Malaysian Journal of Economic Studies 48 (1): 23-36, 2011 ISSN 1511-4554

# Average Wage, Reputation and Reciprocity

Kean Siang Ch'ng* & Yiing Jia Loke**
*Universiti Sains Malaysia*

***Abstract:*** Four experiments with different treatments were conducted to investigate reciprocal behaviour and the role of average wage information in a gift exchange game. No significant differences were found between the *stranger* and *partner* treatments but when workers have information on the average wage in the *partner* treatments, significant differences between *stranger* and *partner* treatments emerge. This suggests that average wage information reinforces positive reciprocity as intentions of the employer becomes clearer and easier to interpret. Furthermore, the information on average wage gives workers who are concerned with wage-effort equality the incentive to reciprocate effort relative to average wage.

Keywords: Average wage effect, enforcement, repetition effect, reputation
JEL classification: D03, C91, D81

## 1. Introduction

A central component in the fair wage effort hypothesis is that workers respond to fair wage (Akerlof and Yellen 1988; 1990; Bewley 1999). Many experimental and empirical studies conducted have shown strong evidence that workers tend to reciprocate with high effort levels when offered a high wage by firms (Fehr *et al.* 1993; 1997; Fehr and Schmidt 1999; Charness and Kuhn 2007). These observed behavioural patterns are influenced by wage comparisons over time which are enforced by repetition effect and reputation effect.

In a repetition game, players will be matched with the same partners throughout the experiment. Therefore, current defection will be reciprocated by punishment in the subsequent interactions. The repetition effect gives the player the incentive to build reputation and to signal their type to the partner. On the other hand, reputation effect is derived in the repetitive treatment where players have access to additional information which enables them to evaluate their opponent's true type and this causes players to pretend to be or truly behave as reciprocal type to induce cooperation from the partner. If the information is not sufficient and players are not certain about the type of partner, players will mimic co-operative behaviour, and if the information is sufficient to reveal the true type, players will behave accordingly as any deviation will invite punishment (Kreps *et al.* 1982; Andreoni and Miller 1993). When players are matched with the same partners, conformation to the current reciprocal norm is enforced by future interactions. In other

* School of Social Sciences, Universiti Sains Malaysia, 11800 Minden, Penang, Malaysia. Email: *cks@usm.my*

** Corresponding author: School of Social Sciences, Universiti Sains Malaysia, 11800 Minden, Penang, Malaysia. Email: *yjloke@usm.my*.

We acknowledge the financial assistance provided under the Universiti Sains Malaysia's Research University (RU) Research Grant: 1001/PSosial/816117.

words, in the repetition effect, if workers do not reciprocate high wage, employers can punish the worker by reducing the wage in the future (Gächter and Falk 2002). However, without sufficient information about the true reciprocal type of the employer, repetition alone does not improve the cooperation significantly (Kreps *et al.* 1982; Andreoni and Miller 1993). Workers deduce the employer's true type or reputation through the difference between wage offered and average wage. If information on average wage is not provided, even if the employer offers a higher current wage than the previous wage, the repetition effect alone does not signal to the workers whether the current wage is fair compared to other co-workers or whether the current wage offered by the employer is truly generous relative to other employers. Hence, with information on average wage, reputation effect emerges as an employer now has the incentive to raise wage if he finds himself underpaying compared to other employers and thus improve his reputation in the hope that the worker will reciprocate with higher effort. These concerns arise because the workers do not know the true reputation of the employers.

This paper highlights the importance of average wage information on workers when they decide on the effort level for the wage offered. The workers' reciprocal behaviour is expected to apply also for the case of employers. Notwithstanding the importance of employers' behavioral patterns in repeated treatments with average wage, the discussion of this paper will focus mainly on workers' behaviour only.

In this paper, we demonstrate the importance of average wage in inducing effort level from workers. In repetitive interactions, employers build the belief that the current decision is enforced by future interactions with the same worker. If the employer perceives that current wage level is not reciprocated with higher effort, the employer can always reduce the future wage level in order to either compensate himself for the loss in the previous interaction or to 'punish' the worker. This belief assures the employer that the current high wage will be reciprocated. This self-enforcing equilibrium is based on the idea that employers can credibly punish the workers if the latter defect (Hoffman *et al.* 1998). As workers are only able to compare current wage and previous wage, employers will only increase wage marginally to induce higher effort.

