

Fair Wages and the Co-Employment of Hired and Rented Hands

- An Experimental Study -

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Abstract

A firm with stochastic demand can rely on hired hands when demand is low and rent additional labour when demand is higher. For high demand this implies the co-employment of hired hands, paid directly by the firm, and of rented hands who are paid by a rental agency. This may cause severe problems if wages differ systematically between hired and rented hands. Will rented hands accept lower wages than hired hands? Or will rented hands demand higher wages as a compensation for flexibility? Fairness norms might play an important role in wage-setting decisions. We will explore theoretically and experimentally possible fairness considerations of the involved parties.

Classification code: C7, C91, D23

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I. Introduction

The employment of rented hands has gained much political attention recently. Policy makers throughout Europe are trying to enhance the flexibility of the labour market by deregulating the laws concerning private agency employment (see CIETT 2000, p. 39), hoping to increase employment. In many countries, employment by private employment agencies (or temporary employment agencies) has been rising during the last decade (Storrie 2002). However, despite this rapid growth, temporary agency jobs still account for only a small fraction of all jobs:² for the European Union, one estimates that in 1999 between 1.8 and 2.1 million people were employed by temporary employment agencies - representing a little more than 1% of total employment (Ciett 2000). More than half of the temporary agency employees ("rented hands") work in the low-skill sector: in 1998, 50% of the rented hands did unskilled manual work and 8% were only qualified for low-skilled office labour, 41% were employed for skilled manual labour, and only 1% could be deployed for skilled office tasks.

In many countries, rented hands earn less than regular employees. For example, in 2002, wages of agency employees in Germany were 22% to 40%, in Spain 10% to 15% and in Great Britain 32% lower than wages of hired hands (Nienhüser and Matiaske 2003: 7). Even after controlling for several factors which potentially influence wages, like skill, firm size, age, nationality and others, the wage differential, for example in Germany, was still 21% for men and 19% for women (Kvasnicka and Werwatz 2002). New labour market regulations in Germany, valid since 2004, aim at closing the wage gap and furthering collective wage agreements for rented hands, while in some other European countries (e.g., France, Greece, Italy, Spain and Finland) laws requiring equal payment for temporary and regular employees have already been in place for a couple of years. While some firms in Germany foresee the "end of temporary agency employment" because of equal payment regulations, others interpret a decrease in the wage differential between hired and rented hands as an important means to improve the reputation of temporary employ-

² There is some limited evidence that temporary agency work varies procyclically, but it is not yet possible to differentiate clearly between business-cycle effects and the recent increase in agency work in most countries (OECD 2002, p. 136, Katz and Krueger 1999, Boockmann and Hagen 2001).

ment agencies as employers and thus the overall image of the whole industry (for a discussion of the effects of pay equality, see Alewell, Friedrich and Martin 2003). Against this background, the question of wage (in)equality and what determines wages paid in co-employment of temporary agency employees ("rented hands") and regular employees ("hired hands") becomes highly relevant.

There is a wide array of interesting topics in this field. First, wage determination for agency employees may be interpreted as one of those rare examples of wage differentiation by skill (see Alewell 1993 and 2001) and is thus a case worth focusing on. Second, it is a difficult and not yet completely resolved theoretical and empirical question whether wage differentials between hired and rented hands induce insider-outsider conflicts with possibly negative effects on the productivity of mixed teams (Friedrich and Martin 2004a, 2004b), or whether pay differentials lead to motivation problems. In the following, we will focus on a third bundle of questions and explore aspects of fairness in wage setting for hired and rented hands. In an experiment, we will analyse whether and, if so, which fairness considerations play a role in wage setting that is not constrained by legal regulations. We focus on "pure fairness considerations" in wage setting and neglect motivation and incentive aspects, because these could give rise to "instrumental" fairness considerations.

We first develop a simple model with co-employment of hired and rented hands (part II) and derive the opportunistic solution outcome (part III). As shown by previous experiments (see Kagel and Roth (eds.) 1995), such benchmark solutions are often not in line with what participants do. Actual behaviour may be strongly influenced by reciprocal considerations and by horizontal (e.g., wages of workers with similar qualifications) and vertical (e.g., of principal and agent) payoff comparisons. The co-employment of hired and rented hands obviously forms a rich context for analysing fairness considerations. We then report an experiment based on the theoretical model in order to learn whether and, if so, how actual behaviour deviates from the benchmark solution.

II. The model

We study a production firm P and its (potential) employee E . Depending on stochastic demand, P may need an additional worker W . Worker W can be employed only by the personnel renting agency A , which also faces a stochastic outside option for renting out

worker W to employers other than P . Both E and W receive unemployment benefits and can accept or reject the offered wages. The decision process consists of the following stages:

Stage 1. Employer P offers E wage S . P also offers a fee c to the rental agency A , which has to be paid in case W is rented out by agency A to employer P . Rental agency A , in turn, offers a two-part contract (S_l, S_h) with $S_h = S_l = 0$ to W . S_h is paid if W is rented out to P or some other employer, while S_l is paid if W is under contract with A but not rented out.³

Stage 2. Employees E and W accept or reject the wage offers by employers P and A . If they reject, they receive unemployment benefits U_E and U_W , respectively. We assume $U_E > U_W$ to account for the typically differing labour market experience of hired and rented hands.⁴

Stage 3. Chance decides whether demand for the products of P is high (h) or low (l) and whether A can rent out W otherwise (o) or not (n). If there is an outside option, the renting-out fee is assumed to be O . For reasons of simplicity, we assume that O is some fixed sum with $U_W < O < (R_h - R_l)$, so that it is always profitable to employ worker W in case of event o and/or h . In case of low demand and acceptance by W in stage 2, the game ends at this stage.

