the principal (who is thus accountable for the outcome), with the case of random assignment, in which it is known that the agents are randomly assigned to the positions independently of their performance. If agents exhibit fairness concerns in the random assignment case, these concerns are driven solely by job-driven wage differences themselves. In the principal assignment case, the assignment creates wage differences that can cause fairness concerns; however, the assignment also reveals principal's intentions, potentially exacerbating the agents' fairness concerns.

An employer typically assigns employees to job positions based on the evaluation of their performance. In our experiment, to mimic features of performance evaluation in the workplace, agents complete a general knowledge quiz before they are assigned to positions with different stakes. The knowledge quiz signifies the distinction between the case of principal assignment and the case of random assignment because it provides a basis on which the principal can make the assignment decision.

Based on the psychology insights that people tend to attribute failure and unfavorable outcomes to others, we conjecture that an agent assigned to the low-stake position (henceforth referred to as Agent L) exhibits stronger fairness concerns under principal assignment than under random assignment, because in the former job assignment outcomes can be attributed to the principal's intentions. In the case of random assignment, since assignment outcome is beyond the principal's control, the principal is not responsible for Agent L being assigned to the low-stake position. In contrast, in the case of principal assignment, we suppose that Agent L holds the principal accountable, strengthening Agent L's fairness concerns.

Through analogous logic we conjecture that an agent assigned to the high-stake position (Agent H) exhibits weaker fairness concerns under principal assignment than under random assignment. Being assigned to the high-stake position, Agent H is likely to receive a higher offer in absolute terms than Agent L. In the case of principal assignment, Agent H appreciates the principal assigning him to the high-stake position and understands if the principal increases the offer ratio (offer to stake size) to compensate Agent L. In case of random assignment, Agent H understands that the principal is not responsible for assigning him to the high-stake position and is less understanding (i.e., has higher sensitivity) to the principal increasing the offer ratio of Agent L.

From the perspective of performance evaluation, job assignment can be merit-based, meaning that a better performer is assigned to a high-stake position and a worse performer is assigned to a low-stake position or reverse-merit-based where the better performer is assigned to a low-stake position and vice versa. The merit-based assignment may not always be achieved due to reasons such as inside politics and nepotism. Imprecise assessment of job performance may also result in a reverse-merit-based assignment.[5]

We explore whether the strength of fairness concerns differs between merit-based and reverse-merit-based assignments, a comparison hard to gauge from happenstance data because of the lack of counterfactuals (and/or possibly not knowing that the implemented assignment is reverse-merit-based). The quiz performance in our experiment likely establishes a sense of entitlement, meaning that an agent who performed better on the quiz feels entitled to be assigned to the high-stake position. Given that entitlements to property rights constitute an important element of fairness concerns (see e.g. Hoffman, McCabe, Shachat, and Smith, 1994), we conjecture that an agent exhibits stronger fairness concerns when he has been assigned to a low-stake position under reverse-merit-based assignment than under merit-based assignment. This is because, under reverse-merit-based assignment, the agent who has been assigned to a low-stake position has achieved a better performance compared to the agent who has been assigned to a high-stake position. The better performing agent therefore feels entitled to the higher offer received by the worse performing agent and this feeling of entitlement strengthens the better performing agent's horizontal fairness concerns.

Our experimental findings support our conjecture that Agent L exhibits stronger fairness concerns under principal assignment than under random assignment, but they do not support our conjecture that Agent H exhibits weaker fairness concerns under principal assignment than under random assignment. In other words, our findings suggest that the principal's intentions significantly strengthen fairness concerns of an employee assigned to a disadvantageous position, but do not significantly weaken fairness concerns of an employee assigned to an advantageous position.

Our finding that Agent L's fairness concerns are weaker under random assignment than under principal assignment yields a managerial implication that a possible way to mitigate horizontal fairness concerns in an organization could be to separate the process of job assignment from that of making wage offers. Decoupling job assignment from wage offers can

[5] A major disadvantage of reverse-merit-based assignment is a mismatch between ability of agents and productivity of positions, leading to production inefficiency, when performance is a measure of agents' ability.

be achieved by making it clear to employees that it is the human resource manager who makes job assignment decisions, and it is the employee's immediate line manager who makes decisions regarding wages. By doing so, agents' fairness concerns arising from wage differences can be weakened because they are separated from the employer's intentions associated with job assignment.

Regarding agents' sense of entitlements, we do not find that the strength of agents' fairness concerns significantly differs between merit-based and reverse-merit-based assignments. At the same time, we find the strongest and statistically significant fairness concerns when the better-performing agent is assigned by the principal to the low-stake position (that is, reverse-merit-based assignment). Our finding is consistent with the idea behind our conjecture that fairness concerns under reverse-merit-based assignment are stronger than under merit-based assignment.

A managerial implication arising from this finding is that the employer should carefully explain the reason behind the job assignment decision to the candidate assigned to a disadvantageous position. This is so that the candidate understands that he has been assigned to the disadvantageous position because the other candidate ranked higher in performance evaluation. Providing a convincing explanation is important because, if the candidate feels that the job assignment is reverse-merit-based, he might exhibit fairness concerns (and withhold his effort consequently). If it is not possible for the employer to offer a convincing explanation or observable proof supporting the job assignment, the employer might need to compress wages between the two salespersons in order to mitigate the fairness concerns.

2. Relationship to the literature

Job assignment is a crucial decision to be made by employers in work organizations. We contribute to the literature on horizontal fairness concerns (sometimes referred to as social or peer comparisons) by investigating impacts of assigning employees to positions with different surplus. The effects of difference in wages (offers made by a principal to agents) on horizontal fairness concerns have been studied in three-player (one principal and two agents) ultimatum and gift exchange games. In most of these previous studies, agents are assigned to positions with identical stake size (ultimatum game) or productivity (gift exchange game).[6] In sharp contrast, agents are assigned to positions with different stake sizes in our multi-agent

[6] The only exception that we are aware of is Charness and Kuhn (2007). Later in this section we will discuss similarities and differences between Charness and Kuhn's (2007) experiment and ours.

ultimatum game because our research question requires positions with different surplus as a key element of the decision-making environment. Positions with different stake sizes enable us to study job assignment and serve as a basis on which different wages are offered across agents. The resulting difference in offers and the perceived principal's intention associated with job assignment serve as possible channels leading to agents' horizontal fairness concerns in our setup.

In the remainder of this section, we discuss our paper's relationships and contributions to the literature on reference dependence, fairness concerns, intentionality of actions, and property rights entitlement.

2.1 Reference dependence

Assigning agents to positions with different surplus often leads to different wage offers, where the offer to the other agent creates a reference point against which own wage is compared. Pioneered by Kahneman and Tversky (1979), reference-dependent preferences have been shown to play a role in various domains of economic behavior. While some reference-dependence theories are based around the idea that expectations can act as a reference point (e.g., Bell, 1985; Loomes and Sugden, 1986; Kőszegi and Rabin, 2006, 2007, 2009; Abeler, Falk, Goette, and Huffman 2011, Gneezy, Goette, and Sprenger, 2017), empirical evidence also shows that people look to their peers for reference to evaluate whether an offer is fair (Ho and Su, 2009). By exploring whether agents' fairness concerns are affected by the process through which their reference offer was established, we contribute to the understanding of factors that drive the salience of reference points and thus possibly impact subsequent behavior.

