The House Money Effect and Negative Reciprocity

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Abstract

Do earned endowments lead to a weaker reciprocal response compared to windfall endowments? Over the past two decades experimental economics research that emerged provided scientific evidence that people care not only about their own material payoffs but also about fairness, equity, and reciprocity. In particular, a lot of attention has been devoted to reciprocity (Camerer, 2003; Cox, 2013). In a vast majority of experiments documenting existence of reciprocity subjects are endowed with some start up money. This endowment serves as "starting capital" from which subjects draw when making decisions of interest to the experimenter. In some situations such windfall endowments might create a so-called "house money effect". Having subjects earn money in another task prior to making decisions produced more self-serving behavior in subjects (Cherry, Kroll and Shogren, 2005; Harrison, 2007; Hoffman, McCabe, Schachat, and Smith, 2002; Gächter and Riedl, 2005; Thaler and Johnson, 1990). Since reciprocation is costly, having to earn an endowment might increase the perceived cost of reciprocation and diminish its frequency and/or size. It is therefore possible that the existing literature overestimates the extent of reciprocal behavior. The current study experimentally tests this conjecture.

The experimental design involves a taking game in which the first mover (FM) decides whether to take money from the second mover (SM). The SM then decides whether or not to punish the FM, and by how much. The experiment consists of three treatments. In the first one the SM's endowment consists entirely of house money. In the second and third treatment, the SM's endowment consists of funds earned in a real-effort task as well as of house money. We test a hypothesis that in the treatment with earned endowments subjects will punish less than in the treatment where the endowments are a windfall. To our surprise, we find the opposite. The fact that subjects who earned their endowments punished *more* rather than *less* as hypothesized, can be explained by an increased inequality aversion (Fehr and Schmidt, 1999) towards subjects who did not have to perform a task. On the other hand in the third treatment it is earned money that is taken from the SMs, we conjecture that they will punish more because of the violation of their property rights. While we find support for this conjecture.

1. Introduction

Over the past two decades experimental economics research provided ample

evidence that people care not only about their own material payoffs but also that they are willing to forego significant income in order to influence the payoffs of others. Particularly a lot of attention has been devoted to reciprocity – a tendency to react to the kind actions of others with kind responses and to the hostile actions of others with retaliation.[1]

In a vast majority of laboratory experiments documenting the existence of reciprocity subjects are endowed with start up money. This endowment serves as starting capital from which subjects draw when making decisions of interest to the experimenter, potentially creating a "house money effect." The current paper explores the implications of endowing subjects with windfall gains for the observed reciprocal behavior. In particular, we are interested whether people are less likely to negatively reciprocate if earned money is in stake as opposed to when they use "house money."

Since money is fungible, why should the source of endowment matter? According to mental accounting (Thaler, 1990) different sources of income might lead to different ways of spending. If costs of obtaining an endowment vary, people might place such endowments in different mental accounts, which might in turn lead to different decisions. In particular, having to earn an endowment might increase the perceived cost of reciprocation and thus diminish its frequency and/or extent. Such conjecture is consistent with the results of previous studies, which show that having subjects earn money in another task prior to making decisions produced a more self-serving behavior (for example, Cherry, Frykblom, and Shogren; 2002). Since reciprocation is costly, it is possible that the experiments in which subjects use house money to pay for punishment overestimate the extent of reciprocal behavior. Previous research shows that generosity observed in the laboratory conditions is often greater than one would observe in the field and that this might be partly due to the house money effect (Carlsson, He, and Martinsson, 2013). However, the existing literature does not allow us to conclude whether reciprocity observed in laboratory conditions is subject to the house money effect.

There are two reasons why the source of endowment might matter for reciprocity. The first is that if money used to pay for punishment is earned as opposed to received from the experimenter, one might perceive the punishment to be more costly due to this money being in a different mental account. The second reason is related to property rights. If another person's decision decreased a decision-maker's endowment and the endowment consisted of earned money rather than house money, he might consider it to be a stronger violation of property rights, which in turn can trigger stronger punishment.

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[1] For example Ostrom et al. (1992), Fehr and Gächter (2000), Ostrom and Walker (2005); see also Camerer (2003), Cox (2013) for surveys and Rabin (1993), Dufwenberg and Kirchsteiger (2004), Falk and Fischbacher (2006), Cox, Friedman, and Gjerstad (2007) and Cox, Friedman, and Sadiraj (2008) for theoretical approaches to modeling reciprocity. Also, while not a model of reciprocity per se, inequity-aversion theory (Fehr and Schmidt, 1999) is sometimes used to explain behavior of fair-minded people who want to achieve more equitable final outcomes.

To tackle the issue of the house money effect we have designed an experiment in which we test whether the source of endowment influences punishment behavior.[2]

Our subjects interact in a two-player *Taking game* in which the First Mover (FM) decides whether or not to take a sum of money from the Second Mover's (SM) endowment. If the FM does not take money, the game ends and both players keep their initial endowments. If the FM takes money from the SM, the SM can punish him in return. Within this game we implement three treatments to separate the above-described reasons behind (possibly) different punishment behavior. In the first treatment, the SM's endowment consists entirely of house money. Whatever is left after the FM's decision, the SM can use to purchase punishment. In the second and third treatment, the SM's endowment consists of funds earned in a real-effort task as well as of house money. In one case, the FM takes the house money part of the endowment and the SM can punish using his earned money whereas in the other case the FM takes the earned part and the SM can punish him using house money.

Our study builds on earlier work of three types: research on negative reciprocity, the house money effect and mental accounting. We discuss each of them in some detail in relation to our research question.

Reciprocity plays an important role in labor relationships as it has a potential to increase efficiency through enforcement of incomplete contracts (Fehr, Gächter, Kirchsteiger, 1997). Firms value loyal workers who are committed to the goals of the firm. Loyalty means that workers take into account the interests of their employers and if employers also take into account the interests of their employees, a positive valuation of the employer's payoff can be created. The notion of loyalty therefore naturally follows from the notion of reciprocity. In the same vein, workers have many opportunities to take advantage of employers. Poor treatment of workers could lead to negatively reciprocal behavior such as low effort or even sabotage. Firms (and their managers) are well aware of potential repercussions from diminished morale and loyalty and try to circumvent them by implementing sensible strategies, such as not lowering wages following a demand shock, which is evidenced by downward wage rigidity (Bewley, 1999). A gift-exchange game has been the workhorse used to study various aspects of labor market relationships and incomplete contracts (see Charness and Kuhn, 2011 for a nice survey). While there exist some experiments (both lab and field) that involve a real-effort task instead of inducing costs of effort (e.g., Gneezy and List, 2006; Kube, Maréchal and Puppe, 2012) as in the most stylized version of the game and thus circumvent the potential house money effect, we are unaware of any studies that would compare the behavior in a gift-exchange game with house money versus earned endowments.