The probabilities of the various constellations are given below.

Demand for Products of P Outside Options for A β	h: High	l: Low
o: outside options	a	b
n: no outside options	g	$1 - a - b - g$

³ Note that imposing $0 \leq S_l$ assumes that for W accepting A 's offers may lead to a situation where unemployment benefits may be lost, i.e., in case of $S_l = 0$, worker W would not earn any money when under contract with agency A but not rented out.

⁴ See Alewell/Friedrich/Martin 2003 for details.

With $a > 0$; $b, g \geq 0$ and $a + b + g < 1$

In general, this allows for any correlation of the two chance events. Since W and E have - by assumption - equal qualifications, it is rather likely that, if P's demand is high, agency A may rent out W. Rather than in the independence of the chance events, we are more interested in such a positive correlation between high demand and the outside option o with β and γ being rather small. A particularly interesting case is a perfect correlation in the sense of $b = 0 = g$, when there is no outside option if demand is low, whereas there is always an outside option if demand is high.

Stage 4. After learning which of the four states of nature applies, rental agency A decides whether to rent out W to P or to some other employer (if such an option is available). This ends the game.

Denote by $R_l (> 0)$ the (lower) revenue of P in case of low demand (l) and E accepting wage offer S , and by $R_h (> R_l)$ the higher revenue of P if high demand h applies and both workers E and W are employed. Due to $R_h - R_l > 0$, employer P can rent out worker W even when A encounters an outside option for renting out W. If only one worker is employed by P, revenue is R_l even in case of high demand h regardless of whether E or W is employed. By assuming $R_l > U_E$, it is always profitable to employ at least one of the workers.

P's profit can be defined by

0	if no worker is employed
$R_l - S$	if only E works for P (under either h or l)
$R_h - S - c$	if E and W work for P (under h)
$R_l - c$	if only W works for P (under either h or l)

For the rental agency A the profit is given by

$c - S_h$	if W is rented out to P
$0 - S_h$	if W is not rented to P but to some other employer

- S_l when W is employed by A but not rented out
- 0 if W does not accept the offered contract

For employee E the payoff is

- S if he accepts the wage offer by P and is employed
- U_E if he rejects the wage offer by P and remains unemployed

For employee W the payoff is

- S_h if she accepts the wage offer by A and works at employer P or some other employer
- S_l if she accepts the wage offer by A , but does not work because she is not rented out
- U_W if she rejects the wage offer by A and remains unemployed

III. The opportunistic solution behaviour

Assuming common and commonly known risk neutrality, we can derive the following optimal decision behaviour.⁵

Employees' decisions: *Employee E* will accept P 's wage offer S if $S = U_E$. Assuming acceptance of the contract in case of indifference, the optimal wage offer to E is thus

$$(1) \quad S^* = U_E$$

Employee W will accept the two-part wage offer (S_l, S_h) with $S_h = S_l = 0$, if the *expected* wage $S_{exp} = U_W$. The expected wage depends on the probability by which W is rented out to employer P or some other employer. As already mentioned, W receives S_h if working (being rented out) and S_l if under contract, but not working.

Let us assume that employer P rents W only as a second worker. This would for example follow if c^* is larger than S^* . Whether and under what conditions this assumption holds is analysed in the appendix.

⁵ For simplicity, we assume that no disutility of work exists. Except for the wages, working conditions and performance of the employees are assumed to be similar (if they are indeed working).

If both workers are employed, W is rented out under high demand with probability $(\mathbf{a} + \mathbf{?})$, and under low demand if there is an outside option for rental agency A , which occurs with probability \mathbf{B} . If P hires E first, then W is not rented out under low demand and no outside option. Thus, the probability for W of being rented out and getting wage S_h is $\mathbf{a} + \mathbf{?} + \mathbf{B}$, the probability of being under contract, but not working and getting S_l is $1 - \mathbf{a} - \mathbf{?} - \mathbf{B}$. Assuming again acceptance of the contract in case of indifference, the optimal wage offer to W fulfils the following condition:

$$(2) \quad S_{\text{exp}}^* = S_h^* (\mathbf{a} + \mathbf{?} + \mathbf{B}) + S_l^* (1 - \mathbf{a} - \mathbf{?} - \mathbf{B}) = U_W.$$

We now turn to the employers' decisions. In stage 1, production firm P has to offer a fee c to rental agency A . There are two main alternatives for P :

The *first* alternative is setting $c = O$, which, due to $O > U_W$, will always be accepted by A , and P will always be able to rent worker W if P wishes to do so. This option is, however, costly to P , paying $c = O$ even if A has no outside option.