2.2 Vertical and horizontal fairness concerns

In laboratory experiments, the vertical fairness between a principal and an agent has been predominantly studied using a two-player version of the ultimatum game (Güth, Schmittberger, and Schwarze, 1982), in which the principal makes an offer how to split a pie of a certain size and the agent decides whether to accept or reject the offer. Principals often offer substantial (fair) fractions of the total pie to agents and that if the offer is deemed unfair, it is likely to be rejected (Camerer, 2003). These findings are robust to stake size (Slonim and Roth, 1998). Relatedly to our research question, Bohnet and Zeckhauser (2004) find that agents' rejection rates increase when average offers are revealed to them in two-player ultimatum games. Also, lower offers are more likely to be rejected when they are intentional than when they are clearly unintentional (Kagel, Kim, and Moser, 1996). Another popular vehicle for studying the vertical fairness is the gift exchange game (see Camerer, 2003 and Charness and Kuhn, 2011 for reviews of the literature), in which the principal offers the agent a wage and the agent responds with exerting costly effort. Usually, a higher wage is correlated with higher effort, but the intentionality behind the offered wage also plays an important role (e.g., Charness, 2004).

Studying horizontal fairness requires a multi-agent setting. In a three-player (one principal-two agents) ultimatum game, Knez and Camerer (1995) implement a setup in which the players receive an outside option in case the offer is rejected . The principal makes an offer to each of the two agents while the agents provide their respective minimum acceptable offers, which could be based on possible amounts offered to the other agent. Knez and Camerer find that agents reject offers more frequently if they are offered less than the other agent but principals do not seem to take this into consideration and do not adjust the offers. Ho and Su (2009) analyze two independent ultimatum games with identical stake sizes played sequentially by a principal and two agents to test if the agents take the other agent's offer as a reference to evaluate their own offer. Ho and Su's result suggests that the second agent may be reluctant to accept an offer that is inferior to that of a peer.

We contribute to the literature on horizontal fairness concerns by investigating job assignment to positions with different surplus as their new and unexplored source. Job assignment is not considered in studies undertaken by either Knez and Camerer (1995) or Ho and Su (2009). In both of those experiments, two agents are assigned to an equal (as opposed to unequal stakes in our study) stake size, and they find that an agent is more likely to reject an offer when the agent observes (Knez and Camerer, 1995) or estimates (Ho and Su, 2009) that the other agent receives a higher offer from the principal.

In a multi-agent setting of the gift exchange game, the principal decides not only on the absolute wage for each agent but also on their relative wages, which introduces (various aspects of) social comparisons if the wages are observable. Charness and Kuhn (2007) conjecture that an agent's sensitivity to other agent's wage should lead the principal to compress wages. In their experiment the subjects are randomly assigned to be either a principal, high productivity agent, or low productivity agent. In the treatment that allows for social comparisons, wages of both agents are made public before the agents choose their effort levels, whereas in the control treatment the wages remain private information. They find that the exerted effort is not sensitive to the other agent's wage.

Our experiment bears some similarity to Charness and Kuhn's (2007) design in that ours has positions with high and low stake sizes, while Charness and Kuhn's has high and low productivity positions, to give principals an incentive to differentiate offers. As studying job assignment is not a part of Charness and Kuhn's research question, in their design the assignment to high and low productivity positions is random and the design does not include assignment by the principal. In contrast, given our focus on job assignment, our experiment includes both the principal assignment case and the random assignment case. By comparing the two cases, we study effects of principal's intentionality associated with the agent's job assignment.

2.3 Intentionality

Economics experiments have clearly demonstrated that intentions influence the vertical perception of fairness in bilateral principal-agent relationships (e.g. Blount, 1995; Cox, 2004; Falk, Fehr, and Fischbacher, 2008; McCabe, Rigdon, and Smith, 2003; Offerman, 2002). The experimental designs studying the role of intentions allow for their presence in one condition and remove them in the control condition by either implementing the decision-maker's choice exogenously by the experimenter (e.g. Charness, 2004; Cox, 2004), using a randomizing device (e.g. Charness, 2004; Cox and Deck, 2005; Gächter and Thöni, 2010), by forcing a particular choice through limiting the choice set to one alternative (e.g. McCabe et al., 2003) or by varying the nature of intentions (Stanca, Bruni, and Corazzini, 2009; Woods and Servátka, 2019) or whether the action was an act of commission or omission (Cox, Servátka, and Vadovič, 2017).

Our contribution to the literature on intentionality of actions is complementary to the contribution by Gächter and Thöni (2010), who study intentionality of actions in the context of horizontal fairness concerns. In a three-player gift-exchange game, Gächter and Thöni study effects of intentionality revealed by wage differences. By including a treatment in which wages are generated randomly and thus the principals are not responsible for the resulting wage differences, Gächter and Thöni identify whether wage comparison effects are due to intentional wage discrimination or wage differences themselves. They find that it is the principal's intentions to discriminate wages rather than the mere wage differences that trigger the wage comparison effect. Given their research question, two agents have identical productivity in Gächter and Thöni's design, and hence job assignment and intentionality associated with it, the focus of our study, do not play a role.

2.4 Property rights entitlement

In the literature on property rights entitlements, it has been shown that whether the assignment to positions triggers fairness concerns often depends on agent's perceived entitlements (sometimes also referred to as legitimacy or deservingness as in Brañas-Garza, 2006). Earlier literature provides ample evidence that fairness concerns are closely related to real effort and relative performance (e.g., Bosman, Sutter, and van Winden, 2005; Cameron, Chaudhuri, Erkal, and Gangadharan, 2009; Cherry, Frykblom, and Shogren, 2002; Danková and Servátka, 2015; Hoffman and Spitzer, 1985; Oxoby and Spraggon, 2008), but do not depend on variables that the agent cannot reasonably influence (see the accountability principle in Konow, 2000).

In an influential study on the topic of entitlements, Hoffman et al. (1994) have their subjects "earn" the right to be the principal (proposer) in the ultimatum game by scoring higher on a general knowledge quiz. The counterpart who scored lower is assigned to be the responder. Performance in this real effort task and the resulting assignment also affects the perceived entitlements and results in principals offering on average a lower share of the pie to their matched agents who are more likely to accept compared to a situation when the rights to be the principal are assigned randomly. We incorporate this design feature into our experiment with the main difference that it is the entitlement to the high surplus position rather than the right to be the principal that is created by the knowledge quiz performance.

3. Experimental design and procedures

We employ a three-person ultimatum game that consists of one principal and two agents. A major advantage of studying fairness concerns using the ultimatum game is that an agent has to sacrifice his payoff to reject an offer inferior to that of another agent, clearly revealing his fairness concerns.[7] In the experiment, each subject is randomly paired with another two subjects to form an anonymous group of three persons and assigned to be either the principal (referred to as the Proposer in the instructions) or one of the two agents (Responders).

