TAX OR TRANSFER? THE FRAMING EFFECT OF REDISTRIBUTION POLICY: EXPERIMENTAL EVIDENCE *

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April 3, 2014

Abstract: This paper investigates whether the framing of redistribution policy affects work effort decisions. I devise two theoretically equivalent treatments: the redistributive tax (TAX) treatment and the redistributive transfer (TRANSFER) treatment and study subjects' work effort choices in a novel public goods experiment. I find evidence supporting the existence of a framing effect. On average, subjects in the TRANSFER treatment group chose 25.27% higher effort levels than those in the TAX treatment group. Then, I explore possible mechanisms that may account for the framing effect. The results of the experiment do not support the cognitive ability hypothesis. When the fairness perception hypothesis is tested I find there is no significant difference in fairness perception between the two treatments. However, surprisingly, the negative effect of using the TAX rather than the TRANSFER framing is significantly larger among subjects who judge their mechanism to be unfair. The results can shed light on the normative debate about the extent to which taxes or transfers should be used more actively for redistribution.

Key words: redistribution policy, work effort, framing effect, income inequality
JEL codes: C91, D03, H21, H31

* I am grateful to Louis Putterman, Pedro Dal Bó and Brian Knight for their guidance and advice. I also wish to thank Geoffroy de Clippel, Mark Dean, Kfir Eliaz and Joseph Tao-Yi Wang, as well as seminar and conference participants at Brown University, Nanyang Technological University and the 13th Public Economics Theory Conference for valuable comments. All errors are mine.
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I. Introduction

Redistribution of income occurs in most democratic countries. Governments redistribute income in two ways: by taxing the high-income relatively more and by making relatively more transfer payments to the low-income. Using data from the Luxembourg Income Study (LIS), Mahler and Jesuit (2006) showed that the tax-and-transfer system reduced income inequality by an average of 16 Gini points in 13 OECD countries during the period of 1980-2000. Milanovic (2000), also using the LIS database, estimated that the income share of the bottom two quintiles of households in the OECD countries in the early 1990s was on average 14.7% higher when measured on a post-tax-and-transfer than on a pre-tax-and-transfer basis.

Even though these two redistribution policy tools, taxes and transfers, share the same goal of achieving a more equal distribution of income, there is at present no consensus regarding which policy tool, taxes or transfers, should be used more actively for redistribution. Two aspects of this question may be considered: first, which policy tool can alter income distribution more effectively? Second, which is less detrimental to economic efficiency, specifically work effort? As to the first question, there is widespread agreement that a transfer system is more effective in redistributing income than a taxation system, as the former is targeted on the poor (Prasad, 2008). The second question, however, has not yet been answered directly in the literature even though many studies have been devoted to examining the disincentive effects of taxes and transfers separately.

In standard consumer theory, a consumer maximizes utility by allocating his limited time among work and leisure. Taxation, by changing the relative price of work and leisure, creates the substitution and the income effect. The former discourages work effort while the latter induces it if leisure is a normal good. Therefore, the effect of taxation on work effort is ambiguous. Empirical and experimental evidence shows the substitution effect dominates the income effect and thus taxation is detrimental to work effort (Blundell and Macurdy, 1999; Blundell and Shephard, 2008; Hall, 2010; Meghir and Phillips, 2010). On the other hand, transfers, if means-tested, also create the

substitution effect and the income effect, both of which discourage work effort.[1] Empirical literature focuses on the magnitude of the disincentive effect of a specific transfer program (Danziger et al., 1981; Moffitt, 2002).

The fact that there is no literature directly comparing the disincentive effects of taxes and transfers has its theoretical and empirical reasons. Theoretically, a central assumption in public finance is that rational people optimize fully with respect to taxes and transfers. They are assumed to perfectly calculate the post-redistribution earnings and thus there should be no behavioral difference when the degree of redistribution is the same. However, a burgeoning literature on tax perception and tax salience suggests that the framing of tax systems or compensation schedules may affect people's labor supply or purchasing behavior (Blumkin *et al.*, 2008; Chetty et al., 2009; Fochmann et al., 2010; Gamage et al., 2010; Lozza et al., 2010).[2] This paper extends existing literature focusing solely on the tax system towards the entire tax-and-transfer system.