Another strand of literature on (negative) reciprocity deals with punishment (or

[2] While it is possible that the behavior is driven by pure retaliation as opposed to punishment for violating a social norm, such distinction is not at the heart of our study. Throughout the paper we use the words punishment and negative reciprocity interchangeably.

sanctions) and enforcement of social norms. In a seminal paper, Ostrom, Walker, and Gardner (1992) show that introducing costly punishment in a common pool resource game can overcome strong self-interest of individual appropriators and lead to a mutually efficient outcome. Fehr and Gächter (2000) explain that many cooperators have aversion against being exploited and are willing to punish free-riders in the voluntary contribution mechanism. These two papers spanned a whole new area of research dealing with various aspects of punishment (e.g. punishment technology in Nikiforakis, Normann, and Wallace, 2010, demand for punishment in Carpenter, 2007), anomalies such as counter-punishment (Nikiforakis, 2008) and anti-social punishment (Gächter, Hermann, Thoni, 2008).

Results from several extensive-form game experiments also show that subjects frequently exercise the explicit or implicit option to punish non-cooperators (Abbink, Irlenbusch, and Renner, 2000; Cox, Sadiraj, and Sadiraj, 2008; Clark, and Sefton, 2001; Gueth et al, 1982; Falk, Fehr and Fischbacher, 2003; Cox and Deck, 2005). Even if punishment is costly to the subjects, those who are perceived to be unkind, offensive or reveal malevolent or selfish intentions are often punished (Pereira, Silva, and Silva, 2006).

Experimental literature thus provides ample evidence for reciprocity under controlled laboratory conditions. As mentioned earlier, in most of these experiments participants are endowed with start up funds from the experimenter that might be treated as a windfall gain, thereby creating a house money effect, meaning that people might spend or invest such money more recklessly than they would their own. The house money effect was first evidenced by Thaler and Johnson (1990) in a lottery choice experiment in which losses were subtracted from subjects' initial endowments. Several studies point out that the observed behavior might differ if subjects receive windfall endowments as opposed to when these endowments are earned (Hoffman and Spitzer 1985; Rutstrom and Williams 2000; Cherry, Frykblom, and Shogren 2002; Clark 2002; Harrison 2007; Cox and Hall, 2010; Reinstein and Riener, 2012). Having to earn the endowment creates a property right entitlement and as a result leads to a more self-regarding behavior by the person who earned it.[3]

For example, Cherry et al. (2002) run a series of dictator game experiments in which the endowments were earned through solving GMAT questions. Such design yielded significantly less generous dictator behavior than a control treatment where the dictator's endowment was randomly determined.

Cox, Servátka, Vadovič (2013) found that earning endowments significantly affected giving and taking behavior by first movers but had insignificant effect on second movers' reciprocal responses. Clark (2002) finds no effect of house money in the

[3] This is contrasted with the other participants respecting the created property rights to the endowment as in Hoffman and Spitzer (1985), Cox, Servátka, and Vadovič (2013), Rutstrom and Williams (2000). A similar pattern has been observed in experiments where the roles in a game are earned (e.g. Hoffman, McCabe, Schachat, and Smith 1994; Erkal, Gangadharam, and Nikiforakis, 2010).

voluntary contributions mechanism public goods game using unconditional nonparametric methods. Harrison (2007), however, shows that the same data display a significant effect when analyzing responses at the individual level and accounting for the error structure of the panel data. Finally, Carlsson, He, and Martinsson (2013) used a 2x2 design combining laboratory and field experiments to examine the impact of windfall money on generosity. In both environments they found that subjects donate more when the endowment is a windfall.

It therefore appears that if the endowments are earned, subjects act in a more self-regarding manner. What causes such change in behavior? Mental accounting sheds some light on the issue. According to the principle of fungibility (Thaler, 1990) all money is the same regardless of its origin or intended use. However, people often treat money differently depending on its source and separate their funds into mental accounts based on subjective criteria. Mental accounting is a cognitive process by which people keep track of the flow of their money and keep their spending under control. Thaler distinguished among three components of mental accounting. The first one captures how outcomes are perceived and experienced, and how decisions are made and subsequently evaluated. The second component involves an assignment of activities to specific accounts. Both the sources and uses of funds are labeled in real as well as in mental accounting systems. The third component of mental accounting concerns the frequency with which accounts are evaluated. Thus according to mental accounting, money in one mental account is not a perfect substitute for money in another account and it might lead to violations of normative economic principle of fungibility. Different sources of experimental endowment might therefore have implications on subject behavior.

2. Experimental Design and Procedures

The purpose of this experiment is to test whether punishment behavior is subject to the house money effect. In particular, receiving an endowment from the experimenter might impact the size and/or frequency of punishment. The existing experimental economics literature describes (at least) three methods of controlling for the house money effect. The first one was implemented by Clark (2002) who had his subjects bring their own money to the experiment. While this is certainly a possibility, most experimental economics laboratories, including ours, advertise that subjects will on average earn a significant amount of cash from participation. Since in our design, which is described below, it is possible to suffer a loss, such method could impact the reputation and credibility of the laboratory and discourage future participation.

A second method, used by Cardenas, De Roux, Jaramillo and Martinez (2013), involves giving money to subjects in advance and requires them to bring it to the experiment. Such method enables the participants to "bond" with money as after a while of having it in possession they might start considering it their own. This method, however, bears a risk that subjects will not show up for the experiment or they will not

bring the money with them.

A third method involves creating property right entitlements towards the initial endowments by having subjects earn them in a real-effort task as in Hoffman, and Spitzer (1985) and Cherry et al. (2002). Such procedure serves as an analogue to everyday life where people exchange their time and effort for monetary payments. While it is possible that the three methods lead to different levels of entitlement, we felt that the third method was quite natural while also being the most practical one and decided to implement it in our experiment.

In our setup, there are two reasons why the source of endowment might matter. The first reason is that if a person had to earn money he uses for punishment, as opposed to receiving it from the experimenter, he might perceive the punishment to be more costly due to this money being in a different mental account and therefore he will punish less. The second reason is that if earned money as opposed to house money is taken from a person, he might consider it to be a stronger violation of his property rights, which in turn can trigger a stronger response.