In Stage 1, all agents have 10 minutes to complete a general knowledge quiz, while the principals are asked to wait patiently and quietly. The instructions specify that within each

[7] This feature, critical for answering our research question, is absent in the gift-exchange game in which the fairness concerns are confounded with self-interest. For example, observed zero effort could be caused by the agent having fairness concerns and thus withholding effort or by the agent being selfish as exerting effort is costly. The gift exchange game, in which the wage is a transfer from the principal to an agent, is better suited for studying the impact of wages on exerted effort rather than gauging the sensitivity of an agent to the offer made to the other agent relative to the stake size.

group, the two agents are ranked based on their quiz scores. If both agents have the same quiz score, the agent who completes the quiz faster is ranked higher. The agents are informed about their relative performance (and thus their ranking) in all treatments. There is no payment directly associated with the quiz performance (but the relative performance might influence the assignment).[8] Whether or not the principal is informed about the relative performance of agents depends on the treatment.[9]

In Stage 2, each agent is assigned to one of the positions representing the available stake size (π_L = 100 francs or π_H = 200 francs; subsequently we will refer to the agent assigned to the low-stake position as Agent L and to the agent assigned to the high-stake position as Agent H). The assignment to positions is common knowledge and depends on the experimental treatment.

Stage 3 is a three-player ultimatum game, in which a principal moves first and offers O_L, $O_L<=\pi_L$, to Agent L, and O_H, $O_H<=\pi_H$, to Agent H (where each offer is interpreted as a wage). Agent behavior is elicited using the minimum acceptable offer.[10] Neither agent observes the offer that the principal made to him; instead, each agent observes the offer that the principal made to the other agent. Observing the other agent's offer can trigger horizontal fairness concerns. After observing the other agent's offer, each agent states his own minimum acceptable offer (MAO). If the offer made by the principal is greater than or equal to MAO, the offer is accepted (a_i=1) and the agent receives the number of francs stated in the offer while the principal keeps the remainder. However, if the offer is less than MAO then the offer is rejected (a_i=0) and both the principal and the agent receive nothing. The principal receives earnings from both interactions while each of the agent receives earnings only from the interaction he participated in. The principal thus receives $a_H(\pi_H-O_H)+a_L(\pi_L-O_L)$ and the agents receive their respective offers $a_LO_L$and a_HO_H.

Upon the completion of the experiment the subjects are asked to complete a questionnaire for which they are paid additional 5 NZD. The ultimatum game earnings are converted from francs into New Zealand Dollars at the exchange rate 1 franc = 0.1 NZD as announced in the

[8] Participating in a quiz prior to role assignment in the ultimatum game relates our study to the literature on spillovers of competition on other-regarding behavior (e.g., Buser and Dreber, 2016; Harbring, 2010; Brandts, Riedl and van Winden, 2009). We note that this feature is kept constant across all treatments and is therefore unlikely to influence treatment comparisons. We thank an anonymous reviewer for pointing out this issue.

[9] Recall that incorporating Stage 1 into the design is pivotal from the perspective of our research question as it not only introduces performance evaluation and allows us to classify assignments as merit-based or reverse-merit-based, but also to make the principal assignment meaningful in the sense that the agents have established entitlements and make the principal accountable for the assignment outcomes.

[10] Armantier (2006) does not find differences in MAOs in an ultimatum game using the strategy method versus the direct response method. See also Brandts and Charness (2011), Camerer (2003), and Selten (1967).

instructions at the beginning of the session. The participants are then called one by one to collect their payment in private in the control room in the back of the laboratory. To avoid cross-contamination of fairness concerns, the participants play the game only once.

As there is no extant literature employing the same design to address a related research question, our sample size is based on raw data from Ho and Su (2009) who also implement the ultimatum game to explore fairness concerns. In this study, a principal is matched with two agents and plays two ultimatum games sequentially. Before the second agent decides whether to accept the principal's offer, he is asked to guess the principal's offer to the first agent based on a signal, consisting of the true value of the first offer plus a random number. Among 148 correct guesses in their data, 36 offers to the second agent are smaller and 112 are larger than the respective offer to the first agent. When the second offer is smaller, 77% of the offers are accepted. When the second offer is larger, 98% of them are accepted. We utilize this information in our power calculations. In order to achieve a power of 70% (i.e., 30% type II error) along with 5% type I error, we need a sample size of 31 observations (where each observation represents a pair of agents) in each treatment. The power analysis was conducted using G*Power 3.1 (Faul, Erdfelder, Lang, and Buchner, 2007).

A total of 285 subjects (95 triads across three treatments) participated in the experiment conducted in the New Zealand Experimental Economics Laboratory (NZEEL) at the University of Canterbury. The treatments were implemented in a between-subject design, in which each participant is exposed to only one treatment. The participants were recruited using the online database system ORSEE (Greiner, 2015). The number of participants in a session varied from 27 to 36, always in multiples of three. On average, a session lasted 50 minutes including the payment and participants earned on average 12.80 NZD.[11] The experiment was programmed and conducted with z-Tree (Fischbacher, 2007). All sessions were run under a single-blind social distance protocol.

Our primary treatment variation is whether the assignment is determined randomly or by the principal. The design is meant to generate four possible assignment cases: merit-based determined by the principal, merit based determined randomly, reverse-merit-based determined by the principal, and reverse-merit-based determined randomly. Within these assignment cases, the reverse-merit based assignment determined by the principal is a crucial counterfactual, often unobservable (or hard to verify) in everyday life, but necessary to evaluate

[11] At the time of the experiment this was approximately 11 USD and the adult minimum wage in New Zealand was 14.25 NZD per hour.

the importance of the assignment on agents' fairness concerns. To generate enough observations of reverse-merit-based assignment determined by the principal, we implement a second variation, whether or not the principal is informed of the relative quiz performance by agents. Therefore, our experimental design consists of three treatments in total: *Principal/Informed, Principal/Uninformed,* and *Random/Informed.*

In the Principal/Informed treatment, the principal is informed about the relative performance of the two agents and then he assigns them to positions. If agents' relative performance created sufficiently strong entitlements for studying fairness concerns, they will be recognized also by the principal who might use the relative performance as the basis for assignment. If that is the case, the principal is more likely to create a merit-based assignment, i.e., assign the better performer to the high-stake position and the worse performer to the low-stake position. While we expect the Principal/Informed treatment to predominantly generate merit-based assignments, reverse-merit-based assignments (in which the lower performer is assigned to the high-stake position and vice versa) might also be possible. Foreshadowing our results, 26 out of 32 principal's assignments were merit-based, while the remaining six were reverse-merit-based.

To be pooled together with the Principal/Informed treatment, the Principal/Uninformed treatment increases the number of reverse-merit-based assignments by omitting the information that the relative performance of agents will be revealed to the principal from subject instructions. In this treatment it is again the principal who assigns the agents to their positions, but this time he is not informed about their relative performance when making the decision. The agents know that it is the principal who assigns positions, but are not told that the principal is not shown the relative performance. As anticipated, this treatment generated 16 merit-based and 16 reverse-merit-based assignments.[12]

In the two above treatments, the knowledge quiz parallels everyday practice in organizations as it makes the principal's assignment meaningful because it allows him to assign agents to positions based on the observed performance. We argue that, without this basis, the principal's assignment is likely to be viewed by the agents as de facto random. Since the agents

[12] The Principal/Informed and Principal/Uninformed treatments are identical from the perspective of the agents, except for the omitted information that the principal does not know the ranking. We do not find any statistically significant difference between the two treatments in Agent L's and Agent H's MAO ratio (p-value=0.60 and 0.18, respectively; Mann-Whitney test). We also verify whether the omission of information could have influenced the principals to make different offers to Agent L and Agent H. We find no such differences between the two treatments in the offer ratio to Agent L and H (p-value=0.37 and 0.19, respectively; Mann-Whitney test).

see the relative performance on their screens after the quiz, they are likely to think that the principal determines the assignment based on the quiz performance.