Empirically, it is very difficult to compare the disincentive effects of taxes and transfers due to data limitation in the field. Even though policy change in any given tax/transfer system may provide a natural experiment for empirical economists to examine the disincentive effect on work effort, change in the characteristics of working population and other variables that may affect work incentives disturb the result (Adam et al., 2006).[3] It is also hard to control the degree of redistribution in order to compare a tax system and a transfer system on the same basis. In addition, non-linear income tax

[1] Some transfer programs like unemployment insurance and welfare benefits create substitution effect because these programs target people who are not working.

[2] Blumkin *et al* .(2008) design two tax systems that yield identical after-tax budget lines and find that work incentives are less affected when tax is levied on consumption than on income. Chetty et al. (2009) use a field experiment in California and find that posting tax-inclusive prices reduces demand by roughly 8% among the treated products relative to control products and nearby control stores. Fochmann et al. (2010) devise three treatments in which tax rates are 0%, 25% and 50% but net wage is identical. Although work incentives should be the same, they find subjects work harder and longer when they are taxed. Gamage et al. (2010) devise four framing conditions with identical after-tax compensation schedules and find that the framing significantly impacts subjects' labor/leisure choices. Lozza et al. (2010) evaluate the framing effect of fiscal bonus: presenting it as income increase (a gain) versus tax rebate (a loss reduction) and find that subjects are more inclined to save the bonus when it is described as a loss reduction. Similar to the literature mentioned above, my experimental design shares the same "theoretical equivalence" property.

[3] Other variables may also affect work incentives include non-earned income, housing tenure, local taxes, disability and ill-health, and, among parents, the number and age of dependent children, and changes in the working patterns among couples.

schedules and opaque benefit-tax linkages for social insurance programs add to the difficulty of the comparison between taxes and transfers (Chetty et al., 2009).

To overcome these challenges, I design two theoretically equivalent but distinctively framed treatments and study subjects' work effort decisions in a laboratory environment. In the redistributive tax (TAX) treatment, subjects are taxed at a proportional rate while each subject receives an equal transfer payment.[4] In the redistributive transfer (TRANSFER) treatment, subjects are taxed by a fixed amount while transfers are distributed to each subject in a "progressive" fashion. Those with higher pre-tax earnings receive fewer transfers than those with lower pre-tax earnings. The main feature of the experiment is the theoretical equivalence of the two treatments. The tax-and-transfer system embedded in each treatment alters the distribution of pre-tax earnings identically. That is, for any pre-tax income distribution, the corresponding income distribution after the tax-and-transfer system in each treatment is identical. This feature allows me to identify the causal relationship between the framing effect of redistribution policy and work effort.

There are three major findings in this paper. First, I find support for the existence of the framing effect of redistribution policy. On average, subjects chose 25.27% higher effort levels in the TRANSFER treatment than those in the TAX treatment. Second, I do not find supporting evidence for the cognitive ability mechanism. Subjects' cognitive abilities make no difference in the treatment effect. This indicates that cognitive limitation (referred to as myopia in Blumkin et al. (2008) and cognitive cost in Chetty et al. (2009)) may not be the only explanation for the framing effect in the domain of redistribution policy. Last, when I test the fairness perception hypothesis, I find that the perceived fairness is not significantly different between the two treatments. However, surprisingly, the treatment effect is significantly larger among the subjects who judge the mechanism to be unfair. This last result suggests that individuals may perceive tax and transfer differently. Individuals that judge the system in their treatment to be unfair may incur a much greater psychological cost when providing more effort means paying more

[4] The TAX treatment builds on the tax experiment that has been widely used in experimental literature on taxation (Levy-Garboua et al., 2009; Durante and Putterman, 2010; Hall, 2010).

taxes (a loss) than when providing more effort means receiving fewer transfers (an absence of gain). Such individuals may thus reduce work effort level by a larger amount in the TAX treatment than in the TRANSFER treatment.

This work builds on and relates to at least three strands of literature. First, it joins the literature on taxes/transfers and labor supply. Even though there are an enormous number of studies investigating the effect of taxes or the effect of transfers on labor supply, this paper is the first attempt which aims to compare the disincentive effects of taxes and transfers. The experimental results have policy implications for the normative question: which redistribution policy tool, taxes or transfers, should be used more actively to alleviate income inequality? Second, this paper adds to the broader literature on tax salience and further extends its application to redistribution policy. Last, this paper also relates to a growing literature on procedural fairness (Bolton et al., 2005; Karni et al., 2008; Ku and Salmon, forthcoming). This literature has found that individuals might judge the fairness of a final outcome on the basis of the procedure that generated it. The tax-and-transfer system embedded in the two treatments indicates two different allocation procedures. Interestingly, my results suggest that the difference in allocation procedure does not create a discrepancy in perceived fairness. However, the allocation procedure has a significant impact on work effort among the individuals who perceive the allocation procedure to be unfair.

