

## Reputation and Market Wage as Contract Enforcement Device: An Experimental Evidence

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**Abstract.** *Shirking opportunity has always been present in an incomplete economic exchange in a labor-employer relation. Due to unverifiability of a contract, economic agents resort to reciprocal norm to enhance the co-operation and efficiency of the relation. This paper uses some data from Kean Siang et al. (2010) to investigate individual behavior. We experimentally show the reciprocal incentives can improve the relation by increasing the number of co-operations. In total we consider four experimental treatments, each treatment being distinguished by its type of information available to the workers and the type of interaction. We observe repetitive interaction and information about market wage enhance the reciprocal inclinations and co-operative behaviors of the workers. In our opinion repetitive interaction effect play a “punishment” role on the non-reciprocal workers and therefore force them to conform to the norm, and workers form the perception of fairness better when the information about market wage is available. We find that degree of conformation is higher when the information is available than the treatment when the information is not available. We conclude that the effectiveness of reciprocity as contract enforcement device can be improved if the workers can form perception of fairness based on relative wage.*

**Keywords:** incomplete contract; reciprocal behavior; repeated game effect; wage differential; co-operation.

**JEL Codes:** D03, C91, D81.

**REL Codes:** 7F, 12F.

## 1. Introduction

Economic exchange is often marred by incompleteness especially when a decision made by one part is unverifiable by a third part. The problem may be caused by asymmetric information, indescribability and cost of description, bounded rationality or other causes, which renders an outcome unobservable to a third part. The discretion over the decision on effort level rests on worker in a typical worker-employer relationship. Effort will not exceed enforceable effort level if extra effort entails cost. Therefore, if co-operation can help to increase the joint profit of employer and worker, then the existing relation is not efficient. This paper intends to analyze how effect of repetition and relative wage can encourage reciprocal norms to overcome this inefficiency.

Evidence for the existence of reciprocal norm in the relation can be traced to behavioral pattern of workers who reciprocate with lower productivity and morale after wage reduction (Blinder and Choi, 1990), workers also reciprocate high wage with high effort level (Gächter, Falk, 2002, Fehr, Schmidt, 1999, Fehr et al., 1997) and in consumer market where the intention and willingness of buyers to offer higher price is reciprocated with higher quality of a good from the sellers (Fehr et al., 1993, Simon, Fehr, 2000). Other controlled experimental studies have also shown the evidence of reciprocal behaviors as the source of co-operation. In an experimental public good market study by Sonnemans, Schram and Offerman (1999), players reciprocate other's contribution i.e., the contribution is conditional on others' contribution to a similar good.

In these analysis, reciprocal norm is derived from the reactions of agent to the offer made by the principal. If the offer is perceived as fair, the agent will reciprocate positively. In this relation, workers do not have information about the earnings of other co-workers. Therefore, the behavioral pattern is caused by vertical fairness. But in reality, agents are always exposed to information about earnings of other workers and this provides opportunity for them to compare with their own wage. Admittedly, although the market wage is not the perfect barometer to gauge fairness, it provides a guide or benchmark to workers to compare their own wage.

Past literature on the role of relative wage on effort has been inconclusive and mixed. Clark, Masclet and Villeval (2007) found that the ranking of wage rather than market wage is strong determinant of effort level. Charness and Peter (2007) found the effect to be mixed. A more comprehensive research on the role of relative wage is done by Gächter et al. (2002), in which the analysis of the effect of relative wage on effort level is aided by the assumption that market effort is observable. If effort exerted is higher than market effort, worker perceives negative wage differential as unfair. However, in reality, workers

seldom observe the ranking and market effort, the perception of fairness depending on the benchmark wage derived either from previous wage offered or wages offered to co-workers.

This paper uses some data from Kean Siang et al. (2010) to study the role of repetitive interaction on individual behavior. We replicate the experimental design from Gächter and Falk (2002) to investigate the effect. The interaction of worker and employer is framed as “gift exchange”. The first treatment is a one shot game in which players interact with another players only once. The second treatment is repetitive game in which the interaction is repetitive throughout the experiment. Therefore the comparison of results between these two treatments highlight the repetition effect.

In both one shot and repeated games, players do not know the wages given to their co-workers. The effect of relative wage on effort level is investigated in the third treatment in which workers are exposed to information about wages to co-workers. There are two types of information available to the workers; when the information is limited only to the difference of own wage to market wage (EAWRG) and when the exact amount of the market wage is known by the workers (AWRG). In the former case, the workers have no idea of exactly how much difference of own wage and market wage as the exact amount is not given; in the latter case the information of the exact amount of market wage is given and the workers have to calculate the difference based on the information. This enables us to distinguish the role of information. The role of wage differential is then compared with the result in repeated game treatment above.