In the Random/Informed treatment the principal is informed about the relative performance of agents but the assignment to positions is random, and agents know about the random nature of the assignment. Hence, the assignment does not convey the principal's intentions. The assignment to positions with different stake sizes can still be a source of horizontal fairness concerns because it drives the difference in offers received by the agents. In contrast, in the other two treatments, it is not only the difference in offers but also the principal's intentions revealed by the assignment that can act as potential channels through which the job assignment impacts fairness concerns. We can therefore disentangle the two possible channels by comparing the outcomes in the Random/Informed treatment to the outcomes in the Principal/Informed and the Principal/Uninformed treatments that pool agents' behavior together.[13]

We investigate the strength of horizontal fairness concerns, that is, the extent to which agents look to the other agent to evaluate whether they are treated fairly by the principal. We measure the strength of horizontal fairness concerns by the sensitivity of an agent's MAO ratio (defined as the ratio of the agent's MAO to the size of own stake) to the other agent's offer ratio (the ratio of the offer that the principal made to the other agent to the stake size assigned to the other agent). We postulate that both Agent L and Agent H exhibit fairness concerns in the following sense. Since the same principal makes offers to both Agent L and Agent H (and thus also decides on the size of the offer relative to the stake size of the position), each agent looks at what share the principal offered to the other agent to evaluate the fairness of his own offer. Hence each agent expects to receive more from the principal when the other agent receives more. It is this relationship that we have in mind when we develop our hypotheses below.

[13] Since each agent is presented with the ranking and the offer made to the other agent, there is a possibility of the experimental demand effect (Zizzo, 2010). We note that in workplaces rankings are often made widely available for transparency reasons and so are the salaries. (For example, in the U.S. salaries of government employees are available on the internet). Regarding the implemented ranking procedure, Experiments 2 and 3 in Cox et al. (2017) yield evidence that performance in a real-effort task and assigning people to different stake sizes (by the experimenter) does not influence subject behavior; instead, it is the hypothesized distinction between acts of omission and acts of commission that shifts the decisions in the predicted way. Also importantly, agents in our experiment are presented with the ranking and offer made to the other agent in all three treatments, which controls for the impact of the procedure when estimating the treatment effects. We do not anticipate any interaction between the procedure and our treatment variables.

4. Hypotheses

We conjecture that being able to attribute job assignment outcomes to the principal's intentions matters. Our hypothesis here is that Agent L exhibits stronger fairness concerns when assignment is determined by the principal rather than when it is determined randomly. In the case of random assignment, since assignment outcome is beyond the principal's control, the principal cannot be blamed for Agent L being assigned to the low-stake position. In contrast, in the case of principal assignment, we suppose that Agent L holds the principal accountable for being assigned to the low-stake position, inducing Agent L to require a higher offer (relative to the stake size) from the principal compared to the offer made to Agent H. Hence, we hypothesize that Agent L exhibits stronger fairness concerns under principal assignment than under random assignment. As for Agent H, through analogous logic we hypothesize that Agent H exhibits weaker fairness concerns under principal assignment than under random assignment. Being assigned to the high-stake position, Agent H is likely to receive a higher offer than Agent L. In the case of principal assignment, we hypothesize that Agent H appreciates not being assigned to the low-stake position and understands if the principal increases the offer ratio to compensate Agent L. The reasoning is weaker in the case of random assignment, meaning that Agent H understands that the principal is not responsible for assigning him to the high-stake position and has higher sensitivity to the principal's increasing the offer ratio of Agent L.

Our conjectures regarding the accountability for the assignment are translated into the following two main hypotheses:

Hypothesis 1: *As the other offer ratio increases, Agent L's MAO ratio increases more if the assignment is determined by the principal than if it is determined randomly.*

Hypothesis 2: *As the other offer ratio increases, Agent H's MAO ratio increases less if the assignment is determined by the principal than if it is determined randomly.*

Since there are two possible assignment outcomes (merit-based and reverse-merit-based), the above two hypotheses are expected to be robust to both assignment outcomes. Therefore, we have the following four more specific hypotheses.

Hypothesis 1a: *As the other offer ratio increases, Agent L's MAO ratio increases more if the merit-based assignment is determined by the principal than if it is determined randomly.*

Hypothesis 1b: *As the other offer ratio increases, Agent L's MAO ratio increases more if the reverse-merit-based assignment is determined by the principal than if it is determined randomly.*

Hypothesis 2a: *As the other offer ratio increases, Agent H's MAO ratio increases less if the merit-based assignment is determined by the principal than if it is determined randomly.*

Hypothesis 2b: *As the other offer ratio increases, Agent H's MAO ratio increases less if the reverse-merit-based assignment is determined by the principal than if it is determined randomly.*

Next, we present the arguments regarding the difference in the strength of fairness concerns under merit-based and reverse-merit-based assignments. We begin by supposing that under merit-based assignment the fairness concerns of both Agent L and Agent H depend on the offer made to the other agent. In particular, for both types of agents, MAO ratio increases as the other offer ratio increases under merit-based assignment, a supposition testable from our data.

Focusing on the merit aspect of the assignment outcome, we conjecture that (i) Agent L exhibits stronger fairness concerns and (ii) Agent H exhibits weaker fairness concerns in the case of reverse-merit-based assignment than in the merit-based assignment. The key driving force behind our conjecture is the sense of entitlement. We suppose that, under reverse-merit-based assignment, Agent L feels entitled to the offer that Agent H receives (which is expected to be higher than the offer that Agent L receives due to the larger stake size) because he has been assigned to the low-stake position even though his quiz performance was better than the other agent's. The sense of entitlement increases Agent L's sensitivity to the offer received by Agent H, strengthening Agent L's fairness concerns.

As for Agent H, we suppose that Agent H feels no entitlement to the offer that Agent L receives since it is expected to be lower than the offer that Agent H receives. We conjecture that Agent H exhibits weaker fairness concerns under reverse-merit-based assignment than under merit-based assignment through the following reasoning. Agent H understands that the principal needs to make a relatively high offer to Agent L to satisfy Agent L's sense of entitlement under reverse-merit-based assignment. Agent H also understands that the principal has to do so because Agent H himself is assigned to the high-stake position despite scoring lower on the quiz. This leads Agent H to understand that he himself is partially 'responsible' for the higher offer that the principal has to make to Agent L, reducing Agent H's sensitivity to the offer received by Agent L. The fairness concerns of Agent H (if any) are thus overshadowed by the fact that he has been assigned to the high-stake position.

Our conjectures regarding the comparison between merit-based and reverse-merit-based assignments are translated into the following testable hypotheses:

Hypothesis 3: *As the other offer ratio increases, Agent L's MAO ratio increases more if the assignment outcome is reverse-merit-based than if it is merit-based.*

Hypothesis 4: *As the other offer ratio increases, Agent H's MAO ratio increases less if the assignment outcome is reverse-merit-based than if it is merit-based.*

Since the assignment outcomes can be determined either randomly or by the principal, the above two hypotheses are expected to be robust to both assignment processes. Therefore, we have the following four more specific hypotheses.