The remainder of the paper is organized as follows: Section II describes experimental design. Results are reported in Section III. Finally, I discuss policy implications as well as limitations in Section IV.

II. Experimental Design

I examine the framing effect of redistribution policy on work effort in a laboratory experiment. Subjects' work effort is elicited in a one-shot game described as follows. In the beginning of the experiment, subjects are randomly assigned to groups of four and given an endowment of 10 points. They will each decide how to allocate their endowment between working and leisure. For each point they allocate to leisure, they earn 1 point. For each point they allocate to working, they earn 1.2 points of wage

earnings, which are subject to a tax-and-transfer system. Their final earnings are the sum of the earnings from leisure and the wage earnings after the tax-and-transfer system (hereafter referred to as "net wage earnings"). The variable of interest is the number of points allocated to working, which measures a subject's choice of work effort.[5]

The framing of a tax-and-transfer system is the only treatment variable in my experiment. In the TAX treatment, subjects' wage earnings are taxed at a rate of 50%. Tax revenue collected will then be equally distributed to each group member. Each subject in the same group receives an equal amount of transfer equal to

$$50\% \cdot \bar{X}$$

where $\bar{X}$ denotes the group average wage earnings. This tax-and-transfer system causes those with higher wage earnings to pay more taxes than those with lower wage earnings while each group member receives an equal amount of transfer.

In the TRANSFER treatment, subjects are taxed by a total of 5 points. Tax revenue collected will then be "progressively" distributed to each group member. The amount of transfer equals

$$50\% \cdot (\bar{X} - X_i + 10)$$

where $\bar{X}$ denotes the group average wage earnings and X_i indicates the wage earnings of subject i. This tax-and-transfer system causes those with lower wage earnings to receive more transfers than those with higher wage earnings, while each group member pays a fixed and equal amount of taxes. These two treatments are mathematically equivalent. I present the proof and a simple numerical example in Appendix I. This theoretical

[5] In my experiment, work effort refers to a subject's choice in the point (experimental money) allocation decision and not the effort by performing a real task. To convey a better sense of their decision on the amount of effort they put into work, I frame the instructions of the experiment as allocating points among working and leisure. A few experimental studies in labor economics employ this "chosen effort" or "stated effort" design (for example, Fehr et al. (1993), Falk and Kosfeld (2004), and Abeler et al. (2010)). In addition, Bruggen and Strobel (2007) compare subjects' choices in chosen-effort and real-effort tasks and find that subjects react similarly to wage offers in a gift-exchange game regardless of the form of effort.

equivalence of the two treatments implies that, if individuals only care about monetary payoffs, the framing of redistribution policy should have no impact on their effort choices.

I employ a between-subject rather than within-subject design to avoid the "carry-over effect" (Charness et al., 2012). If subjects are exposed to both treatments and realize these two treatments provide identical financial incentives, they are more likely to make the same choice of work effort in both treatments. The main concern with a between-subject design is that the results inherently have substantial noise due to individual heterogeneity. A set of control variables will be employed in the regression model to filter out their possible effects on work effort.

The choices of the parameters in my experimental design exhibit similar properties as the voluntary contribution mechanism (VCM) experiment. Each subject allocates his endowment between two activities: group/private account in a VCM versus working/leisure in my experiment. The working account is analogous to the group account. Subject's allocation to the working or group account benefits other members of his group to some extent, although unlike a VCM, allocation to work benefits oneself more than it benefits others.[6] The leisure accounts in my experiment functions exactly the same as the private account in a VCM. Allocation to these accounts only generates private benefit. The distinction between my experiment and the VCM is the redistribution rule of the earnings from the working or group account. In a VCM, earnings from the group account will be "equally" distributed to each group member regardless of how much they put into the group account. However, in my experiment, their contributions to the working account positively relates to their shares of the earnings yielded from the working account.[7]

[6] In my experiment, the marginal social benefit (MSB) of an additional point allocated to working is 1.2. The marginal private benefit (MPB) is equal to 1.2*t+(1/n)*(t)=1.2*0.5+1/4*(0.5)=0.75, where t is the tax rate and n is group size. The marginal cost (MC) is always equal to 1, which falls in between the MSB and the MPB. This condition, MSB>MC>MPB, is in line with the settings in most VCM experiments.