In this paper, the self-enforcing equilibrium is applied to the case of workers as lack of information on the reputation of the employer discourages workers from exerting a higher effort level. Without a reference to an average wage, workers are unable to differentiate whether the intention of a generous employer indicates that the employer is building artificial reputation by increasing wage marginally higher than the previous interaction to induce effort or that the employer is truly co-operating. The lack of confidence among the workers on the reciprocal nature of the employer causes workers to exert only minimum or marginally higher effort level. This lack of coordination between workers and employers can be resolved if workers can refer to an average wage to evaluate the reputation of the employer. The comparison between current and average wage allows workers to judge the fairness of the offered current wage and also to assess whether the employer is truly co-operative. For example, a worker can deduce that the employer is attempting to co-operate when he offers a current wage at the market level. A worker can also identify that the employer is generous if the offered wage is higher than the average wage. This knowledge assures the worker of the type of employer that he is dealing with.

The study of the role of average wage on effort level is not new. Most of the studies incorporated assume that workers react to relative wage. For example, Gächter *et al*. (2008) found that reactive behaviour towards market effort could increase cooperation level while Clark *et al*. (2010) found that instead of average wage, the ranking of wage is a strong determinant for effort level. However, the assumptions that wage ranking and market effort are observable are not realistic in the real world. A study on the role of relative wage which is more closely related to our study is that of Charness and Kuhn (2007) who have incorporated the co-workers' wage. Workers compare current own wage with previous wage and with co-workers' wage. Charness and Kuhn (2007) found limited effect of relative wage on effort level in a random matching treatment. The limited effect may be caused by the lack of enforcement from the same employer.

In this paper, we capture the enforcement effect in a partner treatment and allow workers to access average wage information. The rationale of this treatment is that average wage information is effective in inducing effort level only when it can be enforced. We conducted four experiments to investigate the interaction of these two effects.

We replicated the experimental designs and procedures from Gächter and Falk (2002), particularly the *stranger* and *partner* treatments, to show repetition effects on effort level. It is found that workers are not necessarily more co-operative in *partner* than in *stranger* treatment. The average effort between the two treatments is not significantly different. The workers also do not build credible reputation to induce a high wage. In the *partner* treatment, while the workers and employers can compare each other's history, there is no incentive for either party to deviate significantly from their past decision. As a result, no significant difference between *stranger* and *partner* treatments was found. The non significant results of effort level between *stranger* and *partner* treatments corroborates with existing literature (Gneezy and List 2006; Bolton and Ockenfels 2000).

In the third experiment, workers have access to average wage information but are not enforced to put in a higher effort level due to the absence of repetition effects in *stranger with average wage* treatment. The rationale of this design is that it allows separation of repetition and reputation effects. We tested whether workers reacted to wage difference between current wage and previous average wage. It is expected that workers would exert a higher effort level when wage difference is positive and a lower effort level when wage difference is negative. However, it is found that workers were indifferent to wage difference and the overall effort levels dropped significantly.

The interaction of repetition and reputation effects was tested in the fourth experiment in the *partner with average wage* treatment. It is found that when average wage was enforced by future interactions, the workers exerted a significantly higher effort level. In this treatment, workers could refer to average wage to evaluate the reputation of the employer before deciding on effort level. The generosity of the employer was compared with average wage and if the generosity was enforced by future interactions, workers became more confident in reciprocating the offer. It is observed that workers reacted to positive wage difference with a higher effort and negative wage difference with a lower effort. Also, the effort difference is found to be statistically significant.

The rest of the paper is organised as follows: Section 2 outlines the experimental designs and procedures of the experiments; Section 3 discusses the results. The discussion of the results begins with the overall result and is then followed by the results from each treatment. Then the results between *partner* and *stranger* treatments are compared. Section 4 discusses the other theories that relate to gift exchange. The conclusion follows in Section 5.

## 2. Experimental Designs and Procedures

Following Gächter and Falk (2002), the worker-employer relation is modeled as gift exchange in this paper. It is a typical sequential game where the employer moves first to offer a wage level to a worker. In the second stage, the worker will decide on whether to accept or reject the offer. The decisions are known to the partners only. If it is rejected, both players earn zero profit for that round. In total there are 10 rounds of interactions. If the worker accepts the offer, he has to decide on his effort level.

In the experiment, both players know the profit function of the other player. The profit function of the employer is determined by

$$\pi = (v - w)e \tag{1}$$

where v refers to some exogenously given value, $w$ is wage offered to a worker and $e$ is effort level exerted by the worker.

A worker's payoff is the difference between the wage ($w$) and the incurred effort costs C($e$), minus the fixed travel cost of 20 experimental money:

$$U = w - C(e) - 20 \tag{2}$$

In the experiment, v= 120, and wage offer has to be an integer number from 20 to 120 experimental money. The effort level and the associated costs are shown in Table 1.