The results reveal reciprocal norm incentives encouraging co-operation in both one shot and repeated games. At the aggregate level, we observe positive and significant relationship between wage and effort in both treatments. However, the relationship is stronger in repeated game treatment. This explains the significance of the role of previous wage on the perception of fairness and the formation of reciprocal behavior. At the individual level, this behavior is proven by the presence of high wage/high effort strategy. Although the number of genuine reciprocator remains intact from one shot to repeated game treatment, number of imitative reciprocator increases when they play high wage/high effort strategy. This suggests that the repetition encourages more reciprocation.

When we control the repetition effect and allow players to have information about wage differential, the reciprocal behavioral pattern becomes more enhanced. The wage differential and effort relation is steeper when players know the wage differential. When we compare the results of the two types of information, i.e., EAWRG and AWRG, players who do not know the exact amount of market wage reciprocate more than when workers know the exact amount of market wage. In fact, the effect of wage differential is steeper

in EAWRG than in AWRG treatment. This may be due to the nature of the information provided to the players; workers in EAWRG are informed explicitly of the wage differential, whereas players in AWRG have to calculate to find out how much the difference of own and market wage.

## 2. Experimental design and procedures

In the first session with OS and RG treatments, the design of the game is “gift exchange game” duplicated from Gächter and Falk (2002). It is a typical sequential game with employer moving first to offer a wage level to a worker. In second stage, the worker can decide when to accept or reject the offer. If it is rejected, both players earn zero profit for the round. In total there were 10 rounds of interaction. If the worker accepts the offer, he has to decide on how much to work for the employer.

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

$$\pi = (v - w)e \quad (1)$$

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:

$$U = w - C(e) - 20 \quad (2)$$

In the experiment, we set  $v = 120$ , and wage offer has to be integer number from 20 to 120 experimental money. The effort level and the associated costs are exhibited as in table 1.

Table 1

Effort levels and the associated effort costs										
Effort	0.1	0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.9	1
C(e)	0	1	2	4	6	8	10	12	15	18

The subjects were randomly assigned to the role of “firm” and “worker”. After the role was determined, they were separated into two different rooms. The “workers” and the “firms” were then given about seven minutes to read the instructions, which included a set of questions to calculate the payoff of both worker and firm. The experiment would not start until all the questions were answered correctly and all the concerns were attended to. The experimenter

then presented the slides in “Power-Point” to explain to the subjects about the experiment. Payoff functions of “firm” and “worker” were public knowledge and similar to all the subjects. These were explained and emphasized to the subjects. The experiment was conducted in an economic experimental lab in School of Social Sciences, University Sains Malaysia. The experiment was programmed and conducted with the software z-Tree (Fischbacher, 2007).

Follow the *standard prediction* of selfishness and rationality, firm will offer wage level at  $w = 21$  and effort level  $e = 0.1$ . Since worker is the second mover and higher effort level involves cost, the worker will exert the effort level not more than 0.1. Therefore, the best response of a firm is to offer a wage at the minimum level. Thus,  $w = 21$  and  $e = 0.1$  (i.e.  $w^*$  and  $e^*$ ) are strict subgame equilibrium and they are our reference outcomes.

In the treatments EAWRG and AWRG games, players were informed of the information about market wage. In the EAWRG treatment, players are told of the information about the difference of own wage from market wage but not the exact amount. During the experiment, the players are given three types of information related to own wage compared to market wage; 1) The wage offered is equal or close to the average wage accepted by all the workers, 2) The wage offered is above the average wage and 3) The wage offered is below the average wage. The average wage is defined as total wages *accepted* by the workers divided by number of workers who have accepted the offer in the immediate previous period. Type 1 information is relayed when the wage offered is within 5% difference from the market wage. Information type 2 is relayed when own wage is 5% above and type 3 is when own wage is 5% below the average wage. On the contrary, in AWRG treatment players know the exact amount of the market wage but to know the difference, workers have to calculate the difference of own wage and market wage themselves.

In total there were 144 undergraduates participated in the experiment. Gift Exchange One Shot (OS), Repeated Game treatment (RG) with 42 and 48 subjects respectively, the second session with Extended Average wage Repeated Game (EAWRG) with limited information about each period's market average wage with 32 subjects and Average Wage Repeated Game (AWRG) with perfect market wage information with 22 subjects. The subjects were students recruited from different faculties from University Sains Malaysia (USM). The students never participated in a similar experiment before.