[7] To be more specific, in my experiment, subjects' earnings from the working account equals 62.5% × (1.2 × (own working points)) + 37.5% × (1.2 × (the average working points of other group members)).

I conducted six sessions in a computer lab at Brown University in February and September, 2012.[8] A total of 104 subjects were recruited and each treatment had 52 observations. Each session proceeded as follows: After subjects signed the consent form, instructions were given and read aloud by the experimenter (please refer to Appendix II for instructions). Then, subjects were asked to complete an incentivized comprehension test. In the beginning of the main experiment, subjects were randomly divided into groups of four. After they made the allocation decision, subjects were asked how fair they felt the tax-and-transfer system was.[9] Then, they completed the cognitive reflection test (CRT) and a numeracy test (NUM). They did not receive the feedbacks about their group members' decisions and their final earnings until they answered the fairness perception question and finished the CRT and NUM tests, to avoid the contamination of those last parts by others' decisions. Subjects completed a questionnaire at the end of the experiment.

Each session lasted about 30 minutes and the average monetary earnings were USD$16.73, including the guaranteed $3 participation fee. Payments were made in cash before they left the computer lab. The experiment was programmed and conducted with the software of z-Tree (Fischbacher, 2007).

III. Results

A. Summary statistics of demographic and non-demographic variables

Table 1 summarizes the descriptive statistics of the demographic variables. There is no significant difference between the values of any of the demographic characteristics for the TAX treatment and the TRANSFER treatment, so random assignment is valid ex post. Of the subjects, 43% were male. Half of the subjects considered themselves to be white and 10% of the subjects had a Hispanic background. Subjects' mean family income fell between the $50,000 to $99,999 category and the $100,000 to $149,999 category. Around one quarter of the subjects majored in economics or a joint major of economics

[8] All four sessions were conducted during 1:00-3:00p.m. on weekends.
[9] The question is described as: "How fair do you feel the tax-and-transfer system in the experiment is? Select a number on a scale of 1 (very unfair) to 7 (very fair)."

and related field (e.g., mathematics). Two questions regarding subjects' political philosophy were asked. About half of the subjects reported their political inclination to be Democratic; the other half reported themselves to be Republican, Independent, other or don't know. In terms of political ideology, on a scale of 1 (conservative) to 7 (liberal), subjects were inclined to be liberal. The mean score was 4.91.

Table 2 summarizes non-demographic variables. Four different measures of cognitive abilities were collected in the experiment, including SAT-Math scores (SATM), SAT-Verbal scores (SATV), Cognitive reflection test scores (CRT), and Numeracy reasoning scores (NUM). SAT scores were self-reported; CRT and NUM scores were from incentivized tests during the experiment.

The measure of fairness perception (Fairness) is on a scale of 1 (very unfair) to 7 (very fair). In order to avoid their self-reported fairness perception being affected by their payoffs relative to other group members, the question about their fairness perception was asked immediately after they made the allocation decision (how many points allocated to working). Based on the mean responses, there is no statistical difference between the stated fairness perceptions of the two treatment groups (Mean = 3.38 in the TAX treatment; Mean = 3.44 in the TRANSFER treatment; p-value for two-sided Mann-Whitney test = 0.727).

B. The framing effect is marginally significant

Subjects were asked to complete an incentivized comprehension quiz before they made the allocation decision. This quiz is composed of seven questions to make sure that subjects understand the instructions correctly. Table 3 shows that the correct answer rates were not significantly different between the two treatments. The average number of questions answered correctly is 6.08 and 5.98 in the TAX treatment and the TRANSFER treatment, respectively.

Table 4 compares the effort levels chosen by the subjects in the TAX and TRANSFER treatment groups. Subjects in the TAX treatment group allocated an average of 5.40 points to working and subjects in the TRANSFER treatment allocated an average

of 6.77 points (p-value=4.13% for two-sided t-test; p-value=8.25% for two-sided Mann-Whitney test). Subjects in the TRANSFER treatment group, on average, chose 25.37% higher effort levels than those in the TAX treatment group. This result provides preliminary support for the existence of the framing effect: subjects chose different effort levels under two theoretically equivalent tax-and-transfer systems. Both the average result and each treatment's individual result are similar to the major finding in VCM experiments that subjects provide contributions halfway between the Pareto-efficient level (10 points to working in my experiment) and the free-riding level (0 points to working) in one-shot trials and in the initial stages of finitely repeated trials (Ledyard, 1995).

