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Abstract

Reciprocal behavior was often explained by perception of fairness derived from either agents' *intention* or distributional *outcome*. In this paper, we demonstrated that fairness perception depended on the evaluability of the partner's type. We conducted experiments to investigate how workers formed fairness perception on the employers. We found inconsistency in fairness evaluation in the two simulated worker-employer relations; workers derived fairness by comparing own wage with market wage in a one shot interaction, but workers derived fairness based on current and previous wage when interacting with same employer. The reversal of fairness perception suggested the role of evaluability of partners' attribute in effort decision among workers.

JEL Classification: D03, C91, D81

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1 Introduction

Reciprocity is often invoked to explain the cooperative tendency between agents in economic interactions. Agents exhibit reciprocal response to perceived kindness and unkindness; in response to friendly actions agents are frequently much nicer and cooperative and when faced with hostile actions agents behave much more uncooperative (Fehr and Gächter.,2000; Falk and Fischbacher.,2006). Fairness perception can be traced to either distributional or intentional fairness. In ultimatum game for example, distributional unfairness is often rejected by the responders (Güth et al., 1982; Dawes and Thaler., 1988; Camerer and Thaler.,1988). The theoretical models by Fehr and Schmidt (1999) and Bolton and Ockenfels (2000) assume agents exhibit behavior based on fair outcome. In addition to distributional fairness, another class of research emphasize on fairness intentions as a major role in human behavior (Rabin.,1993; Dufwenberg and Kirchsteiger.,2004; Falk and Fischbacher.,2006; Falk et al.,2008).

The focus of this paper is on the impact of cognitive factors on the perception of fairness. Based on easy to evaluate one's attribute, the perception on fairness may be different from the perception when one's attribute is difficult to evaluate. In a two persons one shot interaction, one party may evaluate another party's kindness based on kindness exhibited by other players in the market. But if the interaction is repetitive and both parties share the same history of actions, agents involved may evaluate kindness based on previous actions of the same player. In the former, the true type of the partner is not easily evaluated as the interaction is one shot, agents thus reciprocate based on average actions in the market. In the latter, the difficulty to evaluate attribute (the true type of partner) becomes easy to evaluate. Therefore, the formation of fairness is influenced by relative kindness in one shot interaction and by absolute kindness in repeated interaction.

Past research that found the preference reversal exhibited above, explained that it is caused by evaluability of choices (Hsee et al.,1999; Hsee.,1996) by attribute ambiguity (Loewenstein et al.,1993) and by dependency of attribute (Nowlis and Simonson.,1997). In this paper, we adopt evaluability hypothesis and attribute ambiguity to explain the formation of fairness perception in the two set-ups. Paper which is very similar to our analysis is Blout and Bazerman (1994) who found that agents formed the perception differently in separate evaluation mode and simultaneous evaluation mode. When agents were asked to make choices in a two separate conditions; (a) to choose to work when payoff was \$7 for all workers and (b) to choose to work when payoff was \$8 or \$10,

more agents chose equal payoff than unequal payoff. However, more agents chose unequal but higher payoff when the choices were presented simultaneously.

In the present paper, we test the evaluability hypothesis in a gift exchange game. Instead of limiting the choices to only equal or only unequal payoff in separate evaluation mode as in Blout and Bazerman, agents in the worker-employer relation are free to make choices between relative or absolute fairness. This causes the interaction to be more complex as agents have to choose between own wage or market wage to form perception of fairness. Conducting the test in a true worker-employer exchange also allows us to learn the role of attribute ambiguity and evaluability hypothesis in explaining fairness perception. For example, the workers cannot tell the true reciprocal type of employer in the one shot treatment. If the hypothesis is true, workers should evaluate fairness based on market wage, and if workers can tell in the repeated interaction, workers will reciprocate based on own wage.