In order to separate these two effects, we have introduced a Taking game played by two players, the First Mover and the Second Mover. The experiment consists of three treatments: HOUSE MONEY, EARNED MONEY (used) for PUNISHMENT, and EARNED MONEY TAKEN, implemented in an across-subjects design. The treatments differ in the source of endowment, which is i) used for punishing and ii) taken by the other player.

In the HOUSE MONEY treatment the FM receives $10 and the SM receives $18 from the experimenter as initial endowments. There is no real effort task performed by SMs. Both movers proceed to playing the Taking game, which is described below.

In the second and third treatment, the SM's endowment consists of funds earned in a real-effort task as well as of house money. In the EARNED MONEY for PUNISHMENT treatment the FM as well as the SM are endowed with $10. The SM performs a real effort task, in which he can earn $8. The real effort task consists of cutting posters inviting students to participate in economics experiments in our laboratory. This particular task does not require any specific skills and we decided to use it because represents a meaningful activity as subjects could later see the posters on notice boards around the university campus. We asked the SMs to neatly cut the bottom part of 20 posters to create stubs that included a web page link of the database where interested students could register for experiments. For accomplishing the task, each SM earned $8. After finishing the task, the Taking game proceeds.

The EARNED MONEY TAKEN treatment differs from the EARNED MONEY used for PUNISHMENT in that in the earlier, the FM takes the house money part of the endowment and the SM can punish using his earned money whereas in the latter the FM takes the earned part and the SM can punish using the house money. Thus, in the EARNED MONEY TAKEN treatment, the FM is endowed with $10 and the SM with $8.

On the top of that, the SM can earn additional $10 in the real effort task.

The Taking game that is played in all three treatments is presented in Figure 1. In Stage 1 of the game the FM has the option to *Take* or *Not Take $10* from the SM. If the FM does *Not Take $10*, this yields the FM a payoff of $10 and SM a payoff of $18. If the FM *Takes $10* from the SM, the game proceeds with Stage 2, where the SM decides whether to punish the FM. Decreasing the FM's payoff by $4 costs the SM $1. The SM can use up to $4 from his own endowment to decrease the FM's payoff up to $16. If the SM does not wish to punish the FM, he can do so by choosing the "decrease by $0" option.

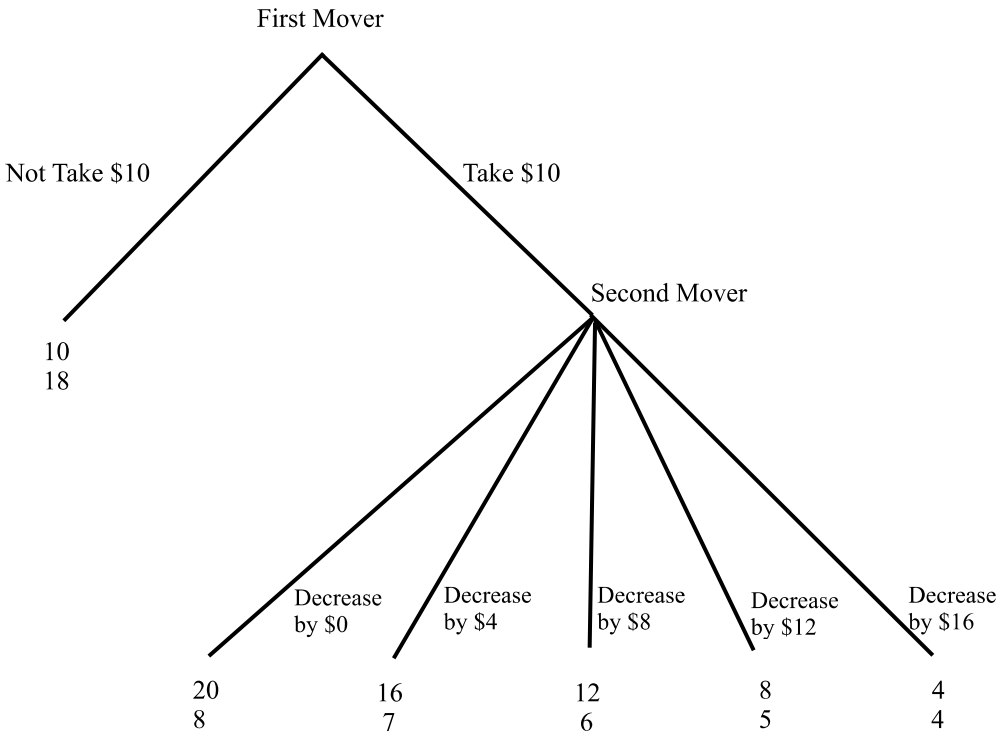

Figure 1. Taking Game

For our design it is crucial that subjects recognize that the SM's endowment consists of two parts – one that could be taken by the FM and the other that can be used to purchase punishment. In order to highlight this we deliberately chose different amounts to represent these two parts: in all treatments $10 can be taken and $8 is used for punishment. What differs is the source. The instructions were framed in a way to ensure that subjects understand which part of their total endowment is being taken and which is used for punishing. This might aid creating two separate mental accounts. The relevant part of the instructions is presented below.

Starting Balance

Each person in Group A will start with a starting balance of $10. Each person in Group B will start with a starting balance of $18.[4] *(*HOUSE MONEY*)*

Each person in Group A as well as in Group B will start with a starting balance of $10. In addition to his/her starting balance each person in Group B has participated in a task, where (s)he earned $8. (EARNED MONEY for PUNISHMENT)

Each person in Group A will start with a starting balance of $10. Each person in Group B will start with a starting balance of $8. In addition to his/her starting balance each person in Group B has participated in a task, where (s)he earned $10. (EARNED MONEY TAKEN)

Our design allows us to identify the reasons why the source of endowment might matter for the frequency and/or extent of punishment. We test the following two hypotheses:

Hypothesis 1: Punishment in the HOUSE MONEY treatment will be greater than in the EARNED MONEY for PUNISHMENT treatment.

Hypothesis 2: Punishment in the EARNED MONEY TAKEN treatment will be greater than in the HOUSE MONEY treatment.

A total of 224 subjects participated in the experiment. The experimental sessions were conducted in the New Zealand Experimental Economics Laboratory (NZEEL) at the University of Canterbury. Subjects were recruited using the online database system ORSEE (Greiner, 2004). Each subject only participated in a single session of the study. The experiment was programmed and conducted with the software z-Tree (Fischbacher, 2007).