Hypothesis 3a: *As the other offer ratio increases under assignment determined randomly, Agent L's MAO ratio increases more if the assignment outcome is reverse-merit-based than if it is merit-based.*

Hypothesis 3b: *As the other offer ratio increases under assignment determined by the principal, Agent L's MAO ratio increases more if the assignment outcome is reverse-merit-based than if it is merit-based.*

Hypothesis 4a: *As the other offer ratio increases under assignment determined randomly, Agent H's MAO ratio increases less if the assignment outcome is reverse-merit-based than if it is merit-based.*

Hypothesis 4b: *As the other offer ratio increases under assignment determined by the principal, Agent H's MAO ratio increases less if the assignment outcome is reverse-merit-based than if it is merit-based.*

5. Results

5.1 Agent Behavior

Table 1 provides summary statistics of the MAO ratio, defined as the ratio of minimum acceptable offer relative to own stake size (either 100 or 200 francs). The summary statistics are calculated separately for each assignment case.[14]

In the case of merit-based assignment determined randomly, Agent L on average asks for a share of 37%, while Agent H asks for a share of 33%. The difference is statistically insignificant (MW test, p-value=0.658). In the case of reverse-merit-based assignment determined randomly, Agent L and Agent H request a share of 32% and 33%, respectively, with the difference also being statistically insignificant (MW test, p-value=0.898).

Table 1: Summary statistics of MAO ratio, separately for each assignment case

Treatment	**Assignment**	**Agent L**	**Agent H**	**N**	**MW test p-values**
Random assignment	Merit-based	0.37 (0.14)	0.33 (0.18)	13	0.658
	Reverse-merit-based	0.32 (0.18)	0.33 (0.18)	18	0.898
Principal assignment	Merit-based	0.39 (0.23)	0.29 (0.20)	42	0.042
	Reverse-merit-based	0.41 (0.19)	0.35 (0.17)	22	0.390

Standard deviations are in parentheses. N refers to the number of observations. MW test presents p-values for the two-sided Mann-Whitney rank sum test comparing the MAO ratio between Agent L and H.

In the case of merit-based assignment determined by the principal, we find that Agents' MAO ratios are statistically different from one another: Agent L requests a share of 39% while Agent H asks only for 29% (MW test, p-value=0.042). Finally, in the case of reverse-merit-based assignment determined by the principal, Agent L requests 41% while Agent H's requests is 35%, with the difference being statistically insignificant (MW test, p-value=0.390). The histogram of MAO ratio for each case is presented in Figure 1.

[14] Recall that one of the objectives of our experimental design is to generate a comparable number of merit-based and reverse-merit-based assignment outcomes under both random and principal assignment procedures. This is achieved by agents in the Principal/Uninformed treatment not being informed whether the principal knows their relative quiz performance. For completeness, the summary statistics at the treatment level are provided in Appendix B, Table 5.

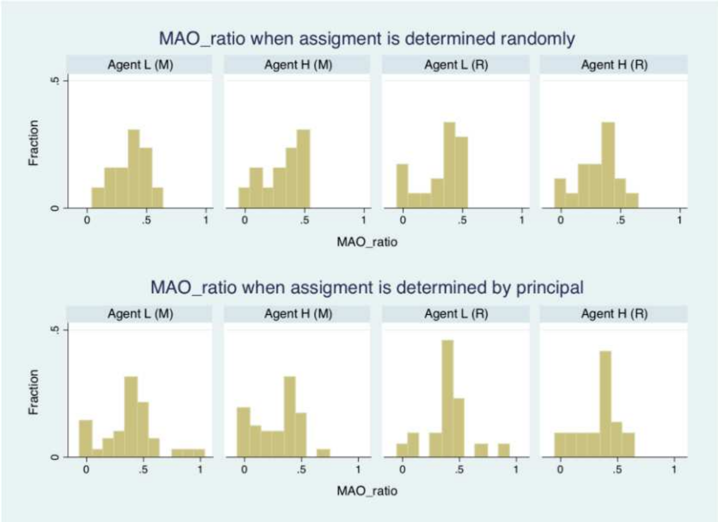

Figure 1: Histogram of MAO ratio, separately for each assignment case

Note: "M" refers to the merit-based assignment and "R" refers to the reverse-merit-based assignment.

To measure agents' fairness concerns, we run OLS regressions separately for the MAO ratio of Agent L and Agent H (see Table 2, Panel A). Relative to non-parametric tests, regressions allow us to control for the impact of the principal's offer to the other agent on one's own MAO ratio. In the regressions, we include the following variables:

1. "Principal-assigned" is a dummy variable equal to 1 for assignments determined by the principal (including both merit-based and reverse-merit-based) and 0 for assignments determined randomly (again including both merit-based and reverse-merit-based). It measures the difference in the MAO ratio between the merit-based assignment determined randomly and determined by the principal when the principal offers nothing to the other agent (in both cases).
2. "Reverse-merit-based assignment" is a dummy variable equal to 1 when the agent who scored higher in the quiz is assigned to the low-stake position (including assignments determined by the principal and randomly) and 0 otherwise (again, including assignments determined by the principal and randomly). It captures the difference in MAO ratio between the randomly determined merit-based and reverse-merit-based assignment when the principal offers nothing to the other agent (in both cases).
3. "Other offer ratio" measures the agent's horizontal fairness concerns (sensitivity of agent's response to the share offered by the principal to the other agent) in the merit-based assignment determined randomly case as the baseline.

4. “Principal-assigned * Other offer ratio” is an interaction term capturing the effect of the merit-based assignment determined by the principal compared to determined randomly (corresponding to Hypotheses 1a and 2a).
5. “Reverse-merit-based assignment * Other offer ratio” is an interaction term measuring the effect of randomly determined assignment that is reverse-merit-based compared to merit-based (corresponding to Hypotheses 3a and 4a).
6. “Principal-assigned * Reverse-merit-based assignment * Other offer ratio” is an interaction term which we also use (in addition to “Principal-assigned * Other offer ratio” and “Reverse-merit-based assignment * Other offer ratio” explained above) to calculate the effect of the reverse-merit based assignment determined by the principal compared to determined randomly (corresponding to Hypotheses 1b and 2b). We also use this term to calculate the effect of principal-determined assignment that is reverse-merit-based compared to merit-based (corresponding to Hypotheses 3b and 4b).

Table 2, Panel B lists the calculations and our findings of horizontal fairness concerns in each of the four cases:

- *Merit-based assignment determined randomly* is represented by the marginal effects of the variable “Other offer ratio.” When the other offer ratio increases from 0% to 100%, Agent L reduces his MAO ratio by 26 percentage points, whereas Agent H increases his MAO ratio by 21 percentage points. Neither effect is statistically significant.
- *Reverse-merit-based assignment determined randomly* is calculated as the sum of the marginal effects of variable “Other offer ratio” and the interaction term “Reverse-merit-based assignment * Other offer ratio.” When the other offer ratio increases from 0% to 100%, Agent L reduces his MAO ratio by 16 percentage points, whereas Agent H increases his MAO ratio by 1 percentage point. Neither effect is statistically significant.
- *Merit-based assignment determined by the principal* is calculated as the sum of the marginal effects of variable “Other offer ratio” and the interaction term “Principal-assigned * Other offer ratio.” When the other offer ratio increases from 0% to 100%, Agent L increases his MAO ratio by 43 percentage points, whereas Agent H increases his MAO ratio by 14 percentage points. Neither effect is statistically significant.
- *Reverse-merit-based assignment determined by the principal* is calculated as the sum of the marginal effects of variable “Other offer ratio”, the interaction term “Principal-assigned * Other offer ratio”, the interaction term “Reverse-merit-based assignment *

Other offer ratio" and the interaction term "Principal-assigned * Reverse-merit-based assignment * Other offer ratio." When the other offer ratio increases from 0% to 100%, Agent L increases his MAO ratio by 72 percentage points, whereas Agent H decreases his MAO ratio by 6 percentage point. The former effect is statistically significant, but the latter is statistically insignificant.