### 3. Results

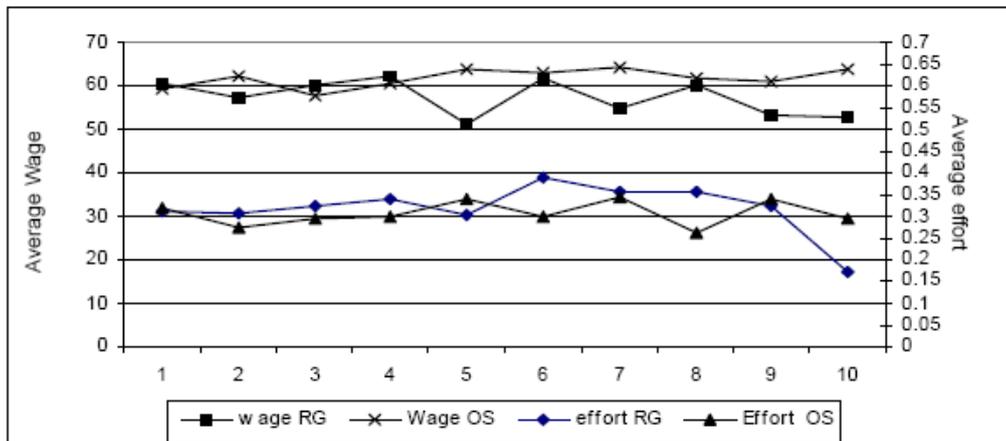
We will start the analysis with gift exchange game, both OS and RG treatments. The findings will be compared to the results in Gächter and Falk (2002). The analysis focuses on the effect of repetition on reciprocal behavior

among workers. We then proceed to the analysis on the role of market wage, we make the comparison when the information is not available in RG, when the information is limited in EAWRG and when the information is perfect in AWRG.

### One Shot (OS) and Repeated Game (RG) treatment

#### *Aggregate -level Observations*

*OS treatment.* Figure 1 shows the evolution of average wages and effort levels from period 1 to period 10 in the OS treatment. From the figure, both the average wage and effort are above the Subgame Perfect Equilibrium level, which are  $e^* = 0.1$  and  $w^* = 21$ . The deviation of both wage and effort are persistent across all periods. The result is consistent with the result in Gächter and Falk (2002). Reciprocation by the workers on higher wage enables higher profit level than that at subgame level. At the subgame level, the profit for a firm is  $(120 - 21) \times 0.1 = 9.9$ , but the actual profit is  $(120 - 62) \times 0.3 = 17.4$  (where 62 is the average wage offered and 0.3 average effort exerted by worker). Whereas at the subgame level, profit for a worker is  $21 - 20 = 1$ , but the actual profit is  $62 - 2 - 20 = 40$ . On average, workers earn more than firms.



**Figure 1.** *The evolution of average wage and effort in OS and RG treatments*

On average, workers reciprocate higher wage level with higher effort. Table 2 shows the result of OLS regression with effort as dependent and wage as independent variable. In the regression, we control for the individual workers' fixed effects<sup>(1)</sup>. The wage coefficient in the OS treatment is 0.0060 and statistically significance below 1% level. The positive relation between wage and effort shows workers play reciprocal norm to return high wage with

high effort level. The F-statistics indicates that the fixed effects are significantly more than zero. The period dummies are not jointly statistically significant since it is a one-shot treatment.

Table 2

**The wage-effort relation (OLS regression with workers' fixed effect)**

Dependent Variable: Effort		
Independent variables	OS Treatment	RG Treatment
Constant	-0.2442(0.0742)	0.0876(0.0422)
Wage	0.0048*** (0.0005)	0.0060***(0.0008)
Period Dummies	Jointly insignificant	Jointly significant
Worker fixed effects	Jointly significant	Jointly significant
	<i>N</i> = 210; <i>F-Test</i> = 11.15 <i>p</i> = 0.0000	<i>N</i> = 240; <i>F-test</i> = 11.45 <i>p</i> = 0.0000

**Note:** Number in the parentheses are standard errors.  
\*\*\* indicates significance at 1% level.

*RG treatment.* From Figure 1, efforts and wages in the RG treatment are also higher than that at the subgame level. Wages offered in the two treatments are rather similar, with average wage 57.42 units in RG treatment and 61.79 units in OS treatment. The common history of a firm-worker relationship plays a role as “punishment” if a player did not play reciprocal norm. Therefore, effort level is enhanced in the RG treatment compared to OS treatment, average effort in RG is 0.32 and OS is 0.3. There is a sharp drop of effort in the last period in RG treatment, average effort level in period 10 is lower than in period 9 ( $p=0.0003$ ) but the wage level in period 10 is not statistically different from the previous period ( $p=0.8517$ ). The drop of effort level at period 10 in RG treatment does not result in effort level equals to  $e^*$  ( $p=0.0189$ ). The effort level in RG treatment in period 10 is lower than the effort level in OS treatment in the same period ( $p=0.0784$ ).