**Table 1.** Effort levels and associated costs

| Effort | 0.1 | 0.2 | 0.3 | 0.4 | 0.5 | 0.6 | 0.7 | 0.8 | 0.9 | 1.0 |
|---|---|---|---|---|---|---|---|---|---|---|
| C($e$) | 0 | 1 | 2 | 4 | 6 | 8 | 10 | 12 | 15 | 18 |

**Table 2.** Types of treatments

| Treatment | Repetition effect | Reputation effect | N |
|---|---|---|---|
| Stranger | Random matching | Without information | 42 |
| Stranger with mean wage | Random matching | With average wage information | 26 |
| Partner | Fix matching | Without information | 48 |
| Partner with mean wage | Fix matching | With average wage information | 22 |

There are two factors of interests in the experiment: repetition and reputation effects. The repetition effect is divided into two levels: (1) the players meet their partners only once in a *stranger* treatment, and (2) the players meet the same partners in the *partner* treatment. The second factor is reputation effect which is divided into two levels: (1) the players do not know the average wage, and (2) the players know the average wage. The total number of different treatments for this design is 2 X 2 = 4, and this is summarised in Table 2.

The four treatments are explained as follows:

1. *Stranger*. The subjects are randomly paired with an anonymous partner. Each subject is matched with a different partner after each round. After each round, the subject is given the information about his payoff and his partner's payoff. After that the subjects proceed to next round.

   In *stranger,* there is no incentive for subjects to build reputation and the current actions cannot be enforced by future interactions. There should be no correlation between wage and effort.

2. *Partner*. Each subject interacts with the same anonymous employer throughout the experiment. After making the effort decision, workers are informed of the summary of payoffs.

   In this finitely repeated interaction, there is incentive for workers to build reputation and the current actions should be enforced by future interactions. If workers build reputation, the cooperation rate should be high in the first few interactions, tapering off when it is near the end. However, if future interaction enforces current decision, the correlation between wage and effort should be strong and the effort level at round $t$ =10 should be 0.1.

3. *Stranger with average wage*. The design is identical with the *stranger* but the only difference is subjects in this treatment have access to average wage. Average wage is the mean wage in the experiment excluding rejection. The workers know the average wage after the effort decision. After each round, the workers will have access to information about their own payoff, employer's payoff and the current average wage.

   If workers react to relative wage, the correlation between current effort and previous average wage should be positive. If current wage deviates negatively from average wage, workers should reciprocate with a low effort level and positive deviation should cause a higher effort level.

4. *Partner with average wage*. The treatment is similar to the *partner* but with information on average wage. This treatment incorporates the two effects under study: repetition and reputation.

   It is expected that workers will react to average wage when there is positive and negative deviations. Therefore, the parameters $\Delta w = W_t - AW_{t-1}$ and $\Delta e = e_t - e_{t-1}$ should have the same sign. Higher reciprocity and cooperation rates, as the responses to wage difference (wage ($t$) – average wage ($t$-1)), are expected to reciprocate due to repetition

effect. In this treatment, reciprocity is more assured than in other treatments as future interaction plays the role of an enforcement tool.

Upon entering the experimental laboratory, the subjects were randomly assigned to the role of 'firm' and 'worker' and each subject was assigned randomly to a cubicle. At this point, the subjects were informed of their respective roles as 'firm' or 'worker'. After the role was determined, the subjects were separated into two different rooms. Then, the 'workers' and the 'firms' were given about 7 minutes to read the instructions, which included a set of questions to calculate the payoff of both worker and firm. The instruction clearly stated that the 'firm' decides on the wage and the 'worker' decides on the effort and this is also further explained by the researcher. The researcher also briefed the subjects on the procedures of the experiment. The experiment was conducted in an economic experimental laboratory in the School of Social Sciences, Universiti Sains Malaysia. The experiment was programmed and conducted with the software z-Tree (Fischbacher 2007).

## 3. Results

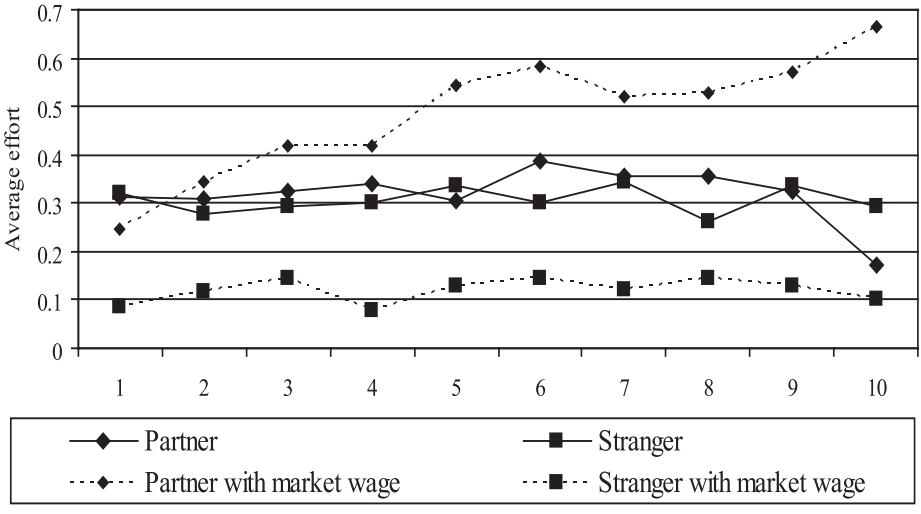
Before proceeding to analyse the information and repetition effects in each treatment, the overall results of the effort and wage across all treatments are presented.