Table 2, Panel C displays our findings with respect to our hypotheses that compare the fairness concerns between the four cases. First consider Hypotheses 1a and 2a, which correspond to the first line of Panel C. Let us consider the case of merit-based assignment determined randomly. As shown in Table B and explained in the previous paragraph, when the other offer ratio increases from 0% to 100%, Agent L reduces his MAO ratio by 26 percentage points. In contrast, in the case of merit-based assignment determined by the principal, when the other offer ratio increases from 0% to 100% Agent L increases his MAO ratio by 43 percentage points. Hence, Agent L's MAO ratio is 69 (=43 – (–23)) percentage points higher if the merit-based assignment is determined by the principal (+43) than if it is determined randomly (–26). This difference is statistically significant and provides support for Hypothesis 1a.[15] Similarly, Agent H's MAO ratio is 7 percentage points lower if the merit-based assignment is determined by the principal than if it is determined randomly. The difference is statistically insignificant and therefore we reject Hypothesis 2a.

Result 1a: As the other offer ratio increases, Agent L's MAO ratio increases more if the merit-based assignment is determined by the principal than if it is determined randomly.

Result 2a: As the other offer ratio increases, Agent H's MAO ratio does not increase less if the merit-based assignment is determined by the principal than if it is determined randomly.

[15] The result becomes insignificant under the conservative Bonferroni correction.

Table 2: The effects of horizontal concerns on MAO ratio of Agent L and Agent H

Panel A: OLS regressions		
Model	(1)	(2)
Dependent variable	Agent L MAO_ratio	Agent H MAO_ratio
1. Principal-assigned	-0.29*	0.03
	(0.17)	(0.13)
2. Reverse-merit-based	-0.09	0.15
	(0.15)	(0.13)
3. Other offer ratio	-0.26	0.21
	(0.20)	(0.27)
4. Principal-assigned * Other offer ratio	0.69*	-0.07
	(0.38)	(0.28)
5. Reverse-merit-based assignment* Other offer ratio	0.10	-0.20
	(0.36)	(0.27)
6. Principal-assigned * Reverse-merit-based assignment * Other offer ratio	0.19	-0.00
	(0.18)	(0.16)
Constant	0.48***	0.20
	(0.08)	(0.13)
N	95	95
R^2	0.08	0.03
Panel B: Fairness concerns in the four cases		
Merit-based assignment determined randomly (3)	-0.26	0.21
Reverse-merit-based assignment determined randomly (3+5)	-0.16	0.01
Merit-based assignment determined by the principal (3+4)	0.43	0.14
Reverse-merit-based assignment determined by the principal (3+4+5+6)	0.72 ***	-0.06
Panel C: Tested hypotheses		
Merit-based assignment determined by the principal – Merit-based assignment determined randomly (4); **Hypothesis 1a & 2a**	0.69*	-0.07
Reverse-merit-based assignment determined by the principal – Reverse-merit-based assignment determined randomly (4+6); **Hypothesis 1b & 2b**	0.88 **	-0.07
Reverse-merit-based assignment determined randomly – Merit-based assignment determined randomly (5); **Hypothesis 3a & 4a**	0.10	-0.20
Reverse-merit-based assignment determined by the principal – Merit-based assignment determined by the principal (5+6); **Hypothesis 3b & 4b**	0.29	-0.20

Note: Standard errors are reported in parentheses. *, **, and *** indicate significance at the 10%, 5%, and 1%-level, respectively.

Next consider Hypotheses 1b and 2b, which correspond to the second line of Panel C. Under reverse-merit-based assignment, Agent L's MAO ratio is 88 percentage points higher if the reverse-merit-based assignment is determined by the principal than if it is determined randomly. This difference is statistically significant and provides support for Hypothesis 1b.[16] In contrast, Agent H's MAO ratio is 7 percentage points lower if the reverse-merit-based assignment is determined by the principal than if it is determined randomly, with the difference being statistically insignificant. Therefore, we reject Hypothesis 2b.

Result 1b: As the other offer ratio increases, Agent L's MAO ratio increases more if the reverse-merit-based assignment is determined by the principal than if it is determined randomly.

Result 2b: As the other offer ratio increases, Agent H's MAO ratio does not increase less if the reverse-merit-based assignment is determined by the principal than if it is determined randomly.

Next consider Hypotheses 3a and 4a, which correspond to the third line of Panel C. Under randomly determined assignment, we find that Agent L's MAO ratio is 10 percentage points higher if the assignment outcome is reverse-merit-based than if it is merit-based, with the difference being statistically insignificant. We therefore reject Hypothesis 3a. As for Agent H, we find that Agent H's MAO ratio is 20 percentage points lower if the assignment is reverse-merit-based than if it is merit-based, with the difference being statistically insignificant. We thus reject Hypothesis 4a.

Result 3a: As the other offer ratio increases under assignment determined randomly, Agent L's MAO ratio does not increase more if the assignment outcome is reverse-merit-based than if it is merit-based.

Result 4a: As the other offer ratio increases under assignment determined randomly, Agent H's MAO ratio does not increase less if the assignment outcome is reverse-merit-based than if it is merit-based.

[16] The result remains statistically significant even under the conservative Bonferroni correction.

Finally consider Hypotheses 3b and 4b, which correspond to the fourth line of Panel C. Under assignment determined by the principal, we find that Agent L's MAO ratio is 29 percentage points higher if the assignment outcome is reverse-merit-based than if it is merit-based, with the difference being statistically insignificant. We therefore reject Hypothesis 4a. As for Agent H, we find that Agent H's MAO ratio is 20 percentage points lower if the assignment is reverse-merit-based than if it is merit-based, with the difference being statistically insignificant. We thus reject Hypothesis 4b.

Result 3b: As the other offer ratio increases under assignment determined by the principal, Agent L's MAO ratio does not increase more if the assignment outcome is reverse-merit-based than if it is merit-based.

Result 4b: As the other offer ratio increases under assignment determined by the principal, Agent H's MAO ratio does not increase less if the assignment outcome is reverse-merit-based than if it is merit-based.

Having tested all our hypotheses, we ask, "In which cases do agents exhibit statistically significant horizontal fairness concerns?" As mentioned earlier, agents do not exhibit horizontal fairness concerns if the assignment is determined randomly, irrespectively of whether the assignment to positions is merit-based or reverse-merit-based. But the principal's intentions and/or agents' sense of entitlements may lead to strong enough fairness concerns. We find that, if the assignment is determined by the principal, while agents (H or L) do not exhibit fairness concerns under merit-based assignment, agent L exhibits fairness concerns under the reverse-merit-based assignment. This finding yields a managerial implication detailed in the Introduction.