Overall, the results supports the hypothesis that repeated interaction strengthens reciprocal co-operation. Table 2 reports comparison of the wage-effort relationship of 0.0060, which is clearly higher than the same coefficient in the OS treatment which reports the value of 0.0048<sup>(2)</sup>.

**Analysis of individual behavior**

*OS treatment.* Reciprocal behavior analysis on an individual behavior corresponds to the hypothesis<sup>(3)</sup>:

*Reciprocity criterion 1 (“Reciprocity (OS)”)*. A person is classified as reciprocal type if the Spearman Rank Correlation Co-efficient between wage

and effort is positive and significant at 1% level. The correlation coefficient is written as  $\text{Corr}(w,e)$  throughout the paper.

*Selfish criterion 1 ("Egoism (OS)")*. A selfish type worker plays  $e^*$  more than 5 times irrespective of the wage offered to him.

Table 3 reports the results of individual workers' behaviors in the OS treatment. According to the reciprocity criterion 1, about 19% of the workers behave reciprocally, whereas 26% of the workers behave egoistically according to the selfish criterion 1. One subject plays  $e^*$  10 times.

Table 3

Summary of worker behavior in the One shot treatment

Worker no	No of $e=0.1$	$\text{Corr}(w,e)$	Worker no	No of $e=0.1$	$\text{Corr}(w,e)$
1 (e)	7	0.3043(0.3926)	12	0	0.6387(0.0469)
2 (e)	7	0.6162(0.0578)	13	4	0.3839(0.2734)
3 (e)	6	-0.5718(0.0871)	14	2	0.5130(0.1294)
4 (r)	1	0.7167*** (0.0197)	15	4	0.2825(0.4291)
5 (r)	0	0.9475*** (0.0000)	16	3	(0.1022)(0.7787)
6 (e)	7	0.4999(0.1412)	17	3	0.6031(0.0649)
7 (e)	10	0	18(e)	6	0.4021(0.2490)
8	0	0.6616(0.0372)	19	3	0.5375(0.1091)
9 (r)	0	0.9784*** (0.0000)	20	5	0.1566(0.6656)
10(r)	2	0.9781*** (0.0000)	21	2	0.4685(0.1720)
11	1	0.7060(0.0225)			

Notes:

-(r) indicates reciprocal type according to the "Reciprocity OS", (e) indicates egoistical type according to "egoism OS".

-No of  $e=0.1$  includes all effort levels of 0.1 and the number of rejection decision if the wage offered was 20.

- $\text{Corr}(w,e)$  indicates Spearman rank correlation coefficients between wage and effort. \*\*\* indicates 1 percent s.l level. Rejection is included in the calculation as  $e=0$ . *p-value* are in the parentheses.

*RG treatment*. In the OS treatment, the worker met the same employer only once. If extra effort exerted by a worker incurs cost, there is no strategic reason for the worker to reciprocate high wage with high effort level. The reciprocal behaviors observed among the workers in the OS treatment, therefore are genuine reciprocators. However, in the RG treatment, workers can behave reciprocally due to strategic reason and will shirk when the opportunity to shirk arises as in the last period of the interaction, or they simply reciprocate high wage with high effort genuinely. The former category is not the genuine type reciprocator.

The criteria to distinguish between genuine and imitative reciprocator in the RG treatment are:

*Reciprocity Criteria 2 ("Reciprocity (RG)")*. A worker is considered to be reciprocal type if the Spearman rank correlation between wage and effort is positive and statistically significant at 1% level and if the effort level is not  $e^*$  at period 10.

*Selfish Criteria 2 (“Imitation”).* A worker is considered to be imitator if the Spearman rank correlation between wage and effort is positive and statistically significant at 1% level and the effort level is  $e^*$  at period 10.

Note that reciprocity criteria 2 and selfish criteria 2 enable to distinguish the genuine reciprocator from the imitative reciprocator.

*Selfish Criteria 3 (“Egoism (RG)”).* The criteria includes players who do not play reciprocal norm and do not imitate reciprocity. The Spearman rank correlation between wage and effort is insignificant at 1% level and effort is  $e^*$  at period 10.