We conducted three experimental treatments to test the hypothesis. The first treatment *Stranger* is a benchmark treatment to the second treatment *Stranger with market wage*. Workers in the *Stranger* were not expected to exhibit reciprocal behavior as the interaction between worker and employer was one shot and workers did not know the market wage. Workers in the second treatment were expected to reciprocate to relative payoff. As workers could not evaluate the reciprocal type of the employers they are dealing with, they compare own wage with market wage to evaluate the employers. The reversal occurs if the evaluation was based on the comparison between current own wage and previous own wage. In the third treatment, *Partner with market wage*, workers interacted with the same employers. The difficult to evaluate attribute, the type of employer, dominates the evaluation; workers value absolute fairness more than relative fairness.

The paper is organized as; section two illustrate the experimental design and procedures of the three treatments. Section three starts with the overall results based on the comparison of the treatments followed by more detail analysis of individual treatment. Section four concludes the paper.

2 Experimental design and procedures

Following Gächter and Falk (2002) we model the worker-employer relation as gift exchange. It is a typical sequential game with employer moves first to offer a wage level to a worker. In second stage, the worker can 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 the round. In total there are 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,

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

where υ 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, we set $\upsilon = 120$, 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.

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 1: Effort levels and the associated costs

Upon entering the experimental lab, the subjects were randomly assigned to the role of "firm" and "worker" and each was assigned randomly to a cubicle. After the role was determined, they were separated into two different rooms. The "workers" and the "firms" were then given about 7 minutes to read the instructions, which included a set of questions to calculate the payoff of both worker and firm. The experimenter then announced the procedures during the experiment and answered to the questions raised. The experiment was conducted in an economic experimental lab in School of Social Sciences, Universiti Sains Malaysia. The experiment was programmed and conducted with the software z-Tree (Fischbacher 2007).

The three treatments are explained as the following;

1. *Stranger*. The subjects were randomly paired with an anonymous partner.

Each subject was matched with different partner after each round. After each round, the subjects were given the information about his payoff and his partner's payoff. After this the subjects proceeded to next round.

The treatment provided a benchmark to compare with *Stranger with market wage* treatment to test for absolute and relative fairness effect.

2. *Stranger with market wage*. The interaction is similar to *Stranger*, but the players knew the information about market wage.

In this treatment, the subjects could not tell the true reciprocal type of the employers as each period they were paired with different partner. Hence, the subjects faced the choices to accept either an equal pay or unequal pay conditions. Workers also can compare current own wage with previous own wage.

We predict that effort should be higher in the equal pay than in the unequal pay condition and the workers value relative fairness more than absolute fairness when deciding on effort level. Relation between effort and relative wage ratio $(Wage_t - AverageWage_{t-1})$ should be positive.

3. *Partner with market wage*. The treatment was similar to the *Stranger with market wage*, but a worker was paired with the same employer throughout the treatment.

In this treatment, the subjects faced with two types of information; change of absolute wage and equal or unequal payoff. We predict workers would value absolute wage more than relative wage.

3 Results

Table 2 describes the overall effort levels for different treatments. The mean effort level is reported for each quartile of wage level from 20 to 120. The data demonstrate that mean effort rises with wage levels in both treatments *Partner with market wage* and *Stranger*, but the correlation is weak in treatment *Stranger with market wage*.

The main purpose of this paper is to investigate the response of workers to relative wage. The bottom half of the table shows the effort levels in response to different levels of relative wage. The market wage is a reference wage level against which the workers compare with his own wage. The difference of own wage and market wage is denoted by the relative ratio $Wage/MarketWage$, and effort level falls into different quartile of the ratio shows the response of workers to the relative wage. For example, in table 2, the average effort in the lowest

quartile of relative wage ratio is 0.1 in *Stranger with market wage*. Reading down from lowest to highest quartile of relative wage in table 2 shows the effort levels increase with relative wage. When the interaction is repetitive in *Partner with market wage*, workers consistently respond higher own wage with higher effort level.