### *3.1 Overall Results*

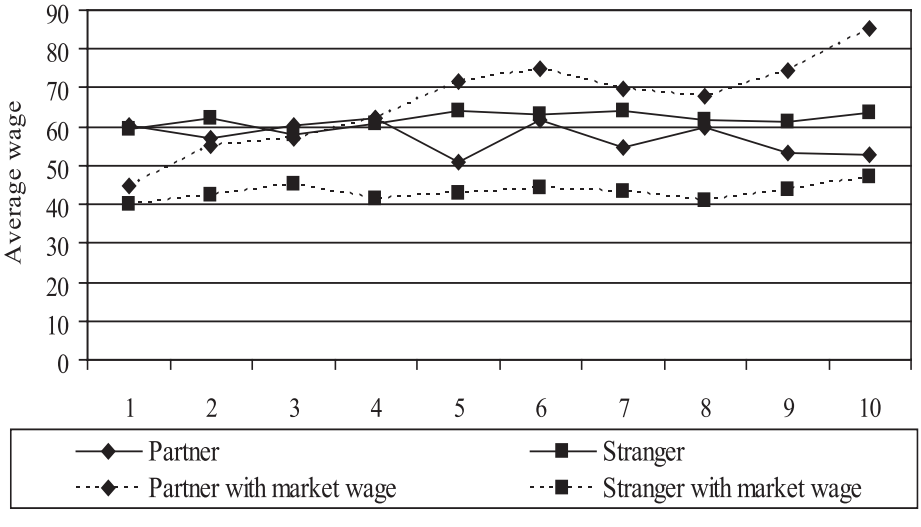
Figure 1 shows the evolution of the average effort and wage for each treatment. On average, Kruskal-Wallis test reveals that the difference in effort and wage across the treatments is significant at 1 per cent level. Pairwise comparisons between *stranger* and *partner* in Figure 1 shows that the repetition effect did not change the effort of workers and wage of employers significantly. The average effort in *stranger* is 0.3 and for *partner* is 0.32 with the difference not being statistically significant. Wage level in *stranger* is 61.79, higher than the wage level in *partner* at 57.42.

The comparisons between *stranger* and *stranger with average wage* treatments show that average wage information alone without enforcement does not encourage cooperation. The average effort level is 0.12 and wage is 43.13. Figure 1 shows that the effort and wage lines are the lowest among the treatments. As the employer is matched with a different worker each round in the *stranger* and *stranger with average wage* treatments, the employer/worker has no incentive to co-operate with their respective partners. The employer/worker has no power to enforce the worker/employer to work harder as there are no future interactions with the same partner. Hence, as expected, the employer has no incentive to offer a higher wage level as the employer knows that a higher wage level will not be reciprocated with a higher effort level from the worker. The lower than average wage is observed by the worker and therefore, the worker has no incentive to put in a higher effort level. This vicious cycle causes both wage and effort levels to drop to the minimum level in *stranger with average wage* treatment compared to *partner with average wage* treatment.

Both effort and wage levels increased significantly when players could observe average wage and were enforced by repeated interactions. The incremental pattern of wage and effort in Figure 1 suggests that employers react to average wage and workers reciprocate to wage difference with high effort. Wilcoxon Sign Rank test reveals that current wage responds




(a) Evolution of effort across treatments




(b) Evolution of wage across treatments

**Figure 1.** *The evolution of responses for workers and employers for all treatments*

closely to average wage ($p$=0.0024) and the average effort is 0.6016 when wage difference is positive and 0.342 when wage difference is negative.

Workers would exert higher efforts to reciprocate a higher wage, if they are confident that employers are of the reciprocal type. This is based on the comparison between current wage offered and average wage. If average wage is important to the decision on effort, then workers should exert a higher effort level if the current wage is higher than the average wage and a lower effort level if the current wage is lower than the average wage. Specifically, the signs of the two equations, $\Delta wage = wage_t - averagewage_{t-1}$ and $\Delta effort = effort_t - effort_{t-1}$, are the same. In the *stranger with average wage* treatment, the number of times when $\Delta wage > 0$ is 59 and reciprocated by $\Delta effort > 0$ is 30 times, and $\Delta wage < 0$ is 71 and reciprocated by $\Delta effort < 0$ is 7 times. In *partner with average wage* treatment, $\Delta wage > 0$ is 77 and reciprocated with $\Delta effort > 0$ is 48 times and $\Delta$ wage $< 0$ is 31 and reciprocated with $\Delta effort < 0$ is 17 times. On average, effort level in *partner with average wage* treatment is higher than the effort level in *stranger with average wage* treatment at 1 per cent significance level (*t*-test). Higher reciprocity in *partner with average wage* than in *stranger with average wage* treatment suggests that workers are confident that current effort would be reciprocated by the same employer when there are repeated interactions.