We document the behavioral types in Table 4. From the table, there are 17% reciprocal type based on reciprocity RG and 19% imitator type according to imitation. Table 5 summarizes the total change in the number of types of players from OS to RG treatment.

Table 4

**Summary of worker behavior in the Repeated game treatment**

Worker no	No of e=0.1	e in t=10	Corr(w,e)	No of m	Worker no	No of e=0.1	e in t=10	Corr(w,e)	No of m
1(e)	4	0.1	0.5032	4	(13)	3	rej(25)	0.8667***	2
2(e)	2	0.1	0.4710	5	14(e,k)	1	0.1	0.7145**	8
3(m)	0	0.4	0.6618**	7	(15)	0	rej(80)	(0.0728)	4
4(m)	1	0.4	0.7015**	6	16(i,k)	2	0.1	0.8361***	7
5(r,m)	3	0.2	0.9846***	8	17(e,k)	1	0.1	0.6977**	5
6(m)	0	0.4	0.6775**	5	18(e)	10	0.1	0	0
7(e)	9	0.1	0.5254	2	19(e,k)	5	0.1	0.5545	5
8(r,m)	0	0.4	0.7702***	5	20(i,k)	4	0.1	0.9343***	7
9(r)	0	0.6	0.8742***	4	21(i)	6	0.1	0.7817***	1
10(k)	4	0.1	0.9155***	7	22(i,k)	1	0.1	0.9162***	5
11(e,k)	2	0.1	0.6025	6	(23)	7	rej(25)	0.6892**	4
12(r,m)	0	0.3	0.9847***	8	24(e)	8	0.1	0.6757**	3

Notes:

-(r) indicates reciprocal type according to the “Reciprocity RG”, (e) indicates egoistical type according to “egoism RG”, (i) indicates an egoistical type according to “Imitation”, (m) indicates criteria “measure for measure”, (k) indicates “imitate measure for measure” type.

-No of e=0.1 includes all effort levels of 0.1 and the number of rejection decision if the wage offered was 20.

-Corr(w,e) indicates Spearman rank correlation coefficients between wage and effort. \*\*\* indicates 1 percent s.l level, \*\* indicates 5 percent s.l 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 are in the parentheses. Workers 13, 15 and 23 are excluded from the analysis.

Table 5

**Share of reciprocal and selfish type from OS to RG treatment**

Share of reciprocal type in percent		Share of selfish type in percent		
Reciprocity (OS)	Reciprocity (RG)	Egoism (OS)	Egoism (RG)	Imitation
19	17	26	38	19

Note:

-According to the criteria, the average income earned by: Reciprocity OS is 17.3, Reciprocity RG (29.12), Egoism OS (37.61), Egoism RG (34.68) and Imitation (33.63).

-The calculation of average income excludes rejection.

### *Robustness*

To check the consistency of reciprocal norm, we perform robustness test on the relation between change of effort in response to the change in wage. Two equations are used to perform the task;  $\Delta e = e_t - e_{t-1}$  and  $\Delta w = w_t - w_{t-1}$ . Reciprocal norm is established if the two signs,  $\Delta e$  and  $\Delta w$  are same. Thus the criteria:

*Reciprocity Criteria 3 ("Measure for measure")*. A player is qualified to be a reciprocator based on "Measure for measure" when the signs of  $\Delta w$  and  $\Delta e$  are same more than 5 times (i.e. no of  $m \geq 5$ ) and effort level is strictly larger than  $e^*$  at period 10.

*Selfish Criteria 4 ("Imitate Measure for measure")*. An imitator of measure for measure when a subject plays  $m \geq 5$  times and effort level is equal to  $e^*$  at period 10.

Table 4 reports the number of players who played measure for measure according to the reciprocity criteria 3 under the column "number of m". There are 28.5% of the subjects who played according to the criteria, and the criteria explains 83% of the reciprocity RG. Therefore, the determination according to reciprocity RG is robust.

**The repeated game with market average wage: Repeated Game (RG), Extended Average Wage (EAWRG) and Average Wage (AWRG)**

### *Aggregate level analysis.*

Figure 2 shows the change of average wage and average effort for the three treatments throughout the interactions. Overall, the wages and effort levels exerted by the players exceed Subgame perfect level. Average wage (effort) in RG is 57.42 (0.32) units, EAWRG is 64 (0.51) units and in AWRG is 66 (0.48) units. The joint profit (worker profit + firm profit) in RG is  $35.41 + 18.774 = 54.184$ , EAWRG is  $37.6 + 28.2 = 65.8$  and AWRG is  $40.3 + 26.85 = 67.15$ . Efficiency is increased when the players are revealed to the information about market wage.