The workers' responses are shown in the OLS regression in Table 3, which shows both the effects of own wage and relative wage on effort levels. Table 3 focuses on workers' responses in which effort is the dependent variable. Column 1 shows the effect of own wage to the effort level in *Stranger*. The effect of own wage on effort is consistent across all levels of wage and is highly significant. In *Stranger with market wage*, if workers are inequality averse, high relative wage should encourage high effort level. Column 2 shows positive relation between effort and relative wage while own wage effect turns to negative and less significant when making decision on effort level. However, the effect of relative wage is negative in *Partner with market wage* as in column 3 when compared with effect of own wage. To investigate the effect of own wage and relative wage on effort level, simple F-test reveals that workers value own wage more than relative wage with p-value of 0.0000.

Table 2: Average effort levels

Treatment	Stranger	Stranger with market wage	Partner with market wage
N	230	130	110
Mean Effort	0.3056(0.2523)	0.12(0.0838)	0.4836(0.2878)
Mean Wage	61.79(18.5111)	43.13(1.2728)	66.3(17.88)
Mean Effort wage first quartile	0.1272(0.0139) n=44	0.0964(0.0063), n=84	0.1214(0.0281), n=14
Mean Effort wage 2nd quartile	0.277 (0.0213) n=100	0.1634(0.0159),n=41	0.3959(0.0261), n=49
Mean Effort wage 3rd quartile	0.4581(0.0345) n=62	0.2(0.1), n=4	0.6976(0.0405), n=43
Mean Effort wage 4th quartile	0.675(0.2015), n=4	0.1(0), n=1	0.525(0.1031), n=4
$W(t)/MW(t-1)$	-		
Mean Relative wage	-	1.0199(0.3473)	1.0773(0.2465)
N	-	117	99
$W(t)/MW(t-1)$ 1st quartile effort	-	0.1014(0.0071), n=71	0.1(0.1154), n=7
$W(t)/MW(t-1)$ 2nd quartile effort	-	0.15(0.0156), n=40	0.4431(0.2171),n=44
$W(t)/MW(t-1)$ 3rd quartile effort	-	0.24(0.06), n=5	0.65(0.2984),n=38
$W(t)/MW(t-1)$ 4th quartile effort	-	0.1(0),n=1	0.56(0.1897),n=3

Note:
-The relative wage ratio $Wage/MarketWage$ in Stranger with market wage treatment ranges from 0.4 to 2.78. 1st quartile represents 25% of the wage ratio from 0.4 to 0.1, 2nd quartile represents 1.01 to 1.58, 3rd quartile from 1.59 to 2.17 and 4th quartile from 2.18 to 2.76.
-The relative wage ratio in Partner with market wage treatment ranges from 0.4 - 0.72, 0.73-1.05, 1.06 - 1.38 and 1.39-1.74.

Table 3: OLS regression of effort response to wage

Treatment	Stranger	Stranger with market wage	Partner with market wage
Own wage	0.0060***	-0.0263*	0.0100***
Wage in range:			
$20-45$	0.2108	-0.0093	-0.1193
$46-70$	0.0924**	-0.0377	0.2456***
$71-95$	0.2445**	-0.1511	0.4511***
$96-120$	0.3750	-0.3300	0.7233***
Relative wage		1.293702**	-0.486
Period effect	Insignificant	Insignificant	Significant
Worker effect	Significant	Insignificant	Significant
R square	0.5754	0.3356	0.5229
	F(9,179)=0.51	F(12, 91) = 0.97	F(10, 75) = 2.55

Note:
-The explanatory variables Wage in Range are dummies in the regression. Wage in range $20-45$ is the constant in the regressions.
-Relative wage is denoted as $Wage_t/MarketWage_{t-1}$
-*** is 1% s.l., ** 5% and * 10%.

We will investigate the influence of relative and own wage on workers in the two treatments; *Stranger with market wage* and *Partner with market wage*.

3.1 Stranger market wage treatment

When the interaction is one shot, workers value relative wage more than own wage; the effort responds to relative wage. Based on Table 2, the effort level when wage is in the range $20-45$ is significantly lower than effort levels in $46-70$, $71-95$ and $96-120$ combined (p=0.067, t-test). However, the effect diminishes when employers offer higher wage level; the effort in $96-120$ is not significantly higher than effort in $46-70$ and $71-95$ combined. When we investigate the effect of relative wage, effort is consistently higher when own wage is higher than market wage. Effort level in $1.59-2.17$ is significantly higher than effort in $0.43-1$ and $1.01-1.58$ combined.