5.2 Principal Behavior

Our final observation is related to behavior of principals. Do the principals compress offers and if so, does the offer compression depend on the assignment process (i.e., whether the assignment is determined by the principals or randomly) and assignment outcomes being merit-based or reverse-merit-based?

Table 3 provides the summary statistics of Principals' offers to Agent L and Agent H. We find supporting evidence of offer compression. For all three treatments, the principal offers a relatively smaller share to Agent H than Agent L; with the difference being statistically significant in all three treatments (two-sided Mann-Whitney rank-sum test, p-values are 0.08, 0.001 and 0.001, respectively).

Table 3: Summary statistics of principals' offer ratios

Variable	Treatment	Agent L	Agent H	N
Offer ratio	Random/Informed	0.52 (0.23)	0.44 (0.15)	31
	Principal/Informed	0.55 (0.15)	0.45 (0.09)	32
	Principal/Uninformed	0.52 (0.15)	0.43 (0.09)	32

We next examine whether the principal's offer ratio is affected by the assignment process being merit-based or reverse-merit-based, and by being determined by the principal or randomly. Table 4 displays OLS regressions of the share the principal offers to agents given the merit-based vs. reverse-merit-based nature of the assignment outcome. The results of the Random/Informed treatment are presented in Model (3) in the first column. Under the merit-based assignment determined randomly, the principal offers 43% (corresponding to "Constant" in the fourth row) to Agent H and offers 5 percentage points more (corresponding to "Agent L" in the first row) of the entire stake to Agent L. This difference, however, is statistically insignificant. In contrast, under the reverse-merit-based assignment determined randomly, the principal offers 11 percentage points (corresponding to the last row) more of the stake to the "unlucky" Agent L who ranked higher on the quiz, with the difference being statistically significant.

Next turn to Model (4) in the second column of the table. When the principal is informed about the agents' rankings on the quiz and determines the assignment himself, he offers 9 percentage points more (the first row) to Agent L than Agent H when he assigns roles based on the merit, and 14 percentage points more (the last row) to Agent L than Agent H when the assignment outcome is reverse-merit-based, with both differences being statistically significant. Finally consider Model (5) in the third column of the table. When the principal assigns roles without having information about agents' performance on the quiz, the principal offers 43% to Agent H and 52% to Agent L (9 percentage points more) with the difference being statistically significant.

Observation: *Under merit-based assignment, the principal compresses offers only when the assignment is determined by the principal himself rather than randomly. Under reverse-merit-based assignment, the principal compresses offers no matter whether the assignment is determined by the principal or randomly.*

Table 4: The effects of job assignment on offer compression

	OLS regressions		
Model	(3)	(4)	(5)
Dependent variable	offer_ratio	offer_ratio	offer_ratio
Treatment	Random/Informed	Principal/Informed	Principal/Uninformed
Agent L	0.05	0.09***	0.09***
	(0.07)	(0.03)	(0.02)
Reverse-merit-based	0.00	-0.04	
	(0.06)	(0.04)	
Agent L * Reverse-merit-based	0.05	0.05	
	(0.08)	(0.08)	
Constant	0.43***	0.46***	0.43***
	(0.06)	(0.02)	(0.02)
N	62	64	64
R^2	0.057	0.139	0.111
Post-estimation test			
Agent L - Agent H (under reverse-merit-based assignment)	0.11**	0.14*	

Note: The results are robust to using fractional logit models (details available upon request). Standard errors clustered at the pair level and reported in parentheses. *, **, and *** indicate significance at the 10%, 5%, and 1%-level, respectively.

6. Discussion

Establishing a sense of fairness across employees is a critical element of productive work organizations. In most previous studies, the effects of wage differences on horizontal fairness concerns have been studied in two-agent ultimatum games and gift exchange games, where agents are assigned to positions with the same surplus or productivity. We experimentally investigate horizontal fairness concerns in a two-agent ultimatum game with different stake positions, representing job positions that generate different surplus. If job positions generate different surplus, it is natural and realistic for the principal to make different offers to agents.

Different stake sizes make job assignment to positions meaningful. As a result, job assignment is a likely source of fairness concerns.

We contribute to the literature on horizontal fairness concerns by distinguishing between job-driven (wage) offer differences and the principal's intentions revealed by the job assignment decision as possible channels through which fairness concerns originate. We disentangle the two channels by comparing the random assignment case and the principal assignment case. We find that offer differences on their own do not impact the agents' fairness concerns. The principal's intentions, on the other hand, significantly strengthen fairness concerns of the agents who were assigned to the low-stake position, but do not affect the agents assigned to the high-stake position. This finding yields a managerial implication that a possible way to mitigate horizontal fairness concerns in an organization could be to separate the process of job assignment from that of making wage offers.

Although the difference in fairness perceptions between Agents H and L does not constitute our research question, the result seems consistent with the previous experimental findings that people tend to be concerned with inequity predominantly when it is disadvantageous (see e.g. Bellemare, Kröger, and Van Soest, 2008) or undeserved (Lefgren, Sims, and Stoddard, 2016) and that they are more likely to engage in upward relative comparisons than in downward comparisons (e.g. Ramalingam, 2014).

Whether agents demonstrate their fairness concerns also appears to depend on the relative comparison with the other agent. In two-agent ultimatum games, Knez and Camerer (1995) and Ho and Su (2009) find that an agent is more likely to reject an offer when the agent observes or estimates that the other agent receives a higher offer. Also, in a two-agent gift-exchange game, Gächter and Thöni (2010) find that the agent who receives a lower wage, responds to changes to the other agent's wage by decreasing his effort, but the agent with a higher wage does not react on average. In these experiments, it seems natural for the agent with the lower offer to exhibit fairness concerns because the two agents are in positions with the same surplus or productivity. In contrast, we find that, when the two agents are assigned to positions with different surplus, it is principal's intentions rather than wage differences that trigger fairness concerns of the agent assigned to the low-stake position. That is, job assignment to positions with different surplus alters the channel through which fairness concerns originate.

In relation to the knowledge quiz, a novel element of our experimental design, mimicking performance evaluation in work organizations, we find that it is the better-performing agent assigned by the principal to the low-stake position who exhibits most significant fairness concerns. This finding suggests importance for the employer to carefully explain the reason behind the job assignment decision to the candidate assigned to a disadvantageous position.

As a direction for future research, we believe that it is meaningful to incorporate in the experiment enriching features that one might encounter in everyday business practice. For example, not all performance can be clearly measured or directly compared, in which case the principal might have to subjectively evaluate the performance of agents. While in our design, in order to allow for causal inference, we make it unambiguous whether an agent scored higher or lower than his counterpart, in some workplace environments the difference in performance is not sharply defined. Furthermore, an employer might choose to make the performance evaluation intentionally vague to mitigate fairness concerns between employees. We view investigations along these lines as a fruitful avenue for future experimental research on the importance of the job assignment process for fairness concerns inside an organization.

In the same vein, one can study horizontal fairness concerns in a setup consisting of two principals and two agents, in which one principal determines the job assignment and the other principal makes offers to both agents. One can then compare the strength of ensuing fairness with those in the principal assignment case studied in the present paper. The comparison would yield an implication regarding the value of separating the process of job assignment from making wage offers, as explained above. Finally, conducting related field experiments would strengthen relevance of the current findings to actual firms and businesses.