To distinguish the cause of reciprocity and to ensure comparability with the analysis above, we run the OLS regression including both own wage and market wage. Table 6 reports the results of the regression.

From the table. wage plays a significant role in determining the effort level when the market wage information is not available to the workers in RG treatment. However, on average, workers reciprocate more to wage differential when the information starts to be available than to wage alone. The coefficient of rent is 0.0071 and is highly statistically significant ( $p < 0.0001$ ) in

comparison with the coefficient of wage in EAWRG. But when the workers need to calculate the wage differential themselves, the effect of wage becomes more important than the information about wage differential. The role of information can be seen from the coefficients of rent in EAWRG, which is 0.0071 but drops to -0.0006 in AWRG treatment when the wage coefficient increases from 0.0014 (EAWRG) to 0.0106 (AWRG).

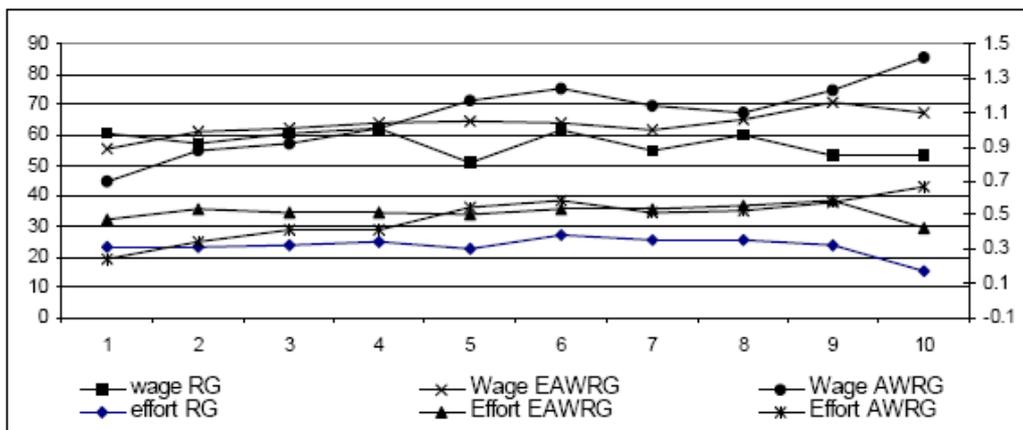


Figure 2. The Evolution of Average wage and Average Effort in the three treatments, RG, EAWRG and AWRG.

Table 6

The relative wage-effort relation (OLS regression with workers' fixed effect)

Independent variables	Dependent Variable: Effort		
	RG Treatment	EAWRG Treatment	AWRG Treatment
Constant	0.0876(0.0422)	0.2928(0.1291)	-0.2170(0.1158)
Wage	0.0060***(0.0008)	0.0014(0.0017)	0.0106***(0.0017)
rent	-	0.0071***(0.0017)	-0.0006(0.0020)
Period Dummies	Jointly significant	Jointly significant	Jointly significant
Worker fixed effects	Jointly significant	Jointly significant	Jointly significant
	$N = 240; F\text{-Test} = 11.45$ $p = 0.0000$	$N = 144; F\text{-test} = 8.81$ $p = 0.0000$	$N = 99; F\text{-test} = 13.91$ $p = 0.0000$

Note:

-Number in the parentheses are standard errors.

-\*\*\* indicates significance at 1% level.

-During the experiment, subjects compare own wage ( $w_t$ ) with the market wage (average wage accepted by the workers) which is given only one period later. Therefore, rent is defined as  $wage_t - AverageWage_{t-1}$

*Analysis of individual behavior*

We need to determine whether the findings in the aggregate level corresponds to the results at individual level. If workers reciprocate to the rents, the relation between rent and effort should be positive and significant. Thus, the similar criteria used to classify the reciprocal types in the preceding section can be used to classify the reciprocators but with some added conditions.

Since we are interested in the role of the information on effort, we hypothesize that a reciprocator responds to positive rent with high effort and negative rent with low effort. Thus criteria 2 (Reciprocity (RG)) becomes:

*Reciprocity criteria 4 ("Reciprocity (RG market wage)").* This criteria includes reciprocators who play high effort when rent is positive and low effort when rent is negative. Spearman correlation between rent and effort is positive and statistically significant at 1 percent level and effort level is more than  $e^*$  at period 10.