The *second* alternative is setting $c = S_h - S_l$, as risk-neutral rental agency A will have to pay W a higher wage if W is rented out. The difference in the wages is $S_h - S_l$ and the decision on stage 4, where W is already under contract, will hinge on this term.

If $S_h - S_l < O$, A would rent out W only in situations with no outside option. Our discussion will rely on this condition $S_h - S_l < O$, which - in view of equation (2) and $O > U_W$ - which applies if

$$(3) \quad (\mathbf{a} + \mathbf{b} + \mathbf{g}) < \frac{O - S_l}{S_h - S_l}$$

For $S_l = 0$, for example, the condition simplifies to $O > (\mathbf{a} + \mathbf{B} + \mathbf{?}) S_h$. And for the special case that W gets a fixed wage with $S_h = S_l$, the condition always holds as $O - S_l > (\mathbf{a} + \mathbf{B} + \mathbf{?}) (S_h - S_l)$ degenerates to $O - S_l > 0$, which should always be true under our assumptions.

Of course, setting $c = S_h - S_l$ requires that A will still want to hire W , i.e., that the expected net profits from hiring W are not negative, or

$$(4) \quad -S_l \mathbf{?} + (O - S_h) (\mathbf{a} + \mathbf{B}) - S_l (1 - \mathbf{a} - \mathbf{B} - \mathbf{?}) = 0$$

or

$$(5) \quad (O - S_h) (\mathbf{a} + \mathbf{B}) = S_l (1 - \mathbf{a} - \mathbf{B}).$$

The net gain for A from employing W in situations with an outside option has to be larger than the expected loss of S_l in situations with no outside option.

By setting $c^* = S_h - S_l$, P will - in comparison to the first alternative of setting $c^* = O$ - save $(O - (S_h - S_l))$ under low demand with no outside option for A, but at the expense of not renting worker W in case of high demand with an outside option for A when the rental agency prefers to rent out employee W to other, better-paying employers.

Setting $c = O$ thus means employing both workers under high demand irrespective of A's outside option and employing only E under low demand. This yields an expected payoff of

$$(6) \quad [(R_l - U_E)(1 - a - \gamma)] + [(R_h - U_E - O)(a + \gamma)],$$

while setting $c = (S_h - S_l)$ results in employing both workers only under high demand and no outside option and gives an expected payoff of

$$(7) \quad [(R_l - U_E)(1 - \gamma)] + [(R_h - U_E - S_h + S_l)\gamma].$$

Comparing (6) und (7) yields: it is optimal for P to set

$$(8) \quad c^* = O$$

if $(6) - (7) > 0$ or

$$(9) \quad (R_h - R_l - O)a > [O - (S_h - S_l)]\gamma$$

holds. Thus, $c^* = O$ is only optimal if the expected net profit through ensuring additional production capacity under high demand and an outside option (left-hand term) is larger than the "loss" by paying more than necessary under high demand but with no outside option (right-hand term). In the special situation with $\gamma = 0$, it will always be optimal to set $c^* = O$, as $R_h - R_l > O$ always holds by assumption.

In general, the optimal choice of c^* depends, however, on the parameters of the model as well as on the endogenous choices of S_h and S_l . We can reformulate (9), sorting for parameters and decision variables, getting

$$(10) \quad (R_h - R_l)\frac{a}{g} - O\frac{(a + g)}{g} > - (S_h - S_l).$$

The right-hand term of (10) is either negative (if S_h is larger than S_l), or zero (if W gets a fixed wage with $S_h = S_l$). Thus, if parameters are such that the left-hand side of (10) is positive, conditions (9) and (10) always hold and $c^* = O$ is optimal. If parameters are

such that the left term of (10) is zero, it is optimal to set $C^* = O$ if W gets a two-part wage. If parameters are such that the left-hand side of (10) is zero and W gets a fixed wage, P is indifferent between setting $c^* = O$ and $c^* = S_h - S_l$.

Finally, rental agency A decides on renting out W to P or to some other employer. For $c^* = O$, W is always rented out to employer P if required and rented out to employers other than P in case of low demand and an outside option.

IV. The structure of the experiment

The participants of the experiment were handed German language instructions (see App. B for a translation) describing the roles of the participants and specifying the parameters. In the experiment, four participants interacted in one round. Participants were randomly matched and randomly assigned one of the four roles, namely employer P , rental agency A , rented employee W and hired employee E .

After a test phase of three rounds, the actual earning phase started, in which participants could earn money by their decisions. Earnings were specified in ECU (Experimental Currency Unit) with 50 ECU corresponding to 1 euro. Additionally, a show-up fee of 125 ECU (2.50 euros) was paid.

Each group of four participants stayed together for 12 rounds with constant role assignment. After the 12th round, groups were reassembled, applying the so-called “round robin” rule, and the experiment started again. In total, 27 periods (including three test rounds that are not considered for the analysis) were played. Participants kept their role throughout the experiment.

Participants were undergraduate students of the Friedrich-Schiller-University in Jena. A total of 80 individuals participated in the experiment, carried out at the experimental laboratory of the Max Planck Institute in Jena. Thus, we observed 20 groups of four individuals in each of the 24 rounds with monetary incentives. The experiment was conducted over a closed computer network and programmed in z -Tree (Fischbacher 1999).