The number of subjects in a session varied from twenty to thirty-six. All sessions were run under a single-blind social distance protocol. On average, a session lasted 60 minutes and subjects earned on average 16.34 NZD per session.[5]

Upon entering the laboratory, subjects were randomly assigned into Group A (FMs) and Group B (SMs) by drawing a letter (A or B) from a manila envelope and asked to sit in an appropriate cubicle. At the beginning of the experiment instructions (provided in the Appendix) were handed out, as well as projected onto a screen. In the EARNED MONEY for PUNISHMENT and EARNED MONEY TAKEN treatment, Task 1 instructions were first handed out to both Group A and Group B and read aloud.

[4] Group A person = FM; Group B person = SM

[5] The minimum hourly wage in New Zealand at the time of the experiment was $13.50

Group B persons were then given scissors and 20 NZEEL posters and asked to cut them along the perforated lines. Once all Group B subjects completed the task, the posters and scissors were collected. Task 2 instructions were handed out, projected on the screen and read aloud to ensure common knowledge of the fact that Group B persons had to earn a part of their starting balance.[6]

Any questions arising were answered in private. All subjects had to answer control questions and had to get all answers right before they could proceed to the decision making part of the experiment, which was run using the strategy method (Selten, 1967; Brandts and Charness, 2011). Afterwards, subjects entered their decisions, and upon the completion of the experiment, they were asked to complete a questionnaire. Subjects were then called one by one to receive their payment in private in the payment room in the back of the laboratory.

3. Results

3.1 FMs' Behavior

Figure 2 summarizes FMs' behavior in the experiment. The highest frequency of taking occurred in the HOUSE MONEY treatment where 31 out of 34 (91.2%) FMs took $10 from the SMs. In the EARNED MONEY for PUNISHMENT treatment it was 33 out of 41 (80.5%) and in the EARNED MONEY TAKEN treatment 28 out of 37 (75.7%) FMs.

Figure 2. FMs' Behavior

[6] Since the HOUSE MONEY treatment did not involve cutting posters, Task 2 instructions were simply called Task instructions.

From Figure 2 it appears that the FMs respected the property rights of the SMs by taking less often if the part of the SM's endowment they could lay their hands on was earned. We test whether this is indeed the case by comparing behavior in both treatments where FMs could take the windfall part of the endowment, i.e., HOUSE MONEY and EARNED MONEY for PUNISHMENT, against the EARNED MONEY TAKEN treatment. The one-sided Fisher's exact tests reported in the second and third rows of Table 1 reveal that the frequency of taking behavior in EARNED MONEY TAKEN is statistically significantly higher than in HOUSE MONEY (p=0.076) but not different from EARNED MONEY for PUNISHMENT (p=0.405).

Since in HOUSE MONEY and EARNED MONEY for PUNISHMENT the FMs could take the windfall part of the endowment, we expect there will be no statistically significant difference, which is confirmed by the result of the Fishers' test reported in the first row of Table 1 (p=0.326 two-sided). FMs' decisions thus provides mild support for the fact that subjects respected property rights created by earning money through exerting effort. Their decisions also provide a useful manipulation check. In particular, two out of three predictions regarding the FMs' behavior that were based on the source of money being taken were born out in the data (and the third prediction had the right "direction"). Based on these results it appears that FMs did not consider the earned and windfall part of SMs' endowments to be completely fungible.

Table 1. Tests for FMs' Behavior

	Fisher's exact test
EARNED MONEY for PUNISHMENT vs. HOUSE MONEY	(0.326)
EARNED MONEY TAKEN vs. HOUSE MONEY	(0.115)
EARNED MONEY TAKEN vs. EARNED MONEY for PUNISHMENT	(0.784)

2-sided tests. p-values in parentheses.

3.2 SMs' Behavior

SMs' behavior is summarized in Table 2. The first column reports the number and frequency of SMs who decided to punish their paired FM for taking $10 from them. Recall that we used the strategy method and therefore have an observation on all SMs who participated in the experiment. To our surprise, the highest frequency of punishment occurred in the EARNED MONEY for PUNISHMENT treatment where 51.2% SMs

spent on average $1.76 on punishment, followed by the EARNED MONEY TAKEN (46% and $1.38) and the HOUSE MONEY (24.5% and $0.77) treatments. The last column of Table 2 presents the consequences of punishment for the FMs' earnings.

Table 2. SMs' Behavior

	Number of punishing subjects	Avg. amount spent on punishment ($)	Standard deviation	SMs decreased FMs' earnings on average by ($)
HOUSE MONEY	8/34 (24.5%)	0.77	1.47	3.08
EARNED MONEY for PUNISHMENT	21/41 (51.2%)	1.76	1.86	7.04
EARNED MONEY TAKEN	17/37 (46%)	1.38	1.69	5.52

The distribution of punishment decisions across the three treatments is presented in Figure 3. The largest difference in SMs behavior appears to be in the $0 and $4 spent on punishment categories. While in the HOUSE MONEY about 76.5% of SMs did not punish at all, in EARNED MONEY for PUNISHMENT and EARNED MONEY TAKEN it was 48.8% and 54.1%, respectively. On the other hand, in EARNED MONEY for PUNISHMENT 34.2% punished the maximum amount, in EARNED MONEY TAKEN it was only 18.9% and in HOUSE MONEY only 11.8%.