Similar to the analysis in the preceding section, there are players who reciprocate initially for positive rent but shirk when opportunity for positive rent diminishes in the last period of the interaction. We classify these players as imitators.

*Selfish criteria 5 ("Imitation").* This criteria includes players whose positive Spearman rank correlation coefficient between rent and effort is statistically significant at 1% level but shirk in the last period with effort equals to  $e^*$ .

Lastly, we are left with players who never reciprocate to rent offered by firms. Instead, this group of players choose  $e^*$  in the last period and the relation between rent and effort is not significant.

*Selfish criteria 6 ("Egoism market wage").* A player is included in this category if Spearman rank correlation between rent and effort is not significant at 1% level and shirks by playing  $e^*$  in period 10.

*Reciprocity criteria 5 ("Measure for Measure" based on average wage).* This criteria classifies players who play measure for measure with indicator  $r \geq 5$  times and effort at period 10 is larger than  $e^*$ .

Table 7 documents all the types of players. Treatment RG follows the classification defined in the preceding section, treatment EAWRG and AWRG follow the definition in reciprocity criteria 4 and 5, and selfish criteria 5 and 6. Table 8 summarizes the change of workers' behavior from RG treatment to EAWRG and AWRG treatments when the information about average wage is introduced.

The results show that reciprocity is the dominant behavioral strategy in the experiment. Particularly, the behavioral pattern is enhanced from RG to EAWRG and AWRG treatments when the players know and can compare own wage to market wage. Secondly, when workers can form perception of fairness

more objectively based on market wage, they are more co-operative. From Table 7, both reciprocal type and “measure for measure” type share 67% of the same trait. Thirdly, market wage may serve as a signal of firms’ intention to the workers. If the offered wage is positively differed from previous market wage ( $w_t - \text{averagewage}_{t-1} > 0$ ), it can be interpreted as generosity of firm or its intention to co-operate with the workers. The presence of this information to both worker and firm provides mechanism to judge fairness and adjust offer accordingly.

#### 4. Conclusion

The presence of positive relation between effort and wage in our experimental study highlights the importance of reputation (repeated game effect) and reciprocal behavior in increasing the degree of co-operation between worker and employer. The effect of wage is relatively stronger in RG treatment than in the OS treatment, and the effort in the RG treatment is also higher than in OS treatment. The degree of co-operation, high wage is reciprocated with high effort, is more pervasive among players in RG treatment than workers in OS treatment. Our results correspond very much to the findings in Gächter and Falk (2002) but with weaker co-operation among players. Although Malaysian subjects play reciprocity as we observe many genuine reciprocators in both OS and RG treatment, the number of co-operation is lesser in our analysis than in the paper.

We also find players become more co-operative when they can evaluate fairness by comparing own wage with market wage. The inclination to cooperate increases significantly when players know how much their co-workers earn and the difference of own wage and market wage. However, workers are more co-operative when they are told *explicitly* about the wage differential than when they have to calculate the wage differential themselves. In the two treatments with relative wage effect, workers in EAWRG treatment is more responsive to wage differential when they are told of the wage differential. But workers in AWRG are less responsive and many turn to own wage as guide to decide on effort level.

Our results are very much relevant to the view that the combination of own pecuniary payoff and the relative payoff motivate people (Bolton, Ockenfels, 2000). In the paper, the authors argue that “... along with pecuniary payoff, the relative payoff - a measure of how a person’s pecuniary payoff compares to that of others - motivates people”. The presence of reciprocal behaviors due to reputation and wage differential in our paper supports this argument.