The results so far suggest the importance of average wage information and repetition effect. The presence of average wage enforces the wage offered among the employers and the comparison between current wage and average wage informs workers about the type of employers they are dealing with. Common information about the type of employer provides avenue for the players to react. In the next section, we proceed to a more detailed analysis of each treatment.

### *3.2 The Repetition Effect*

#### 3.2.1 Benchmark *Stranger* and *Partner* Treatments

If workers exhibit future-oriented behaviour, expectation of reciprocity in future interactions with the same partner plays a role as enforcement to the workers' current actions. This causes workers to reciprocate a current higher wage with a higher effort level. Therefore, effort level in *partner* should be higher than in *stranger* treatment. Tables 3 and 4 show the behavioral patterns among workers in *stranger* and *partner* treatments.

It is found that the average effort among workers in *stranger* is 0.3 and in *partner* is 0.32. The difference is not statistically significant ($p$ = 0.5967, using two-way Anova test). The Spearman rank correlation between wage and effort level is computed to investigate the reciprocity in *stranger* and *partner* treatments. The hypothesis of future oriented behaviour is that the Spearman rank correlation between wage and effort is significant at 1 per cent level and the effort level at time $t$ = 10 should be 0.1. This is because future-oriented workers will not gain any benefit to exert a higher effort level when there is no future interaction.

Based on the results from Tables 3 and 4, as expected none of the workers in the *stranger* treatment took into consideration future interaction in their current effort determination. On the other hand, a few workers (21%) took into account the effect of future interaction when they were matched with the same employer in the *partner* treatment.

**Table 3.** Summary of worker behaviour in the *stranger* treatment

| Worker no. | *e* in t=10 | Corr(*w*,*e*) | Worker no. | *e* in *t* =10 | Corr(*w*,*e*) |
|---|---|---|---|---|---|
| 1 | 0.1 | 0.3043 | 12 | 0.9 | 0.6387** |
| 2 | 0.1 | 0.6162** | 13 | 0.3 | 0.3839 |
| 3 | 0.1 | -0.5718* | 14 | 0.2 | 0.5130 |
| 4 | 0.3 | 0.7167*** | 15 | 0.4 | 0.2825 |
| 5 | 0.5 | 0.9475*** | 16 | 0.5 | (0.1022) |
| 6 | 0.1 | 0 | 17 | 0.4 | 0.6031* |
| 7 | 0.1 | 0.4999 | 18 | 0.1 | 0.4021 |
| 8 | 0.2 | 0.6616* | 19 | 0.1 | 0.5375 |
| 9 | 0.3 | 0.9784*** | 20 | 0 | 0.1566 |
| 10 | 0.2 | 0.9781*** | 21 | 0.6 | 0.4685 |
| 11 | 0.7 | 0.7060 | | | |

*Notes:* Corr(w,e) indicates Spearman rank correlation coefficients between wage and effort. *** indicates 1%; ** 5%; * 10 % significance level. Rejection is included in the calculation as *e*=0

**Table 4.** Summary of worker behaviour in the *partner* treatment

| Worker no. | No. of *e*=0.1 | e in *t*=10 | Corr (*w*,*e*) | Worker no. | No. of *e*=0.1 | e in *t*=10 | Corr (*w*,*e*) |
|---|---|---|---|---|---|---|---|
| 1 | 4 | 0.1 | 0.5032 | (13) | 3 | rej(25) | 0.8667 |
| 2 | 2 | 0.1 | 04710 | 14 | 1 | 0.1 | 0.7145** |
| 3 | 0 | 0.4 | 0.6618* | (15) | 0 | rej(80) | (0.0728) |
| 4 | 1 | 0.4 | 0.7015** | 16(f) | 2 | 0.1 | 0.8361*** |
| 5 | 3 | 0.2 | 0.9846*** | 17 | 1 | 0.1 | 0.6977** |
| 6 | 0 | 0.4 | 0.6775* | 18 | 10 | 0.1 | 0 |
| 7 | 9 | 0.1 | 0.5254 | 19 | 5 | 0.1 | 0.5545 |
| 8 | 0 | 0.4 | 0.7702*** | 20(f) | 4 | 0.1 | 0.9343*** |
| 9 | 0 | 0.6 | 0.8742*** | 21(f) | 6 | 0.1 | 0.7817*** |
| 10(f) | 4 | 0.1 | 0.9155*** | 22(f) | 1 | 0.1 | 0.9162*** |
| 11 | 2 | 0.1 | 0.6025* | (23) | 7 | rej(25) | 0.6802 |
| 12 | 0 | 0.3 | 0.9847*** | 24 | 8 | 0.1 | 0.6757** |