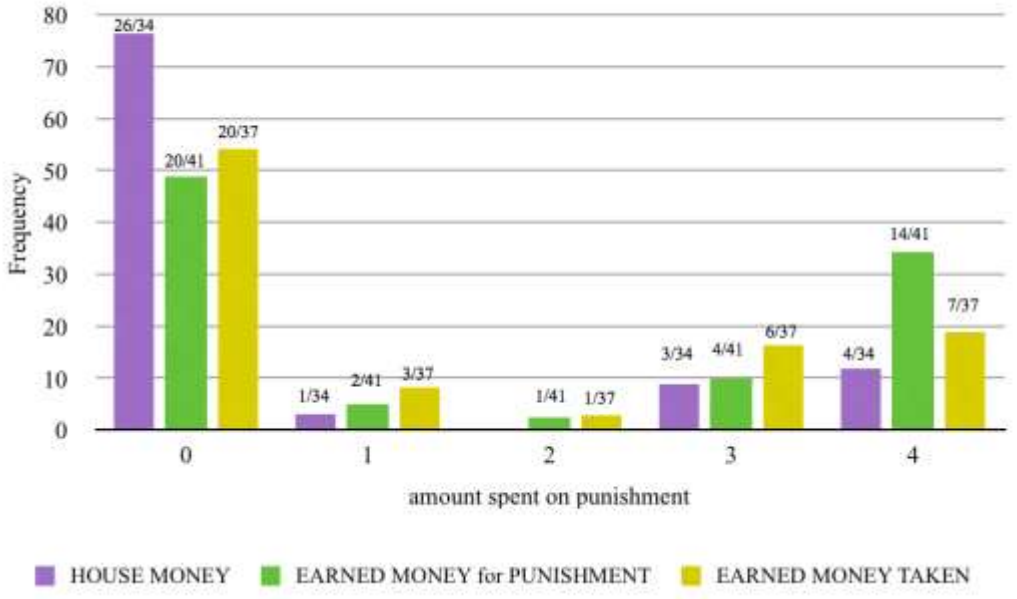

Figure 3. Distribution of SMs' Punishment Behavior

Out Hypothesis 1 states that punishment in the HOUSE MONEY treatment will be greater than in the EARNED MONEY for PUNISHMENT treatment. This is based on a conjecture that if money used to pay for punishment is earned as opposed to received from the experimenter, one might perceive the punishment to be more costly due to this money being in a different mental account. Result 1 summarizes our finding.

Result 1: The frequency and extent of punishment is higher in the EARNED MONEY for PUNISHMENT treatment than in the HOUSE MONEY treatment.

Support for Result 1:

As can be seen from Table 2, there is more punishment in EARNED MONEY for PUNISHMENT than in HOUSE MONEY. The two-sided Fisher's exact test, reported in the first row of Table 3, supports this observation by detecting that the frequency of punishing behavior is statistically significantly higher (p-value = 0.018) in EARNED MONEY for PUNISHMENT than in HOUSE MONEY. The Mann-Whitney test reported in the same row, detects statistically significant difference between the two treatments in terms of the extent of punishment (p-value = 0.012), thus leading to the rejection of Hypothesis 1.

□

In light of our original conjecture that earning money increases the cost of punishment, the fact that SMs' punished more with their earned money is somewhat surprising. While the increase in punishment does not necessarily indicate that the SMs considered the two parts of their endowment to be fungible, it suggests that (negative) reciprocity and property rights are inherently related. In Section 4 we provide an ex-post interpretation of our results from the perspective of inequity aversion.

Table 3. Tests for SMs' Behavior

	Mann-Whitney test	Fisher's exact test
EARNED MONEY for PUNISHMENT vs. HOUSE MONEY	- 2.511 (0.012)	(0.018)
EARNED MONEY TAKEN vs. HOUSE MONEY	-1.795 (0.073)	(0.08)
EARNED MONEY TAKEN vs. EARNED MONEY for PUNISHMENT	0.926 (0.354)	(0.658)

2-sided tests. p-values in parentheses.

Hypothesis 2 states that punishment in the EARNED MONEY TAKEN treatment will be greater than in the HOUSE MONEY treatment. We conjectured that since in the EARNED MONEY treatment FMs (could) take the earned part of the SMs' endowment, SMs might consider it a stronger violation of their property rights, which could lead to stronger punishment.

Result 2 The frequency and extent of punishment is higher in the EARNED MONEY TAKEN treatment than in the HOUSE MONEY treatment.

Support for Result 2:

The Fisher's exact test, reported in the second row of Table 3 reveals that the frequency of punishment in EARNED MONEY TAKEN is statistically significantly higher than in the HOUSE MONEY (p-value = 0.08). The corresponding Mann-Whitney test detects that the extent of punishment was also higher (p-value = 0.073), thus providing support for Hypothesis 2.

□

Our experimental design also allows for comparison of punishment behavior in the EARNED MONEY for PUNISHMENT treatment with that in the EARNED MONEY TAKEN treatment. By combining Hypothesis 1 and Hypothesis 2 together, we expected to see more punishment in EARNED MONEY TAKEN than in EARNED MONEY for PUNISHMENT.

Result 3: There is no statistical difference in punishment between the EARNED MONEY for PUNISHMENT treatment and the EARNED MONEY TAKEN treatment.

Support for Result 3:

The Fisher's exact test reported in the third row of Table 3 detects no difference in the frequency of SMs' punishing behavior between these two treatments. The corresponding Mann-Whitney detects no difference in the extent of punishment (p-value = 0.354).

□

The fact that SMs punished more in both EARNED MONEY for PUNISHMENT and EARNED MONEY TAKEN treatments than in HOUSE MONEY tells us that property right entitlements might lead to a stronger negatively reciprocal response. But do subjects make a distinction between house money and money that was earned in the real effort task? To get that at this issue, in EARNED MONEY TAKEN, which was the last treatment we ran, we added two questions about subjects' perception about the source of SMs' endowment into the post-experiment (demographics) questionnaire. In particular, we asked subjects the following questions.

The FMs who took $10:

- *The money that you took from the Group B person was earned/not earned by them?*
- *Why did you decide to take $10 from the Group B person?*

The FMs who did not take $10:

- *The money that you could have taken but didn't from the Group B person was earned/not earned by them.*
- *Why did you decide not to take $10 from the Group B person?*

The SMs from whom $10 was taken:

- *The money that Group A person took from you was earned/not earned by you.*
- *Why do you think the Group A person took $10 from you?*

The SMs from which $10 was not taken:

- *The money that the Group A person could have but didn't take from you was earned/not earned by you.*
- *Why do you think the Group A person didn't take $10 from you?*

According to answers provided in the questionnaire, 31 out of 37 (83.8%) FMs and 32 out of 37 (86.5%) SMs perceived the money taken as earned. This suggests that the remaining 6 FMs and 5 SMs were either confused or considered the two parts of the initial endowment to be fungible.[7] While this questionnaire data does not prove that subjects placed their house money and earned money in two different mental accounts which would influence their decisions in the experiment, it serves as a manipulation check showing that they recognized different sources of SMs' endowments.