In the experiment, the model parameters were set as follows:

$$O = 25, U_W = 8, U_E = 10, \mathbf{a} = 0.33, \mathbf{?} = 0.33, \mathbf{B} = 0.17, 1 - \mathbf{a} - \mathbf{B} - \mathbf{?} = 0.17,$$

$$R_h = 100, R_l = 50.$$

Formula (9) thus gives $(100 - 50) * 0.33 / 0.331 - (25) * 0.66 / 0.33 = 0$. Setting $c^* = O = 25$ is optimal for employer P as long as $S_h - S_l > 0$, that is, if there is a two-part wage for W.

Otherwise, with a fixed wage for W with $S_h = S_l$, $c^* = S_h - S_l = 0$ would be optimal.

Concerning the optimal wages, (1) implies $S^* = 10$ and (2) leads to $S_h^* = 9.64 - 0.205 S_l^*$ or – expressed by expected wage – $S_{exp} = 0.83 S_h^* + 0.17 S_l^*$.

V. Results

Let us first analyse whether the behaviour is optimal as derived above, before analysing the relevance of fairness norms for wage setting behavior.

V.1. Optimal behaviour of the participants?

Optimal behaviour would imply that (expected) wage offers equal the reservation wage of 8 and 10 ECU for W and E, respectively. However, the average wage offer to employee E is 18.29 ECU (standard deviation 4.26), while the average wage offer to employee W is $S_l = 8.26$ ECU (standard deviation 2.83) and $S_h = 13.42$ ECU (standard deviation 3.51). The expected wage for W is thus 12.54 ECU. Both average values deviate significantly ($p = 0.001$) from the reservation wages.

Only 25 decisions (by nine subjects) or approximately 5% of the decisions relied on $S_l = S_h$. Thus, in most cases W received a two-part wage, and thus $c^* = O = 25$ would have been optimal in nearly all the decisions rounds. However, the average offer c from P to A is larger than O with $c = 27.20$ ECU (standard deviation 7.94). One can hardly view such findings as confirming optimality.

A first - and hardly surprising - result is that the actual behaviour of the participants in the experiment does not correspond to optimal behaviour in the sense of own payoff maximisation or opportunism (see Roth 1995, for an earlier review of similar experimental findings).

V.2. How to account for non-optimal behaviour

There are several traditions or possible ways to account for deviations from optimal behaviour, for example by assuming bounded rationality or by fitting preferences or utility

functions of decision makers to bring optimal behaviour more in line with empirical behaviour (for an overview, see, e.g., Camerer 2003).

One possible explanation, discussed in the literature, are fairness and justice norms. In case of simultaneous employment of hired and rented hands, participants may not only be motivated by their own monetary reward but also by fairness or justice considerations. However, as Konow (2003) shows in great detail by surveying the justice literature, there are many different criteria and reference points by which people may judge the fairness or justice of decisions, wages, payments, etc. (see Gantner, Güth and Königstein 2001, for an experimental analysis of various equity standards). In more complex employment relations, like in our model, vertical fairness (between employer and employee) or horizontal fairness (between different employees; for an earlier experimental study, see Güth, Königstein, Kovács and Zala 2001) may matter.

Co-employment of rented and hired hands is a field that is especially rich regarding these aspects, as several different fairness standards could be decisive. On the other hand, fairness concerns presuppose the possibility of payoff comparisons, as granted by information feedback in our experiment (except for the c-decision), and are known to be weak in stochastic settings like ours. In what follows, we will explore whether and, if so, what kind of fairness considerations might explain wage and/or fee offers in our experiment.

V.3. Horizontal fairness considerations

Let us now look at several possible horizontal fairness standards which each imply a specific ratio of the wage offers to employees E and W by their respective employers P and A:

a. Both employees are offered the same wage as they are perfect substitutes and do exactly the same type of work (the experimental design assumes that the revenue from employing either employee is 50 ECU). Thus, the wage offers should follow the rule $S = S_{\text{exp}}$ and in the special case of a one-part wage for W the rule $S = S_l = S_h$.

b. Each employee is offered an (expected) wage corresponding to their reservation wage. The wage offers should be at 10 ECU for E and (expected) 8 ECU for W. For temporary employee W, both an offer of a fixed wage with $S_l = S_h = 8$ ECU and an expected wage

with $0.17 * S + 0.83 * S_h = 8$ ECU would be in accordance with this rule.⁶ Note that, by setting $S = 0$, agency A could try to balance at least S and S_h since $U_E = 10$ and $S_h = 8/0.83 = 9.64$ are rather close.

c. Each employee receives a wage offer resulting in the same (expected) relative improvement (relative employment dividend) upon the respective reservation wage. Thus, wage offers should show the same relation as the reservation wages, or $S^* / S_{exp}^* = 1.25$. Wage setting according to rule b. is a special case, namely of zero-employment dividends. We differentiate here between the two rules, as rule b. corresponds to optimal behaviour, while rule c. partly does not.