*Notes*: (f) indicates reciprocators whose actions are future oriented.
*** indicates 1%; ** 5%; * 10% significance level.
If the wage was rejected in the final period, it is indicated as 'rej' in the '*e* in *t*=10' column, and the wage rejected is in parenthesis.
Workers 13, 15 and 23 were excluded from the analysis.

**Table 5.** Number of times workers change effort level according to situation: (1) wage > average wage and (2) wage < average wage in *stranger with average wage* treatment

| Situation | n | Increase | Decrease | No change |
|---|---|---|---|---|
| 1) Wage > Average wage | 49 | 14 | 15 | 20 |
| 2) Wage < Average wage | 81 | 21 | 5 | 55 |

When no information about average wage levels was given, performance in a repeated interaction did not deviate from performance in a one-shot situation. This stands in contrast to the findings of Gächter and Falk (2002) who found that the effort levels are considerably higher in the fixed-matching than in the random-matching treatments. The difference in the results may be due to the impact of different subject pools.

### *3.3 The Average Wage Effect*

#### 3.3.1 Average Wage in *Stranger* Treatment

The second factor that motivates reciprocity is associated with the reactive behaviour of workers to the average wage. The definition by Keser and van Winden (2000) is used to investigate the players' reactive behaviour when players are oriented towards the average behaviour of other group members. Although average effort levels are not observable in our treatments, the average wage information signals that the wage is agreeable by all the workers. Therefore, if the current wage is lower than the commonly agreed average wage, workers will react to the wage offered which does not follow the average wage with a lower effort level.

Based on this reason, it is hypothesised that workers will increase effort level when wage difference is positive and decrease effort level when wage difference is negative. Table 5 shows the workers' reactions to situation (1) current wage > average wage and situation (2) current wage < average wage in *stranger with average wage* treatment. Employers offer current wage > average wage 49 times and workers respond with higher effort in only 14 times. Total number of offers for current wage < average wage is 81 and workers respond with lower effort only 5 times.

Based on these two categories of effort level according to the situations, the effort difference in increase category and decrease category under situations 1 and 2 were tested. If the reactive hypothesis is true, then the effort level in increase category should be higher than in the decrease category under situation 1, and the effort level in decrease category should be lower than in the increase category under situation 2. Two sample *t*-tests reveal that the difference of effort in increase and decrease under situation 1 is not statistically significant ($p = 0.1787$) and the difference of effort in increase and decrease categories under situation 2 is statistically significant at 5 per cent level ($p = 0.0367$).

At the individual level, the correlation between effort and wage difference (current wage at *t* and average wage at *t*-1) was computed. The Spearman rank correlation between effort and wage difference is expected to be statistically significant at 1 per cent level if the workers are reactive to average wage. Table 6 reports the relationship.

**Table 6.** Summary of worker behaviour in the *stranger* with average wage information

| Worker no. | No. of $e$=0.1 | Corr ($r$,$e$) | $e$ in $t$=10 |
|---|---|---|---|
| 1 | 10 | 0.6390* | 0.1 |
| 2 | 5 | -0.0356 | 0.1 |
| 3 | 10 | 0.6390* | 0.1 |
| 4 | 9 | -0.2739 | 0.1 |
| 5 | 10 | 0.3651 | 0.1 |
| 6 | 10 | 0 | 0.1 |
| 7 | 10 | 0.6455** | 0.1 |
| 8 | 8 | 0.2018 | 0.1 |
| 9 | 9 | 0.6175** | 0.1 |
| 10 | 6 | 0.1941 | 0.1 |
| 11 | 9 | -0.0913 | 0.1 |
| 12 | 7 | 0.1773 | 0.1 |
| 13 | 5 | 0 | 0.1 |

*Notes:* Corr($r$,$e$) refers to Spearman rank correlation coefficients between wage difference (r) and effort (e) level. **indicates 5% and * 10% significance level.

**Table 7.** Number of times workers change effort level according to situation: (1) current wage > average wage and (2) current wage < average wage in *partner with average wage* treatment

| Situation | n | Increase | Decrease | No change |
|---|---|---|---|---|
| 1) Wage > Average wage | 77 | 39 | 23 | 15 |
| 2) Wage < Average wage | 31 | 18 | 10 | 3 |

From Table 6, it can be seen that none of the workers reacted to average wage when deliberating on effort decision. All the workers shirked by extending $e$=0.1 more than 5 times and the relationship between wage difference and effort is not significant.