Summary of worker behaviors in the repeated game treatments

Worker no	Repeated Game (RG)			EAWRG			AWRG						
	No of e=0.1	e in t=10	Corr(w,e)	No of m	Worker no	No of e=0.1	e in t=10	Corr(r,e)	Worker no	No of e=0.1	e in t=10	Corr(r,e)	No of r
1(e)	4	0.1	0.5082	4	1(r,h)	0	0.2	0.7818*** (0.0128)	1(r,h)	1	0.8	0.8152*** (0.0074)	6
2(e)	2	0.1	0.4710	5	2	0	0.6	0.4658 (0.2063)	2	2	0.2	0.3782 (0.3156)	4
3(m)	0	0.4	0.6618**	7	3(r,h)	0	0.9	0.8335*** (0.0050)	3	3	0.3	0.6325 (0.0675)	3
4(m)	1	0.4	0.7015**	6	4(h)	0	0.7	0.6836** (0.0423)	4(h)	0	0.7	0.7591*** (0.0177)	6
5(r,m)	3	0.2	0.9846***	8	5(r)	0	0.5	0.8416*** (0.0044)	5(r)	0	1	-0.3701 (0.1023)	5
6(m)	0	0.4	0.6775**	5	6	0	0.7	0.0275 (0.9440)	6(r,h)	1	1	0.8536*** (0.0034)	7
7(e)	9	0.1	0.5254	2	7(e)	1	0.1	0.5130 (0.1579)	7	0	0.8	0.3286 (0.3879)	2
8(r,m)	0	0.4	0.7702***	5	8(e)	1	0.1	0.7120** (0.0314)	8	0	0.5	0.2291 (0.5532)	3
9(r)	0	0.6	0.8742***	4	9(e)	1	0.1	0.7143** (0.0306)	9	0	0.4	0.6295 (0.0693)	4
10(k)	4	0.1	0.9155***	7	10(r)	0	0.9	0.9048*** (0.0008)	10(r,h)	0	0.7	0.8645*** (0.0026)	7
11(e,k)	2	0.1	0.6025	6	11(e)	1	0.1	0.7432** (0.0217)	11(h)	2	0.9	0.5255 (0.1462)	7
12(r,m)	0	0.3	0.9847***	8	12(r,h)	0	1	0.8598*** (0.0030)	6	2	0.9	0.5255 (0.1462)	7
13	3	rej(25)	0.8667***	2	13	1	0.1	0.3760 (0.3186)	5	3	0.1	0.5321 (0.1403)	3
14(e,k)	1	0.1	0.7145**	8	14(r)	1	0.5	0.7985*** (0.0099)	2	0	0		
15	0	rej(80)	(0.0728)	4	15(e)	5	0.1	0	0	0	0		
16(i,k)	2	0.1	0.8361***	7	16(e)	1	0.1	0.5321 (0.1403)	3	0	0		
17(e,k)	1	0.1	0.6977**	5									
18(e)	10	0.1	0	0									
19(e,k)	5	0.1	0.5545	5									
20(i,k)	4	0.1	0.9343***	7									
21(i)	6	0.1	0.7817***	1									
22(i,k)	1	0.1	0.9162***	5									
23	7	rej(25)	0.6892**	4									
24(e)	8	0.1	0.6757**	3									

Notes:

-(r) indicates reciprocal type according to the "Reciprocity criteria 2(RG)", (e) indicates egoistical type according to "selfish criteria 3(RG), (i) indicates an egoistical type according to "imitation" or selfish criteria 4, (m) indicates "measure for measure" reciprocity criteria 3, (k) corresponds to selfish criteria 4.

-In treatments EAWRG and AWRG, (r) indicates reciprocity criteria 4, (e) indicates selfish criteria 6, and (h) measures the number of "measure for measure" according to reciprocity criteria 5. -No of e=0.1 includes all effort levels of 0.1 and the number of rejection decision if the wage offered was 20.

-Corr(r,e) indicates Spearman rank correlation coefficients between rent and effort. \*\*\* indicates 1 percent s.l level, \*\* indicates 5 percent s.l 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 are in the parentheses. Players 13, 15 and 23 are excluded from the analysis.

-The market wage includes only wages accepted by the workers.

-No of r indicates the "measure for measure" strategy with  $\Delta r = wage_t - average\ wage_{t-1}$  and  $\Delta e = e_t - e_{t-1}$  having the same sign. It includes no of r  $\geq 5$  times.

Table 8

**Share of reciprocal and selfish type from RG to EAWRG and AWRG treatments**

Share of reciprocal type in percent			Share of selfish type in percent	
Reciprocity (RG)	Reciprocity (EAWRG)	RG market wage (AWRG)	Egoism (RG)	Egoism Market wage (EAWRG)
17	37.5	36.4	38	37.5

*Note:*

-According to the criteria, the average joint income earned by: Reciprocity RG is 29.12, Reciprocity EAWRG (64.73) and AWRG(63.09), Egoism RG (34.68) and Egoism EAWRG(64.52).

-The calculation of market wage excludes rejection.

**Notes**

- (1) In the paper by Gächter and Falk (2002), Tobit regression was used to investigate the effect of wage on effort with worker fixed effect.
- (2) The results found in the paper by Gächter and Falk (2002) report the co-efficient of OS is 0.0069 and RG is 0.0111. The overall effect of repeated game on wage-effort relationship in our paper corresponds to the result but the effect is weaker and the overall values are different.
- (3) We use the criteria established by Gächter and Falk (2002).

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