3.4 Ex-Post Interpretation of Data Based on Inequity Aversion

An alternative explanation of results from our experiment is provided by inequity aversion. A few outcome-based models of other-regarding preferences posit that people dislike unequal payoffs and may lower their material payoffs to lessen the disparity. Bolton (1991) suggests that people only care about relative payoffs when they are at a relative disadvantage while Bolton and Ockenfels (2000) assume that people have a symmetric dislike for inequity. Fehr and Schmidt (1999) develop the notion of self-centered inequality aversion, in which one dislikes all inequality but cares more about this when at a relative payoff disadvantage. Inequity aversion means that people resist inequitable outcomes; i.e. they are willing to give up some material payoff to move in the direction of more equitable. According to Fehr and Schmidt inequity model, subjects who dislike inequitable outcomes experience inequity if they are worse off in material terms

[7] The findings presented in Subsection 3.1 are robust to removing these subjects from the statistical analysis. The results are available from the authors upon request.

than the other players in the experiment. However, they also feel inequity when they are better off.

In Fehr and Schmidt (1999) model the utility function for player *i* is defined as follows:

$$U_i = x_i - \alpha_i \max \{x_j - x_i, 0\} - \beta_i \max\{x_i - x_j, 0\}, \text{ where } i \neq j.$$

In our experiment, it is not possible for a SM to get a higher payoff than the FM, so we take into consideration only the advantageous part of the utility function: $U_i = x_i - \alpha_i \max \{x_j - x_i, 0\}$. Based on this specification, we calculate the cut-off alpha necessary for subjects to display punishing behavior to be 1/3. By having SMs earn a part of their endowment, their alpha increased, meaning they started to care more about being in a disadvantageous position. This lead to more subjects having $\alpha > 1/3$ in EARNED MONEY for PUNISHMENT and EARNED MONEY TAKEN than in HOUSE MONEY, which in turn lead to more punishment in these two treatments.

4. Discussion

This paper experimentally investigates the extent of reciprocal reaction to unkind behavior when a part of the initial endowment is being earned by performing a real effort task. We compare subjects' behavior in three treatments embedded that differ in the source of endowment being taken by another player and/or used for punishment. The treatments are nested in a Taking game in which the FM has an opportunity to take $10 from the SM for which the SM can punish him. Based on mental accounting (Thaler, 1990) we conjecture that subjects place their earned money and house money in two different mental accounts and as a result will punish less using their earned money because it increases the costs of punishment. Similarly, if it is earned money that is taken from them, we conjecture that they will punish more because of the violation of their property rights which are stronger for the account that stores earned funds. While we find support for the latter conjecture, we also find that subjects actually punish more with their earned money than with house money, suggesting that earning a part of their endowment made them more inequality averse. While we provide auxiliary evidence that subjects recognized the difference between earned money and house money, this does not necessarily mean that they were using different mental accounts for the two. This exploration is left for future research.

References

1. Abbink, K., Irlenbusch, B., & Renner, E. (2000). The moonlighting game: An experimental study on reciprocity and retribution. Journal of Economic Behavior & Organization, 42(2), 265-277.
2. Bewley, T. F., & Bewley, T. F. (1999). Why wages don't fall during a recession: Harvard University Press.
3. Bolton, G. E. (1991). A comparative model of bargaining: Theory and evidence. The American Economic Review, 1096-1136.
4. Bolton, G. E., & Ockenfels, A. (2000). ERC: A theory of equity, reciprocity, and competition. American Economic Review, 166-193.
5. Brandts, J., & Charness, G. (2011). The strategy versus the direct-response method: a first survey of experimental comparisons. Experimental Economics, 14(3), 375-398.
6. Camerer, C. F. (2003). Behavioural studies of strategic thinking in games. Trends in cognitive sciences, 7(5), 225-231.
7. Cárdenas, J. C., De Roux, N., Jaramillo, C. R., & Martinez, L. R. (2013). Is it my money or not? An experiment on risk aversion and the house-money effect. Experimental Economics, 1-14.
8. Carlsson, F., He, H., & Martinsson, P. (2013). Easy come, easy go: The role of windfall money in lab and field experiments (). Experimental Economics, 16(2), 190-207.
9. Carpenter, J. P. (2007). The demand for punishment. Journal of Economic Behavior & Organization, 62(4), 522-542.
10. Charness, G., & Kuhn, P. (2011). Lab labor: What can labor economists learn from the lab? Handbook of Labor Economics, 4, 229-330.
11. Cherry, T. L., Frykblom, P., & Shogren, J. F. (2002). Hardnose the dictator. The American Economic Review, 92(4), 1218-1221.
12. Clark, J. (2002). House money effects in public good experiments. Experimental Economics, 5(3), 223-231.
13. Clark, K., & Sefton, M. (2001). The sequential prisoner's dilemma: evidence on reciprocation. The Economic Journal, 111(468), 51-68.
14. Cox, J. C., & Deck, C. A. (2005). On the nature of reciprocal motives. Economic Inquiry, 43(3), 623-635.
15. Cox, J. C., Friedman, D., & Gjerstad, S. (2007). A tractable model of reciprocity and fairness. Games and Economic Behavior, 59(1), 17-45.
16. Cox, J. C., Friedman, D., & Sadiraj, V. (2008). Revealed Altruism1. Econometrica, 76(1), 31-69.
17. Cox, J. C., & Hall, D. T. (2010). Trust with private and common property: Effects of stronger property right entitlements. Games, 1(4), 527-550.
18. Cox, J. C., Sadiraj, K., & Sadiraj, V. (2008). Implications of trust, fear, and reciprocity for modeling economic behavior. Experimental Economics, 11(1), 1-24.
19. Dufwenberg, M., & Kirchsteiger, G. (2004). A theory of sequential reciprocity. Games and Economic Behavior, 47(2), 268-298.
20. Erkal, N., Gangadharan, L., & Nikiforakis, N. (2010). Relative earnings and giving in a real-effort experiment: Department of Economics, University of Melbourne.
21. Falk, A., & Fischbacher, U. (2006). A theory of reciprocity. Games and Economic Behavior, 54(2), 293-315.