Both average and individual results indicate that workers do not react to average wage. The lack of reciprocation from the workers is due to the absence of repeated interaction which plays a role as an enforcement tool for wage and effort. The subsequent discussion focuses on the analysis when the interaction is repeated with average wage.

### *3.4 The Interaction of Repetition and Average Wage Effects*

#### 3.4.1 Average Wage in *Partner* Treatment

Table 7 reports the workers' reactions to the wage difference in the *partner with average wage* treatment. Employers offer current wage > average wage 77 times and this generosity is responded 39 times with a higher effort level by the workers in situation 1. When

**Table 8.** Summary of worker behaviour in the *partner* with average wage information

| Worker no. | No. of $e$=0.1 | Corr ($e$,$w$) | Corr ($r$,$e$) | $e$ in $t$=10 |
|---|---|---|---|---|
| 1(f,r) | 2 | 0.9147*** | 0.8085*** | 0.1 |
| 2 | 2 | 0.6829** | 0.3235 | 0.2 |
| 3 | 3 | 0.5871* | 0.0766 | 0.3 |
| 4(f,r) | 2 | 0.7502*** | 0.7289*** | 0.1 |
| 5(f,r) | 1 | 0.9178*** | 0.7793*** | 0.1 |
| 6(f) | 3 | 0.9969*** | 0.3221 | 0.1 |
| 7(f) | 1 | 0.9138*** | 0.1095 | 0.1 |
| 8 | 0 | 0.8944*** | 0.3296 | 0.5 |
| 9 | 2 | 0.6440** | 0.3698 | 0.1 |
| 10(f) | 0 | 0.5231 | 0.7683*** | 0.7 |
| 11(f) | 2 | 0.8985*** | 0.3950 | 0.1 |

*Notes:* Corr(r,e) refers to Spearman rank correlation coefficients between wage difference and current effort level. *** indicates 1%; ** 5% ; * 10% significance level.
f indicates worker reciprocating high wage with ahigh effort at 1% significance level and e=0.1 at t=10
r indicates worker reciprocating according to wage difference at 1% significance level.

employers offer current wage < average wage, workers respond with lower effort 10 times in situation 2. The effort level in increase category is statistically higher ($p$=0.0004) than the effort level in the decrease category in situation 1. Further, the effort level in the decrease category is statistically lower ($p$=0.0033) than in the increase category in situation 2.

Table 8 reports the correlations between effort and wage, and effort and wage differences. It is expected that if workers are influenced by both future-oriented and reactive behaviours, the Corr ($e$, $r$) and Corr ($e$, $w$) will both be statistically significant at 1 per cent level and $e$=0.1 at $t$=10.

Based on the table, 54% of the workers takes into consideration future interactions in the current effort level decision and 36% are influenced by reactive behaviour. The high level of cooperation suggests the importance of interaction between repetition and average wage information.

## 4. Discussion

The following section explores the extent to which other related theories could explain the results observed in this study.

### *4.1 Pure Altruism*

The theory of altruism explains that cooperation is motivated by "taking pleasure in others' pleasure" (Dawes and Thaler 1988). Further, for an altruistic player, Andreoni and Miller (1993) assume that an increase in utility is not only caused by one's own payoff but also by others' payoff. This behaviour implies unconditional cooperation among the players. The theory of altruism cannot explain the results in this labour-employer experiment. This is because if workers are altruistic, positive effort level in the *stranger* treatment should have

been observed when the wage is at the minimum. However, based on the results, when the wage is at the minimum, the effort level lies in the range from zero to 0.1. The effort level marginally increases when employer increases the wage level, and the Spearman correlation coefficient between the two variables is 0.5015 ($p$=0.0000).

### *4.2 Reputation Building*

According to Kreps *et al.* (1982) and Andreoni and Miller (1993), in a finitely repeated interaction framework, rational players have the incentive to play co-operatively in the initial rounds to build a co-operative reputation but will then defect to low cooperation. This theory cannot explain the behavioral patterns in our results because in the *partner* treatment without average wage, workers did not put in a higher effort level as the workers were unsure of the employers' reciprocal nature. Workers also did not build reputation in the *partner* treatment when they had access to average wage information. On average, effort level in rounds 1 to 5 is 0.3 and in rounds 6 to 10 is 0.6 in the *partner with average wage* treatment.

