

Efficiency Wages Survive Multiple Sources of Income Inequality

Extended Abstract

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Over the years a large body of literature has emerged around the fair wage-effort hypothesis (e.g. Akerlof/Yellen 1988, 1990) as well as the gift exchange game (e.g. Fehr et al. 1993), which is employed to provide the corresponding experimental evidence. Whereas early experimental studies focus on the relationship between one employer and one employee (e.g. Fehr et al. 1998, Gächter/Falk 2002), a few newer studies consider multi-worker relationships (e.g. Maximiano et al. 2007, Gächter/Thöni 2010). Maximiano et al. (2007) thus find that the positive correlation between effort levels and wages, which is observed in bilateral games, remains stable in penta-lateral games (one employer plus four employees). This holds true despite the fact that employers naturally earn more than employees, because they receive earnings from work relations with multiple agents. In fact, the study indicates that payoff inequality might not be the factor driving effort provision, since no differences in the level of effort provision in multi-worker firms are found when compared to bilateral work relations.

We therefore pursue two goals with this study. Firstly, we systematically investigate whether the source of payoff inequality between employer and employee leads to differences in employee effort provision. Secondly, we estimate the parameters of two models of inequity aversion (Fehr/Schmidt 1999, Bolton/Ockenfels 2000) for a bilateral gift exchange game in order to test if these models can be calibrated to explain the wage-effort relation in games with inequality in payoff distributions.

We use controlled lab experiments and base our study on the experimental design of a gift exchange game with payoff functions similar to those employed by Brown et al. (2004). We design three different treatments to shed light on our research questions: the first treatment, *1on1* is a classical bilateral gift exchange game. *Large Group (LG)* is a 13-lateral gift exchange game where each employee generates earnings from only his work relationship with the employer and the employer generates earnings from 12 work relations. *165* is a classical bilateral gift exchange game, in which the employer receives an additional lump sum payment of 165 currency units per round. We choose this amount since each employee contributes on average

15 experimental currency units of employer earnings in *1on1*, *165* (15·11) then simulates the efficiency of 11 co-workers. *165* is thus introduced to test if the source of employer income has an effect on effort choices, i.e. whether employee effort choices are different, once employers earn their higher income through other work relations or are rich by nature.

All of our treatments last for 15 rounds with fixed employer-employee groups and the total payment amounts to the sum of the round income. In order to determine the role of the employer, we let the subjects answer six multiple-choice GMAT questions. The subjects have five minutes to answer as many questions as possible. The role of the employer is then given to the best performer or randomly assigned between the best performers.

In the first step of the game, the employer makes a wage offer to each employee. In the large group treatment, the employer is allowed to discriminate between employees while making his wage offers. After each employee receives the wage offer, the employee either accepts the offer and chooses an effort level or rejects the offer. In case the employee rejects the wage offer, neither the employer nor the employee generate earnings from the work relation in this round of the game. Those employees, who decide to accept the wage offer and subsequently choose an effort level between 10 and 100 percent, incur a non-linear cost of effort depending on the amount of effort chosen.

The experiment was conducted at MaXLab at the University of Magdeburg with 170 subjects leading to 21 independent observations for *1on1*, 8 independent observations for *LG* and 12 independent observations for *165*. Each session lasted about an hour with earnings ranging between 0.50 Euro and 62.30 Euro depending on treatment and role.

We observe a positive monotonous relationship between wage and effort in all treatments (one-tailed Spearman correlation; all correlations significant at the 1% level). We further find no statistically significant difference between effort per experimental currency unit in *1on1* and *LG*, i.e. when deciding upon the effort level, an employee does not differentiate between an employer who generates earnings from only one work relationship or an employer who earns significantly more because he generates earnings from multiple work relations. However, effort per experimental currency unit in *1on1* is significantly larger than in *165* at the 1% level (one-sided U-Test $p=0.005$), indicating that employees exert a lower effort per experimental currency unit once they are aware that their employer is rich by nature. At the same time, effort levels per se do not differ significantly between the three treatments. We thus conclude that efficien-

cy wages survive different sources of payoff inequality. However, wage ranges that are considered fair by the employees vary with the source of income inequality. Thus, while wage levels between *1on1* and *LG* do not differ significantly, wages paid in *165* are significantly larger than those in *1on1* (one-sided U-test, $p=0.052$).

Our results find further support in our maximum likelihood estimations that fit two different models of inequity aversion (Fehr/Schmidt 1999 and Bolton/Ockenfels 2000) under the assumption that subjects choose their optimal reaction given their concern for inequity aversion and their wage offer. Assuming that employees err to some degree when making their decisions and observing no sign of learning in our data, we fit our models to all 288 wage-effort pairs collected in *1on1*.

We find that both models are able to explain the results of *1on1* significantly better than a model of pure income maximization. For the Fehr/Schmidt model we get a coefficient for disadvantageous inequality (α) equal to 0.538 and a coefficient for advantageous inequality (β) equal to 0.231. For the Bolton/Ockenfels model we estimate the coefficient of the comparative effect (b) to be around 80, given that the pecuniary payoff parameter (a) equals 1.¹ Neither of the estimated models, however, can sufficiently explain the positive correlation between wage effort relations in the two other treatments, *LG* and *165*. We therefore conclude that the models of inequity aversion that we consider face difficulties explaining employee behavior when there is an income disparity, even though inequality preferences should not change over treatments.

Our results thus have two major implications: On the one hand, efficiency wages and high effort levels are present despite the unequal distribution of employer and employee payoffs. Inequity aversion apparently does not drive high effort choices when fair wages are paid. Therefore, it seems more important for companies to determine which wage levels are considered fair by their employees than to determine the conditions for payoff equality. Paying fair wages – and not creating equal income situations – enables companies to induce positively reciprocal effort choices from their employees. On the other hand, our findings add to the external validity of the efficiency wage concept for macroeconomic studies, as effort provision is not negatively affected by commonly observed income inequalities due to company size or employer wealth.

¹ Note that a player is fully characterized by a/b .

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