22. Falk, A., Fehr, E., & Fischbacher, U. (2003). On the nature of fair behavior. Economic Inquiry, 41(1), 20-26.
23. Fehr, E., & Gächter, S. (2000). Cooperation and punishment in public goods experiments. The American Economic Review, 90(4), 980-994.
24. Fehr, E., Gächter, S., & Kirchsteiger, G. (1997). Reciprocity as a contract enforcement device: Experimental evidence. Econometrica: journal of the Econometric Society, 833-860.
25. Fehr, E., & Schmidt, K. M. (1999). A theory of fairness, competition, and cooperation. The Quarterly Journal of Economics, 114(3), 817-868.
26. Fischbacher, U. (2007). z-Tree: Zurich toolbox for ready-made economic experiments. Experimental Economics, 10(2), 171-178.
27. Gneezy, U., & List, J. A. (2006). Putting behavioral economics to work: Testing for gift exchange in labor markets using field experiments. Econometrica, 74(5), 1365-1384.
28. Güth, W., Schmittberger, R., & Schwarze, B. (1982). An experimental analysis of ultimatum bargaining. Journal of Economic Behavior & Organization, 3(4), 367-388.
29. Harrison, G. W. (2007). House money effects in public good experiments: Comment. Experimental Economics, 10(4), 429-437.
30. Herrmann, B., Thöni, C., & Gächter, S. (2008). Antisocial punishment across societies. Science, 319(5868), 1362-1367.
31. Hoffman, E., McCabe, K., Shachat, K., & Smith, V. (1994). Preferences, property rights, and anonymity in bargaining games. Games and Economic Behavior, 7(3), 346-380.
32. Hoffman, E., & Spitzer, M. L. (1985). Entitlements, rights, and fairness: An experimental examination of subjects' concepts of distributive justice. J. Legal Stud., 14, 259.
33. Kube, S., Maréchal, M., & Puppe, C. (2012). The currency of reciprocity-gift-exchange in the workplace. American Economic Review, 102(4).
34. Nikiforakis, N. (2008). Punishment and counter-punishment in public good games: Can we really govern ourselves? Journal of Public Economics, 92(1), 91-112.
35. Nikiforakis, N., Normann, H.-T., & Wallace, B. (2010). Asymmetric enforcement of cooperation in a social dilemma. Southern Economic Journal, 76(3), 638-659.
36. Ostrom, E., & Walker, J. (2005). Trust and reciprocity: Interdisciplinary lessons from experimental research (Vol. 6): Russell Sage Foundation Publications.
37. Ostrom, E., Walker, J., & Gardner, R. (1992). Covenants with and without a sword: Self-governance is possible. The American Political Science Review, 404-417.
38. Pereira, P. T., & Silva, N. (2006). Positive and negative reciprocity in the labor market. Journal of Economic Behavior & Organization, 59(3), 406-422.
39. Rabin, M. (1993). Incorporating fairness into game theory and economics. The American Economic Review, 1281-1302.
40. Reinstein, D., & Riener, G. (2012). Decomposing desert and tangibility effects in a charitable giving experiment. Experimental Economics, 15(1), 229-240.
41. Rutström, E. E., & Williams, M. B. (2000). Entitlements and fairness:: an experimental study of distributive preferences. Journal of Economic Behavior & Organization, 43(1), 75-89.
42. Selten, R. (1967). Die Strategiemethode zur Erforschung des Eingeschränchte

Rationalen Verhaltens in Rahmen eines Oligopolexperiments', inBeitraägge zur Experimentellen Wirtschaftforschung, ed. by H. Sauermann, Tübingen: JCB Mohr.
43. Thaler, R. (1985). Mental accounting and consumer choice. Marketing science, 4(3), 199-214.
44. Thaler, R. H. (1990). Anomalies: Saving, fungibility, and mental accounts. The Journal of Economic Perspectives, 4(1), 193-205.
45. Thaler, R. H., & Johnson, E. J. (1990). Gambling with the house money and trying to break even: The effects of prior outcomes on risky choice. Management Science, 36(6), 643-660.

Appendix 1 HOUSE MONEY Treatment Instructions

INSTRUCTIONS

No Talking Allowed

Now that the experiment has begun, we ask that you do not talk. If you have a question after we finish reading the instructions, please raise your hand and the experimenter will approach you and answer your question in private.

Anonymity

You have been randomly divided into two groups, called Group A and Group B. Each person in Group A will be randomly paired with a person in Group B. No one will learn the identity of the person (s)he is paired with.

Structure of the Experiment

Each Group A and Group B person will make only one decision in this experiment. The experiment is computerized. If you have any trouble entering your decisions on the computer, please raise your hand to alert the experimenter who will assist you.

Starting Balance

Each person in Group A will start with a starting balance of $10. Each person in Group B will start with a starting balance of $18.

Group A Decision Task

Each Group A person decides whether or not to take $10 from the starting balance of the paired Group B person.

If the Group A person decides **not to take $10** then the Group A person receives final earnings of $10 and the Group B person receives final earnings of $18.

If the Group A person decides **to take $10**, the paired Group B person then decides whether to decrease the Group A person's earnings. Group B person's decision is explained below.

Group B Decision Task

If the Group A person has decided to take $10 from the starting balance of the Group B person, the Group B person can decrease the Group A person's final earnings. Decreasing a Group A person's final earnings by $4 costs Group B person $1 which will be subtracted from his/her remaining $8. The following table shows five possible decisions that are available to a Group B person and the resulting final earnings for the pair.

	Group B person decides to decrease				
	Group A person's earnings by $0	**Group A person's earnings by $4**	**Group A person's earnings by $8**	**Group A person's earnings by $12**	**Group A person's earnings by $16**
Group A person's final earnings	**$20**	**$16**	**$12**	**$8**	**$4**
Group B person's final earnings	**$8**	**$7**	**$6**	**$5**	**$4**

Note that the decision by the Group B person will only be relevant if the Group A person chose to take $10 from Group B person.

Payment of Experiment Earnings

All participants are asked to sit patiently until the end of the experiment. Once all Group B persons have made their decisions, you will be presented with a summary screen of your earnings. Click OK after you have seen this screen, so other participants cannot see your decisions. You will then be prompted to complete a questionnaire. After the questionnaire, you will be asked one by one to approach the payment room at the back of the lab for the payment of your earnings. All the money will be paid to you in cash at the end of the experiment. Because your decision is private, we ask that you do not tell anyone your decision or your earnings either during or after the experiment. We also ask you to not gather near the lab after you receive your payment.

Are there any questions?

Appendix 2 EARNED MONEY for PUNISHMENT Treatment Instructions

TASK 1 INSTRUCTIONS

No Talking Allowed

Now that the experiment has begun, we ask that you do not talk. If you have a question after we finish reading the instructions, please raise your hand and the experimenter will approach you and answer your question in private.

You have been randomly divided into two groups, called Group A and Group B. Each person in Group B will now have the opportunity to earn money.