Figure 1 shows the distributions of effort levels by treatment. In both treatments, a substantial number of subjects chose to allocate all their endowments to working (30.56% in the TAX treatment and 38.89% in the TRANSFER treatment). Subjects in the TAX treatment group were more likely to choose low effort levels (0-2 points) while subjects in the TRANSFER treatment group tended to choose high effort levels (7-10 points).

C. Possible mechanisms for the framing effect

In this section, I examine two potential mechanisms that may account for the framing effect: cognitive ability mechanism and fairness perception mechanism. Because there was a substantial number of subjects who chose to allocate either none (0 points) or all (10 points) of their endowments to working, I employ both OLS and Tobit regression models to further investigate possible mechanisms for the framing effect. The dependent variable is the effort level measured by the number of points allocated to working. Since the experiment is a one-shot game and subjects do not know the identities of their group members, all observations are independent.

Tables 5 and 6 report Tobit and OLS regression results, respectively. In both tables, I estimate equation (1)−(6) without demographic controls. Then, I estimate these equations with demographic controls in equation (7)−(12). The demographic controls include gender, race, family income, economics major and political inclination. None of the demographic controls is statistically significant in any specification except gender.

In Column (1), I only include Treatment, which is a dummy variable equal to 0 if the subject is in the TAX treatment group and 1 if in the TRANSFER treatment group. The coefficient associated with Treatment indicates the difference in the average effort levels between the two treatment groups. The treatment effect is significant at the 10% significance level in the Tobit regression and significant at the 5% significance level in the OLS regression. After adding demographic controls in Column (7), the results still hold.

The above results have shown that the framing of redistribution policy impacts subjects' effort choices. Because the results are derived from a randomized experiment, this relationship is presumably causal. For the rest of this section, I will discuss possible mechanisms that may contribute to the framing effect. Two factors are considered: cognitive ability and fairness perception.

C.1 Cognitive Ability Hypothesis

Previous studies, including Blumkin *et al.* (2008), Chetty et al. (2009), Finkelstein (2009), and Sahm et al. (2012) suggest that the visibility of taxes (tax salience) affects individuals' labor supply and/or purchasing decisions. This cognitive bias of relative inattention to less salient forms of taxation mitigates the negative effects of taxation, such as deterring work incentives and reducing consumption. In my experiment, I conjecture that the marginal tax rate in the TAX treatment (50%) is more salient than that in the TRANSFER treatment even though these two treatments are theoretically equivalent. Subjects might perceive their wage earnings to be taxed on the margin at a zero percent rate in the TRANSFER treatment because they see the tax itself as fixed and lack the mental acuity to process the marginal impact of the transfer on net wage earnings. If this cognitive bias exists, then subjects in the TRANSFER treatment group are predicted to choose higher effort levels.

I test this hypothesis with the aid of the additional assumption that subjects with lower cognitive abilities suffer from this cognitive bias to a larger degree than those with higher cognitive abilities. This assumption is supported by recent studies in behavioral economics, including Oechssler et al. (2008), Hoppe and Kusterer (2010), and Benjamin

et al. (2012).[10] These studies established a negative relationship between cognitive abilities and behavioral biases. Psychological literature also suggests that cognitive biases may arise due to an individual's innumeracy (for example, Dale et al., 2007). Building on this assumption, the treatment effect would be larger among those with lower cognitive abilities than those with higher cognitive abilities.

In Tables 5 and 6, I add cognitive ability in Column 2 and both cognitive ability and the interaction term between cognitive ability and treatment in Column 3. Four different measures of cognitive abilities, including SAT-Math score, SAT-Verbal score, CRT score and NUM scores are utilized.[11] The coefficients associated with cognitive ability are all negative, suggesting that subjects with higher cognitive abilities contributed less work effort. This is consistent with the findings in public goods experiments (for example, Putterman et al., 2011). However, the coefficient associated with the interaction term is insignificant. This implies the treatment effect is not significantly different among subjects with high cognitive abilities and those with low cognitive abilities. Hence, I do not find supporting evidence for cognitive ability being a possible mechanism for the framing effect. However, it should be noted that this is not direct evidence to refute the cognitive ability hypothesis. It is still not clear whether the additional assumption on which my analysis is based is legitimate. Possibly, both subjects with high cognitive abilities and low cognitive abilities suffer from the cognitive bias of perceiving the marginal effect of a tax more than that of a transfer to a similar extent.