Employer A could rely on differential fairness norms when W is working or is under contract but not working.

d. One such possibility is to set equal wages for actual work, i.e., $S = S_h$, which essentially weakens rule a.

e. Another possibility is to pay equal relative employment dividends for actual work, i.e., to set S and S_h in the same ratio as U_E and U_W , which is 1.25. A special case would be again zero-employment dividends for actual work ($S = U_E$ and $S_h = U_W$).

According to our data, the average wage offers were $S = 18.29$ ECU (standard deviation = 4.26) for employee E. For employee W the average offers were $S = 8.26$ ECU (standard deviation = 2.83) and $S_h = 13.41$ ECU (standard deviation = 3.51), yielding an expected wage $S_{exp} = 0.83 * 13.41 + 0.17 * 8.26 = 12.54$ ECU. Thus, fairness considerations do not lead to equal (expected) wages for E and W (fairness rules a. and b.). All average values deviate significantly ($p=0.001$) from the reservation payoffs. Reservation payoffs thus have no appeal. Employee W receives, on average, only 65.01% of the wage offered to employee E. The ratio between the wage offers of approximately 1.52 (standard deviation

⁶ We cannot be sure whether participants used the (original) probability distribution from the instructions. As participants have little time to gather experience about behavior of their co-players, they should, how-

0.72) rather than 1.25, as required by horizontal fairness, contradicts rule c. One main observation is that both employees earn more, on average, than their reservation wages, and that wage *differentials* between E and W are *larger* than the reservation wage differentials, although both employees do the same work.

Rule d. is not confirmed either, as S and S_h usually show different average values. The 25 decisions where they have the same value account only for about 5 % of all decisions. The same applies to rule e. postulating the ratio 1.25 of S and S_h , whereas the average ratio of the two is $S/S_h = 1.43$ (SD = 0.63).

Overall, it seems that horizontal fairness considerations hardly influence wage offers. These results could be due to the fact that only pairs of employers and employees are direct contract partners. This might induce them to neglect wages paid in other contracts even if the employees work together and perform the same work. Besides, there are some other criteria which could influence fairness considerations like the horizontal fairness of what rental agency A, as employer of employee W, earns in comparison to the production firm P.

V.5. Vertical fairness considerations

Vertical fairness rules aim at a fair division of revenue (or surplus) between employer and employee, that is, within one pair of contract partners.

Rule f: Wage offers divide the revenue equally between employer and employee.

Revenues differ between the two employers. Let us have a look at employer P. As the employment of each employee results in a revenue of 50 ECU in the experiment, this would lead to wage offers of $S = 25$ ECU to employee E. While the revenue share is equal, the surplus over the respective reservation utilities is unequal: $25 - 0 = 25$ for the employer, $25 - 10 = 15$ for the employee.

For W, the respective wage offers of A should follow the rule $0.5c = S_{\text{exp}}$ (or $0.5c = S_h$, if only actual work is considered). Again, equal revenue shares imply unequal (relative) surplus shares over reservations utilities.

ever, form probability assessments which strongly rely on the instructions.

Lower wages for rented hands could result from the fact that the revenue $R_h - R_l$, earned by employing W, has - via c - already been distributed among the two employers. Thus, if *vertical* fairness considerations are shown by the participants, much lower wages for rented hands can result in case of $R_h - R_l > c$, as implied by optimality due to $R_h - R_l > O$, and $O = c^*$. What can be divided between A and W may thus be much smaller than what can be divided between P and E.

Rule g. The two parties of a contract get the same surplus over their respective reservation utilities.

Employer P collects 50 ECU by employing E and has a reservation utility of zero, while employee E has a reservation wage of 10. The total surplus over the reservation utilities is 40. Dividing this surplus equally leads to the wage offer $S = 30$.

A's reservation utility is zero, while W's reservation wage is $U_w = 8$. For employer A and employee W the expected surplus is thus $c\mathbf{g} + O(\mathbf{a} + \mathbf{b}) - U_w = 12.75$ if participants behave *optimally*. Thus, equal division of the expected surplus suggests an expected wage S_{exp} or S_h of $12.75/2 + 8 = 14.375$ ECU.

If participants use *actual* values (when these deviate from optimal ones) to calculate fair wages, we have to discriminate between situations with $c < O$ and situations with $c > O$. For both(situations), the expected surplus is given by $[c(\mathbf{a} + \mathbf{?} + \mathbf{B}) - U_w]$ suggesting S_h or $S_{exp} = U_w + [c(\mathbf{a} + \mathbf{?} + \mathbf{B}) - U_w] / 2 = 4 + 0.415c$. In situations with $c < O$, the expected revenue of agency A is given by $[c\mathbf{?} + O(\mathbf{a} + \mathbf{B})]$, so that fair wages (S_{exp} or S_h) would be $U_w + [c\mathbf{?} + O(\mathbf{a} + \mathbf{B}) - U_w] / 2 = 8 + [0.33c + 25(0.33 + 0.17) - 8] / 2 = 10.25 + 0.165c$.