Group B Task

In today's experiment each person in Group B will participate in a task, where (s)he will get a chance to earn $8. Each participant will be given 20 posters promoting NZEEL experiments. These posters need to be cut in a way that people passing by can take a stub with web page link where they can register for the experiments. The posters will then be placed in different parts of the university in order to recruit subjects for future experiments. Please cut the posters individually so that the stubs are neat. You will be paid only if you finish cutting all 20 posters that will be given to you.

Group A Has No Task

While Group B persons perform their task, we ask all Group A persons to wait patiently and quietly. Please do not use the computer in front of you as it is set up for the experiment.

Task 2 of the experiment will follow shortly.

TASK 2 INSTRUCTIONS

Anonymity

In Task 2 each person in Group A will be randomly paired with a person in Group B. No one will learn the identity of the person (s)he is paired with.

Structure of Task 2

Each Group A and Group B person will make only one decision in Task 2 which is the final part of the experiment. That is, after Task 2 there are no more tasks.

Task 2 is computerized. If you have any trouble entering your decisions on the computer,

please raise your hand to alert the experimenter who will assist you.

Starting Balance

Each person in Group A as well as in Group B will start with a starting balance of $10. In addition to his/her starting balance each person in Group B has participated in a task, where (s)he earned $8.

Group A Decision Task

Each Group A person decides whether or not to take the $10 starting balance from the paired Group B person.

If the Group A person decides **not to take $10** then the Group A person receives final earnings of $10 and the Group B person receives final earnings of $18 ($10 starting balance and $8 from Task 1).

If the Group A person decides **to take $10**, the paired Group B person then decides whether to decrease the Group A person's earnings. Group B person's decision is explained below.

Group B Decision Task If the Group A person has decided to take the $10 starting balance from Group B person, the Group B person can decrease the Group A person's final earnings using the money (s)he has earned in the Task 1. Decreasing a Group A person's final earnings by $4 costs Group B person $1 which will be subtracted from his/her Task 1 earnings of $8. The following table shows five possible decisions that are available to a Group B person and the resulting final earnings for the pair.

	Group B person decides to decrease				
	Group A person's earnings by $0	**Group A person's earnings by $4**	**Group A person's earnings by $8**	**Group A person's earnings by $12**	**Group A person's earnings by $16**
Group A person's final earnings	**$20**	**$16**	**$12**	**$8**	**$4**
Group B person's final earnings	**$8**	**$7**	**$6**	**$5**	**$4**

Note that the decision by the Group B person will only be relevant if the Group A person chose to take $10 from Group B person.

Payment of Experiment Earnings

All participants are asked to sit patiently until the end of the experiment. Once all Group B persons have made their decisions, you will be presented with a summary screen of your earnings. Click OK after you have seen this screen, so other participants cannot see your decisions. You will then be prompted to complete a questionnaire. After the questionnaire, you will be asked one by one to approach the payment room at the back of the lab for the payment of your earnings. All the money will be paid to you in cash at the end of the experiment. Because your decision is private, we ask that you do not tell anyone your decision or your earnings either during or after the experiment. We also ask you to not gather near the lab after you receive your payment.

Are there any questions?

Appendix 3 EARNED MONEY TAKEN Instructions

TASK 1 INSTRUCTIONS

No Talking Allowed
Now that the experiment has begun, we ask that you do not talk. If you have a question after we finish reading the instructions, please raise your hand and the experimenter will approach you and answer your question in private.

You have been randomly divided into two groups, called Group A and Group B. Each person in Group B will now have the opportunity to earn money.

Group B Task

In today's experiment each person in Group B will participate in a task, where (s)he will get a chance to earn $10. Each participant will be given 20 posters promoting NZEEL experiments. These posters need to be cut in a way that people passing by can take a stub with web page link where they can register for the experiments. The posters will then be placed in different parts of the university in order to recruit subjects for future experiments. Please cut the posters individually so that the stubs are neat. You will be paid only if you finish cutting all 20 posters that will be given to you.

Group A Has No Task

While Group B persons perform their task, we ask all Group A persons to wait patiently and quietly. Please do not use the computer in front of you as it is set up for the experiment.

Task 2 of the experiment will follow shortly.

TASK 2 INSTRUCTIONS

Anonymity
In Task 2 each person in Group A will be randomly paired with a person in Group B. No one will learn the identity of the person (s)he is paired with.

Structure of Task 2
Each Group A and Group B person will make only one decision in Task 2, which is the final part of the experiment. That is, after Task 2 there are no more tasks.
Task 2 is computerized. If you have any trouble entering your decisions on the computer, please raise your hand to alert the experimenter who will assist you.

Starting Balance
Each person in Group A will start with a starting balance of $10. Each person in Group B will

start with a starting balance of $8. In addition to his/her starting balance each person in Group B has participated in a task, where (s)he earned $10.

Group A Decision Task

Each Group A person decides whether or not to take the $10 which Group B person has earned in the previous task.

If the Group A person decides **not to take $10** then the Group A person receives final earnings of $10 and the Group B person receives final earnings of $18 ($8 starting balance and $10 from Task 1).

If the Group A person decides **to take $10**, the paired Group B person then decides whether to decrease the Group A person's earnings. Group B person's decision is explained below.

Group B Decision Task

If the Group A person has decided to take the earned $10 from Group B person, the Group B person can decrease the Group A person's final earnings using the money from the starting balance. Decreasing a Group A person's final earnings by $4 costs Group B person $1 which will be subtracted from his/her starting balance of $8. The following table shows five possible decisions that are available to a Group B person and the resulting final earnings for the pair.

	Group B person decides to decrease				
	Group A person's earnings by $0	**Group A person's earnings by $4**	**Group A person's earnings by $8**	**Group A person's earnings by $12**	**Group A person's earnings by $16**
Group A person's final earnings	**$20**	**$16**	**$12**	**$8**	**$4**
Group B person's final earnings	**$8**	**$7**	**$6**	**$5**	**$4**

Note that the decision by the Group B person will only be relevant if the Group A person chose to take $10 from Group B person.

Payment of Experiment Earnings

All participants are asked to sit patiently until the end of the experiment. Once all Group

B persons have made their decisions, you will be presented with a summary screen of your earnings. Click OK after you have seen this screen, so other participants cannot see your decisions. You will then be prompted to complete a questionnaire. After the questionnaire, you will be asked one by one to approach the payment room at the back of the lab for the payment of your earnings. All the money will be paid to you in cash at the end of the experiment. Because your decision is private, we ask that you do not tell anyone your decision or your earnings either during or after the experiment. We also ask you to not gather near the lab after you receive your payment.

Are there any questions?