### *4.3 Reciprocity*

Reciprocity is defined as being kind to those who are kind and to hurt those who are being hostile (Rabin 1993). The reciprocity theory predicts positive correlation between wage and effort in the experiment. Our results show the presence of reciprocity and the motivations are particularly stronger when there is repetition effect. Based on the signs of the parameters, $\Delta w$ and $\Delta e$, 53% of the times, the two parameters have the same sign in *stranger*, 67% in *partner,* 33% in *stranger with average wage,* and 70% in *partner with average wage*.

### *4.4 Equity*

Fehr and Schmidt (1999) and Bolton and Ockenfels (2000) showed that reciprocal behaviour is not only motivated by own payoff but also relative payoff. The equity concern motivates positive reciprocity when one's own payoff is fair compared to other workers' payoff and negative reciprocity when the payoff is not fair. This behaviour explains the strong correlation found between effort and wage difference in our results above.

## 5. Conclusion

Our results show significant difference in effort when average wage information is introduced. Workers cooperate slightly more in *partner* treatment than in *stranger* treatment due to repetition effect although the effect is not statistically significant. Although workers built reputation in the first few sessions, the reputation is not statistically different from the effort in the *stranger* treatment. Workers also did not react significantly to wage difference when it was not enforced by repeated treatments. When repetition effect and average wage were combined and tested in the *partner with average wage* treatment, the number of reciprocators increased significantly under this treatment. It is found that workers reacted to wage difference at a significantly higher effort level when wage difference was positive and low effort level when wage difference was negative. This highlights the significance of

average wage information in reinforcing positive reciprocity as workers are now able to know the true intention of the employer. In addition, the significance of effort and wage difference suggests that wage-effort equity plays a significant role in motivating reciprocity of workers.

## References


Akerlof, G. and J. Yellen. 1988. Fairness and unemployment. *American Economic Review* **78( 2 )**: 44–49.

Akerlof, G. and J. Yellen. 1990. The fair wage effort hypothesis and unemployment. *Quarterly Journal of Economics* **105 (2)**: 255–283.

Andreoni, J. and J. H. Miller. 1993. Rational cooperation in the finitely repeated prisoners' dilemma: experimental evidence. *The Economic Journal* **103 (418)**: 570–585.

Bewley, T.F. 1999. Why not cut pay? *European Economic Review* **42 (3)**: 459–490.

Bolton, G.E. and A. Ockenfels. 2000. ERC: a theory of equity, reciprocity and competition. *American Economic Review* **90(1)**: 166–193.

Charness, G. and P. Kuhn. 2007. Does pay inequality affect worker effort? Experimental evidence. *Journal of Labor Economics* **25(4)**: 693–723.

Clark, A. E., Masclet, D. and Villeval, M-C. (2010). Effort and comparison income: Experimental and survey evidence. Industrial and Labor Relations Review.

Dawes, R.M. and R.H. Thaler. 1988. Anomalies: cooperation. *Journal of Economic Perspectives* **2 (3)**: 187–197.

Fehr, E. and K. Schmidt. 1999. A theory of fairness, competition and cooperation. *Quarterly Journal of Economics* **114 (3)**: 817–868.

Fehr, E., S. Gächter and G. Kirchsteiger. 1997. Reciprocity as a contract enforcement device: experimental evidence. *Econometrica* **65(4)**: 833–860.

Fehr, E., G. Kirchsteiger and A. Riedl. 1993. Does fairness prevent market clearing? An experimental investigation. *Quarterly Journal of Economics* **108 (2)** : 437–460.

Fischbacher, U. 2007. z-Tree: Zurich toolbox for ready-made economic experiments. *Experimental Economics* **10(2)**: 171–178.

Gächter, S., D. Nosenzo and M. Sefton. 2008. The Impact of Social Comparisons on Reciprocity. Working Paper No. 3639, Institute of Study of Labour, University of Bonn, Germany. Available at *http://ideas.repec.org/p/iza/izadps/dp3639.html*.

Gächter, S. and A. Falk. 2002. Reputation and reciprocity: consequences for the labour relation. *Scandinavian Journal of Economics* **104(1)**: 1–26.

Gneezy, G. and J. List. 2006. Putting behavioral economics to work: testing for gift exchange in labour markets using filed experiments. *Econometrica* **74(5)**: 1365 – 1384.

Hoffman, E., K. McCabe and V. Smith 1998. Behavioral foundations of reciprocity: experimental economics and evolutionary psychology. *Economic Inquiry* **35(July)**: 335-352.

Keser, C. and F. van Winden. 2000. Social motivation and voluntary contributions to a public good. *Scandinavian Journal of Economics* **102(1)**: 23-39.

Kreps, D., M. Milgrom, P. Roberts and R. Wilson. 1982. Rational cooperation in the finitely repeated prisoners' dilemma. *Journal of Economic Theory* **27(2)**: 245–252.

Rabin, M. 1993. Incorporating fairness into game theory and economics. *American Economic Review* **83 (5)** : 1281–1302.