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Appendix A.
INSTRUCTIONS

No talking allowed

Thank you for coming. The purpose of this session is to study how people make decisions in a particular situation. From now until the end of the session, unauthorized communication of any nature with other participants is prohibited. If you violate this rule we will have to exclude you from the experiment and from all payments. If you have a question after we finish reading the instructions, please raise your hand and the experimenter will approach you and answer your question in private.

Earnings

Every participant will have an opportunity to earn money in the experiment. Your final experimental earnings will depend on your decisions and on the decisions of others. It is therefore very important that you read these instructions carefully. The payoffs will be denoted in experimental currency referred to as *francs*. Upon completion of the experiment, all francs will be exchanged into dollars using the following exchange rate:

1 franc = $0.1

Notice that the more francs you earn, the more dollars you will receive. All the money will be paid to you privately in cash at the end of the experiment.

Group Assignments

You will be randomly paired with two other participants to form a group of three persons. No one will learn the identity of the persons (s)he is paired with. Each person in the group will be assigned to serve as either "a Proposer" or "a Recipient". Each group consists of one Proposer and two Recipients: Recipient A and Recipient B. The computer randomly determines whether you will be a Proposer, Recipient A or Recipient B and will inform you about your assignment at the beginning of the experiment. You have a 1/3 chance of becoming a Proposer, a 1/3 chance of becoming Recipient A, and a 1/3 chance of becoming Recipient B.

General knowledge quiz

In the first part of the experiment the Recipients will be asked to complete a general knowledge quiz. Each Recipient will be asked to answer the same set of 20 questions in the same order. Each question has one correct answer. The Recipients will have 10 minutes to answer all 20 questions. Remaining unanswered questions count as incorrect answers.

Within each group, the two Recipients will be ranked based on their quiz scores. If both Recipients have the same score in the quiz, the Recipient who completed the quiz more quickly will be ranked higher. [Principal/Informed and Random/Informed: The Proposer and both Recipients will be informed about which of the Recipients ranked higher.]

While Recipients complete the quiz, we ask all Proposers to wait patiently and quietly. Please do not use the computer in front of you as it is set up for the experiment.

Decision-making part

[Random/Informed: Within each group, one randomly selected Recipient will be assigned the R-200 role, and the other Recipient will be assigned the R-100 role. Each Recipient has a 1 in 2 (i.e. 50%) chance of being assigned the R-200 role, and also 1 in 2 (i.e. 50%) chance of being assigned the R-100 role.]
[Principal/Informed and Principal/Uninformed: Within each group, one Recipient will be assigned the R-200 role and the other Recipient will be assigned the R-100 role. The Proposer decides which Recipient is assigned the R-200 role and which the R-100 role.]

The Proposer and the R-200 Recipient will receive a sum of 200 francs to be divided between themselves. Separately, the Proposer and the R-100 Recipient will receive a sum of 100 francs to be divided between themselves.

The procedure for dividing each sum of money between the Proposer and each Recipient is as follows. The Proposer will choose how many francs out of 200 to offer to the R-200 Recipient and how many francs out of 100 to offer to the R-100 Recipient.

If the R-200 Recipient accepts the offer made to him/her, (s)he will receive the number of francs stated in the offer, whereas the Proposer will keep the remainder, (200 – the offer). If the R-200 Recipient rejects the offer, the 200 francs disappears and both the Proposer and the R-200 Recipient will receive nothing.

Similarly, if the R-100 Recipient accepts the offer made to him/her, (s)he will receive the number of francs stated in the offer, whereas the Proposer will keep the remainder, (100 – the offer). If the R-100 Recipient rejects the offer, the 100 francs disappears and both the Proposer and the R-100 Recipient will receive nothing.

Each Recipient will not observe the offer that the Proposer made to him/her; however, (s)he observes the offer that the Proposer made to the *other* Recipient. After observing the offer that the Proposer made to the other Recipient, each Recipient chooses a number (an integer between zero and the total sum, which is 200 francs for the R-200 Recipient and 100 francs for the R-100 Recipient). This number represents the minimum offer that (s)he is willing to accept from the Proposer, so we call this number the *Minimum Acceptable Offer*. That is, if the offer made by the Proposer turns out to be greater or equal to this number, the offer is accepted. However, if the offer is less than this number then the offer is rejected. It is important to understand that each Recipient chooses the minimum acceptable offer before (s)he comes to know his/her actual offer. The decision procedure described above will be conducted only once.

Calculation of Experimental Payoffs

If the Proposer's offer to a Recipient turns out to be greater than or equal to that Recipient's Minimum Acceptable Offer, then the offer is accepted. This means the Recipient receives the amount of the offer and the Proposer receives the remainder (i.e. the total sum minus the offer made to the Recipient).

If the Proposer's offer to a Recipient turns out to be less than that Recipient's Minimum Acceptable Offer, then the offer is rejected and the Proposer and the Recipient both receive zero francs.
Notice that each Recipient's payoff is not affected by the Proposer's offer to the other Recipient, or by whether that offer (to the other Recipient) is accepted.

A hypothetical example for demonstration purposes

Suppose that:

- *Recipient A is randomly assigned the R-200 role. Recipient B is randomly assigned the R-100 role.*
- *The Proposer offers Recipient A 80 francs (out of 200)*
- *The Proposer offers Recipient B 40 francs (out of 100)*
- *Recipient A chooses a Minimum Acceptable Offer of 60 francs*
- *Recipient B chooses a Minimum Acceptable Offer of 50 francs*

This example results in the following payoffs:

- *Recipient A:*

In this case, the Proposer offered 80 francs, which is more than 60 francs, the minimum amount Recipient A would accept.
Payoffs: The Proposer receives 200-80= 120 francs and Recipient A receives 80 francs.

- *Recipient B*:

In this case, the Proposer offered 40 francs, which is less than 50 francs, the minimum amount Recipient B would accept.
Payoffs: The Proposer receives 0 francs and Recipient B receives 0 francs.

- *Proposer:*

From above, the Proposer receives 120 francs from his/her interaction with Recipient A (the remainder of the 200 francs), and receives 0 francs from his/her interaction with Recipient B (as the Proposer's offer was rejected). Thus in total the Proposer receives 0+120=120 francs.

Summary

If you are randomly selected to be the Proposer, you will have to choose an offer for each of the two Recipients. If you are randomly selected to be a Recipient, you will learn about the other Recipient's offer and will then have to state the minimum offer you are willing to accept.

Are there any questions?

Appendix B:

Table 5: MAO Ratio based on Treatments

Treatment	Assignment outcome	Mean (SD)	N	MW test P-values
Random/Informed	Agent L	0.34 (0.16)	31	
	Agent H	0.33 (0.17)	31	0.72
Principal/Informed	Agent L	0.37 (0.21)	32	
	Agent H	0.29 (0.19)	32	0.08
Principal/Uninformed	Agent L	0.42 (0.21)	32	
	Agent H	0.33 (0.19)	32	0.22

Standard deviations in parentheses. N refers to the number of observations. MW test presents p-values for the two-sided Mann-Whitney rank sum test comparing the MAO ratio between Agent L and H.