In inspecting the data, let us consider employer P and employee E first. As already mentioned, the average wage offer S to E of 18.29 ECU (standard deviation = 4.26) differs considerably from 25 ECU and thus contradicts fairness rules f. and g. with regard to employer P and hired hand E. In only 59 decisions (12.29% of all wage offers to E), E was offered 25 ECU as expected under rule f. Only 11 subjects out of 20 participants in the role of P offered 25 ECU at least once, and only five subjects offered this more than twice.

A wage offer of 30 ECU as expected under rule g. is made only six times by three subjects (1.04% of all wage offers by P) with one subject offering this sum three times, one participant twice and one subject once. All in all, there is no evidence for vertical fairness concerns of P when setting wages.

Regarding the wage offers by rental agency A to employee W, it is interesting to note that the average expected wage S_{exp} equals 12.54 ECU (standard deviation 2.87). Thus, the hypothesis derived from fairness rule f. cannot be rejected when applying a t -test. Yet only four participants (20% of the participants in the role of employer P) made offers leading to an expected wage of either 12 or 13 ECU. S_h is, on average, 13.41 ECU (standard deviation = 3.51) and thus higher than the wage of 12.5 ECU expected under fairness rule f. Nevertheless, in 161 (33.5%) decisions participants in the role of agency A made a wage offer S_h being either 12 or 13 ECU.⁷

Regarding fairness rule f., we checked for $0.5c$, S_{exp} as well as S_h for every group (20 in total), every decision round (24 in total) and all plays (20 groups times 24 decision rounds = 480 cases). In only 3 out of 480 cases (0.63 %), $0.5c$ equals the expected wage S_{exp} , and in 51 cases (10.63%) $0.5c$ equals S_h . As the experimental design limited values of S_h to integer numbers, we also examined rounded values for $0.5c$ and S_{exp} . Here, in 49 cases (out of 480; 10.21%), the value of $0.5c$ equalled S_{exp} , and in 67 cases (14.0%), $0.5c$ equalled S_h . In 47 cases (9.79% of all decisions) an expected wage of 14 ECU and in 20 cases an expected wage of 15 (4.12%) was offered by rental agency A.

Finally, only few decisions are in line with fairness rule g. Table 1 summarises the results for each of the two different *actual* values for c , $c > 0$ and $c < 0$.

⁷ Possible values for c were limited by the experimental design to integer numbers.

	C > O	C < O
Number of Decision Cases (out of 480 [24 Periods * 20 groups])	350 (72.92%)	93 (19.38%)
$S_{exp}=4+0.415c$ for $c>O$ or $S_{exp}=10.25+0.615c$ for $c < O$ (based on rounded values ⁸)	8 (2.3%)	4 (4.3%)
$S_h=4+0.415c$ for $c>O$ or $S_h=10.25+0.615c$ for $c < O$ (based on rounded values)	23 (6.6%)	5 (5.4%)

Table 1: Decisions in line with fairness rule g, based on actual values

VI. Summary

A summary of the previous results can be found in table 2, which compares predicted (according to various hypotheses) and actual decision data of different actors.

Optimal results		
	Expected offers	Actual offers
Behavior of A	$S_{exp} = 8$	$S_{exp} = 12.54$ Only 5% cases with $S_h = S_l$
Behavior of P	$S = 10$ $c = O = 25$ if $S_h - S_l > 0$ (which was the case in 95% of deci- sions)	$S = 18.29$ $c = 27.29$
Results under fairness rules		
Horizontal fairness considerations		
Fairness rule a): W und E are offered same (expected) wages	$S = S_{exp}$ oder $S = S_h$	$S=18.29 \neq S_{exp} = 12.54$ $S_l=8.26 \neq S_h=13.41 \neq S = 18.29$
Fairness rule b): wage offered to W and E corre- sponds to reservation wage	$S = 10$ $S_{exp} = 8$ ($S_l=S_h=8$ or $0.17*S_l+0.83*S_h=8$)	$S = 18.29 \neq 10$ $S_{exp} = 12.54 \neq 8$ $S_h = 13.41, S_l = 8.26$
Fairness rule c): wage offered to W and E results in a similar improvement of the payoffs in comparison to reservation wage	$S / S_{exp} = U_E / U_W = 1.25$	$S / S_{exp} = 1.52 \neq 1.25$
Fairness rule d): equal wages for actual work	$S = S_h$	$S=18.29 \neq S_h=13.41$ (equality only in 9.17% of deci- sions)
Fairness rule e):	$S / S_h = U_E / U_W = 1.25$	$S / S_h = 1.43 \neq 1.25$

⁸ As it seemed unlikely that the values for S_{exp} or $S_h = 4+0.41*c$ ($c>O$) and S_{exp} or $S_h = 10.25+0.165*c$ ($c<O$) would equal exactly S_{exp} , we based our analysis on rounded values.