Table 4 shows individual workers' responses to own wage and relative wage. Only one worker reciprocates high own wage with higher effort, while five workers react to high relative wage with higher effort level.

The reciprocal tendency among workers towards relative wage information

suggests the perception of fair treatment is more towards relative fairness rather than absolute fairness. This is no surprise as when workers cannot tell the true reciprocal type of the employer, workers will compare own wage with market wage to reveal the true type of the employer.

In the next section, we allow workers to know the reciprocal type of employer through repetition. We intend to learn how workers react to absolute and relative fairness when the information is common between workers and employers.

Table 4: Respones of individual workers to Own Wage and Relative Wage

worker no	No of e =0.1	Corr(w,e)	Corr(r,w)
1	8	0.565	0.7246**
2	6	0.6215	0.7303**
3	9	0.4805	0.4108
4	9	-0.1158	0
5	9	0.2372	0.4108
6	10	0	0
7	8	0.5588	0.5175*
8	7	0.0718	-0.5249
9	8	0.3133	0
10	5	0.6670**	0.5597*
11	9	0.2566	0.1369
12	6	0.5899	0.6938**
13	5	-0.1197	0.1009

Note:
- Corr is Spearman Rank Correlation Coeffiecient.
-e is effort
-w is wage and $r = Wage_t - AverageWage_{t-1}$.
-** is 5% s.l. and * is 10% s.l.

3.2 Repeated market wage treatment

When the worker-employer relation shares the same common history, workers reciprocate more to own wage rather than relative wage. Based on Table 2, the exerted effort levels when wage falls in the category $71-95$ and $96-120$ combined are significantly higher than effort in $20-45$ or $46-70$. And when wage is within $46-70$ workers respond with 0.3959 which is significantly higher than effort when employer offers $20-45$. However, higher relative wage does not induce higher effort level; effort in $1.39-1.73$ is not significantly higher than effort in $1.06-1.38$ wage category. On average, Spearman Rank Correlation reveals the relation between wage-effort is 0.6632 (p=0.0000) compared to 0.4331(p=0.0000) for

relative wage-effort.

Individual worker analysis also reveals that absolute fairness is valued more than relative fairness among workers. Table 5 reports the responses of workers to own wage and relative wage. Almost all of the workers react to absolute fairness and only few workers react to comparison income between own and relative wage.

Table 5: Respones of individual workers to Own Wage and Relative Wage

worker no	no of e=0.1	Corr(w,e)	Corr(r,e)
1	1	0.9147***	0.8152***
2	2	0.6829**	0.3782
3	3	0.5871*	0.6325*
4	0	0.7502***	0.7591***
5	0	0.9178***	-0.5791
6	1	0.9969***	0.8536***
7	0	0.9138***	0.3286
8	0	0.8944***	0.2291
9	0	0.6440**	0.6295*
10	0	0.5231	0.8645***
11	2	0.8985***	0.5255

Note:
- Corr is Spearman Rank Correlation Coefficient.
-e is effort
-w is wage and $r = Wage_t - AverageWage_{t-1}$.
-** is 5% s.l. and * is 10% s.l.

4 Conclusion

We conducted experimental test to investigate the influence of relative and absolute fairness on workers' reciprocal responses. Reciprocity was tested in the two types of environment; when the worker-employer relation is random and one shot compared to when the relation is random and repeated. Workers faced the evaluability problem in the former as they always interacted with different employer. Whereas in repeated interaction, the attribute of the employers was easy to be evaluated based on historical offers. The evaluability of the type of employers renders different fairness formation among workers; workers who faced the evaluability problem derived fairness from the comparison payoff, and workers who did not face the problem formed fairness perception based on absolute payoff.

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