wages offered to W for actual work and E result in a similar improvement of the payoffs in comparison to reservation wage		
Vertical fairness considerations		
Fairness rule f) revenues should be divided equally between employer and employee	<p>$S = 25$</p> <p>Based on optimal values: S_h (or S_{exp}) = $0.5c = 12.5$</p> <p>Based on real values: S_h (or S_{exp}) = $0.5c$</p>	<p>$S = 18.29 \neq 25$ (in 12.29% of decisions $S = 25$)</p> <p>Based on optimal values: $S_h = 13.41$ (but: in 33.5% of decisions $S_h = 12$ or $S_h = 13$) $S_{exp} = 12.54$, $c/2 = 13.6$</p> <p>Based on real values: In 0.63% of decisions $S_{exp} = 0.5c$ In 10.63% of decisions $S_h = 0.5c$ Based on real <i>rounded</i> values: In 10.21% of decisions $S_{exp} = 0.5c$ In 14.0% of decisions $S_h = 0.5c$</p>
Fairness rule g) participating parties A and W as well as P and E get same surplus over respective reservation wage	<p>$S = 30$</p> <p>Based on optimal values: $S_{exp} = 14.375$</p> <p>Based on real values: a) $c > 0$ S_h or $S_{exp} = 4 + 0.415c$</p> <p>b) $c < 0$ S_h or $S_{exp} = 10.25 + 0.165c$</p>	<p>$S = 18.29 \neq 30$ (only in 1.04% of decisions $S = 30$)</p> <p>$S_{exp} = 12.54 \neq 14.375$</p> <p>Based on real <i>rounded</i> values a) $c > 0$ in 2.3% of decisions for S_{exp} in 6.6% of decisions for S_h</p> <p>b) $c < 0$ in 4.3% of decisions for S_{exp} in 5.4% of decisions for S_h</p>

Table 2: Summary of results

VII. Conclusions

As expected, experimental behaviour differs significantly from the opportunistic solution. We systematically explored various fairness norms to account for such deviations. However, the hypothesis that the wage offers for co-employed hired and rented hands are based on horizontal and/or vertical fairness is not well supported. Participants obviously did *not* follow any of the horizontal fairness rules we analysed. With respect to the vertical fairness rules, there is only weak evidence for rule f. of sharing revenue equally.

Whereas P and E obviously did not follow this rule, the average expected wage of worker W seems partially supported by this idea, although only a very small fraction of the participants actually complied with the fairness rule. Altogether, there is no strong evidence for fairness concerns.⁹

An interesting result is that, under certain conditions, vertical fairness leads to larger wage differentials between the two types of employees than predicted by opportunism or horizontal fairness. The reason for different vertical fairness between P and E, and A and W, respectively, seems to be that in the latter case three parties share the surplus.

New German legislation, valid since 2004, stipulates equal wages for rented and hired hands and is clearly aiming at horizontal fairness and thus at a smaller surplus of employers (here of employer P) when employing rented hands. In contrast to what this legislation seeks to ensure, however, this may not further employment at temporary employment agencies but actually hinder it. The new legislation apparently neglects the surplus shares of intermediaries, here agency A, which according to our data will be positive.

Further research could introduce performance incentives for employees.¹⁰ It may too be a promising consideration to reduce the complexity of the situation, e.g., by simplifying or even excluding its stochastic aspects.

⁹ Thus, fairness considerations can hardly be used in an "instrumental" way by employers. This might be different in less complex wage-setting situations, e.g., deterministic ones, as participants could then form more reliable expectations about the behaviour of their fellow participants.

¹⁰ In our model, we excluded any performance incentives for wages and assumed participation incentives only.

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Appendix A - Other employer strategies

As shown above, there are some parameter constellations where condition (9) does not hold, and it may be optimal to set $c^* = S_h - S_l$. This alternative to setting c^* poses an additional question. As the two employees E and W are perfect substitutes, production firm P could abstain from employing E if this is more costly than renting W even in case of high demand and trade off additional production capacity under high demand with lower wages under low demand.

Let P first compare two options, namely renting W only, or hiring E first and renting W additionally in case of high demand. With $c^* = S_h - S_l < 0$, W will not be rented out to P in case of an outside option of rental agency A. The two expected payoffs are:

$$(A) \quad (1 - \alpha - \beta) (R_l - (S_h - S_l))$$

for renting W only and

$$(B) \quad \gamma (R_h - (S_h - S_l) - U_E) + (1 - \alpha - \beta - \gamma) (R_l - U_E)$$

for employing E and also renting W. Additionally, A has to employ W, which is only profitable if condition (5) holds. It is profitable to employ both E and W if (B) is larger than (A) or

$$(C) \quad \gamma [R_h - R_l - (S_h - S_l)] - (1 - \alpha - \beta) [U_E - (S_h - S_l)] > 0.$$

Appendix B - Instructions of the experiment

Welcome to our experiment and thank you for participating in this experiment. Please read these instructions carefully. From now on, please do not communicate with other participants and concentrate on the experiment. If you have any questions, please raise your hand and wait until one of the experimenters comes to you.

The instructions are identical for all participants. All decisions remain anonymous, i.e., you will not be informed by us of the identity of the other participants with whom you will interact.

The experiment consists of two parts. The first part is a test phase and will therefore not be paid. In the second part, you can earn money according to the payoff rules. How much you earn will depend on your own decisions, the decisions taken by the other participants and on chance. All monetary amounts will be paid out in ECU (Experimental Currency Units). 50 ECU correspond to 1 euro. Your payoff plus a show-up fee of 125 ECU (2.50 euros) will be paid to you in cash at the end of the experiment.

In this experiment, four participants interact in one round. In each period, you interact with different participants. Each participant is randomly assigned a role which (s)he keeps throughout the experiment. The roles are marked with the letters P, E, W and A and are described below.

- P is the production firm which can earn a profit by employing E and/or renting W from rental agency A. By selling its products, P can make a profit of 100 ECU if E and W work for P and if there is a high demand for P's products. E and W's jobs are exactly the same (a description of the roles of W and E is given below). Under low demand, or if only one of the two employees works for P, the profit is 50 ECU. The level of demand is open to chance. Employer P starts with a capital of 50 ECU.
- E is an employee and can be directly hired by employer P who offers E a contract with a fixed wage S . Then E decides whether to accept the contract or stay unemployed. If E stays unemployed, (s)he will receive an unemployment benefit of 10 ECU.
- A is a rental agency. It receives a fixed amount c from P if it rents out its employee (W) to employer P. Chance decides whether A has a possibility to rent out W to other employers. In this case, A can decide whether to rent out W for a fixed amount O to other employers or for a fixed amount c to employer P. The amount O lies between 0 and 50 ECU. Rental agency A starts with a capital of 50 ECU.
- W is also an employee, but cannot be hired directly by employer P. If W is hired, it will be by rental agency A. Agency A offers W a contract (wage); this consists of an amount \bar{S} paid if the agency can rent out employee W to a production firm, and an amount \underline{S} paid if the agency cannot rent out W. W decides whether to accept the

contract or stay unemployed. If W stays unemployed, she will receive an unemployment benefit of 8 ECU.

- Unless indicated otherwise below, all offers of each participant are made known to the other three participants interacting with the former.
- In case you, in the role of P or rental agency A, are unable to pay the wages offered, you may take out loans up to your show-up fee (125 ECU). Payment will be reduced accordingly at the end of the experiment.

Each period of the experiment consists of four stages:

- Stage 1: Employer P offers employee E wage (S). P also offers a fee c to rental agency A, payable in case W is rented out to employer P. This amount is known only to A and P. Rental agency A offers contract (\bar{S}, \underline{S}) to employee W.
- Stage 2: Employee E accepts or rejects contract (S). Employee W accepts or rejects contract (\bar{S}, \underline{S}) .
- Stage 3: Two events are decided by chance, first, whether demand for the products of P is high or low and, second, whether rental agency A can rent out employee to another employer (i.e., other than P). It can then collect $O = 25$ ECU from another firm.
- There are thus four constellations:
 1. High demand, renting out W by A to another employer is possible;
 2. High demand, renting out W by A to another employer is not possible;
 3. Low demand, renting out W by A to another employer is possible;
 4. Low demand, renting out W by A to another employer is not possible. The probabilities of (1) and (2) are 33% each and of (3) and (4) 17% each, respectively.
- Stage 4: Rental agency A decides whether to rent out W to P for amount c . This stage only takes place if W accepts the offer made by A, and employer P still has a demand for employees (i.e., either when demand is high or, in case of low demand, E has not accepted the offer made by P).

Below, potential earnings are presented for each person.

Employer P earns

0	if no employee is hired (production = sale = turnover = demand = 0)
50 - S	if only E is employed under contract S
100 - S - c	under high demand and if E and W are employed
50 - c	if only W is employed and c is paid to A

Rental agency A earns

$c - \bar{S}$	if W is rented out to P against payment of c
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- $O - \bar{S}$ if W is rented out to another employer
 $-\underline{S}$ if W is not rented out, but has accepted the contract (\underline{S}, \bar{S}) with A
 0 if W does not accept the contract offered by A

Employee E earns

- S if E accepts the contract offered by P
 10 if E does not accept the contract offered by P and receives unemployment benefit

Employee W earns

- \bar{S} if W accepts contract (\underline{S}, \bar{S}) offered by A and is rented out
 \underline{S} if W accepts contract (\underline{S}, \bar{S}) offered by A and is not rented out
 8 if W does not accept the contract offered by A and receives unemployment benefit

Survey:

	Stage 1	Stage 2	Stage 3	Stage 4
P (Employer)	a) Offers E a contract and wage S b) offers A a fixed amount c for renting out W		Chance decides on high or low demand for the products of P	
E (Employee)		Accepts contract offered by P or stays unemployed		
A (Rental agency)	Offers W a contract and wage (\underline{S}, \bar{S})		Chance decides whether W can also be rented out to other employers	Decides on the renting out of W
W (Rented employee)		Accepts contract offered by A or stays unemployed		

Examples:

- P offers E the following contract: $S = 20$ ECU. P offers A an amount $c = 30$ for rented employee W.
- A offers W the following contract: $\bar{S} = 15$ ECU for renting her out, $\underline{S} = 8$ ECU in case of not renting her out.
- E prefers to stay unemployed and does not accept any contract.
- W accepts the contract offered to her.

- Chance decides that demand is high and that A has no possibility to rent out W to another employer.
- A rents out W to P.

Earnings:

P	$50 - c$	$100 - 20 - 30 = 50$
E	Unemployment benefits	10
A	$c - \bar{S}$	$30 - 15 = 15$
W	\bar{S}	15