C.2 Fairness Perception Hypothesis

The second factor of interest is fairness perception. Many recent studies have shown that fairness perception induces work effort and cooperation (See Cornelissen et al. (2010) and Cohn et al., (2011) for work effort and Balafoutas et al. (2010) for cooperation). In my experiment, fairness perception (Fairness) is a self-reported measure on a scale of 1 (very unfair) to 7 (very fair). It is elicited immediately after subjects make

[10] Benjamin et. al. (2012) show that small-stakes risk aversion and short-run discounting are less common among those with higher standardized test scores. Hoppe and Kusterer (2010) find individuals with lower cognitive abilities tend to be affected more by behavioral biases. Oechssler et al. (2008)'s results are mixed. They show that individuals with lower cognitive abilities are more likely to exhibit the base rate fallacy, the conservatism fallacy, and overconfidence. However, this link is not significant for the endowment effect.
[11] I only show the regression results using CRT score as the measure of cognitive ability.

their allocation decisions to avoid this measure being contaminated by other group members' allocation decisions.

Surprisingly, the fairness perception of the subjects is uncorrelated with treatment. First, the mean response is 3.38 in the TAX treatment and 3.44 in the TRANSFER treatment (p-value = 0.73 in two-sided Mann-Whitney test). Second, the Pearson's coefficient of correlation is 0.02. Third, the distribution of fairness perception is similar among the two treatments, shown in Table 7. The number of subjects who reported the tax-and-transfer system to be unfair (1-3), neutral (4) and fair (5-7) are very close regardless of which treatment they were exposed to. These results indicate that subjects' fairness perception is not significantly different between the two treatments.

In Column 4 and 10, I add fairness perception (Fairness) to the regression equation. The coefficient of Fairness is significantly positive at the 1% significance level, which indicates that the fairer the subjects felt a tax-and-transfer system was, the higher the effort levels they chose. This result is in line with previous evidence showing that perception of unfairness negatively impacts work effort (Cornelissen et al., 2010; Cohn et. al., 2011). The coefficient of treatment is significant at the 5% level without demographic controls and significant at the 10% level with demographic controls.

In Column 5 and Column 11, the interaction term between fairness perception and treatment is added. The coefficient associated with the interaction term is significantly negative at the 5% level with demographic controls and at the 10% level without demographic controls. This indicates that the treatment effect is larger when subjects perceive the tax-and-transfer system to be unfair.

Figure 2 illustrates the above result in more detail. When subjects felt the tax-and-transfer system to be unfair, the average effort level was only 4.20 in the TAX treatment group, as opposed to 6.29 in the TRANSFER treatment group. On the other hand, when subjects felt the tax-and-transfer system to be neutral or fair, the average effort level in the TAX treatment group was only slightly lower than that in the TRANSFER treatment group.

To account for the above findings, I propose an explanation based on the theory of loss aversion (Tversky and Kahenman, 1991). Loss aversion means that individuals have a propensity to prefer avoiding losses to obtaining gains. In the TAX treatment, an individual first "earns" his wage earnings, but then half is taken away as taxes, so he perceives paying taxes as a loss (loss frame). In the TRANSFER treatment, the individual does not earn the potential transfer. The fact that he does not receive some transfer money that he might have received had he chosen not to work is not perceived by him as a loss. Rather, it is perceived as a potential gain that did not occur (gain frame).[12] The theory of loss aversion suggests that the disutility associated with the loss frame (paying more taxes) is greater than that associated with the gain frame (receiving fewer transfers). I further postulate that this disparity in the level of disutility would even grow when perceived fairness is low. Accordingly, individuals that judge the system in their treatment to be unfair may incur a much greater psychological cost when providing more effort means paying more taxes (a loss) than when providing more effort means receiving fewer transfers (an absence of gain). Such individuals may thus reduce work effort level by a larger amount in the TAX treatment than in the TRANSFER treatment.

A previous study by Zhou and Wu (2011) may provide some justifications for my assumption. In their experiment, subjects played the responder in the ultimatum game and decided whether to accept or reject a number of hypothetical offers.[13] The only manipulation is the framing of the game: loss-framed or gain-framed.[14] They found that subjects are more likely to reject unfair offers when the game is loss-framed than when it is gain-framed. Although fairness in their experiment is defined as a realized division of the $10 gain or loss rather than stated fairness perception, their findings suggest the link between fairness perception and the gain-loss framing.

[12] In both treatments, subjects lose 0.45 points of wage earnings for each additional point allocated to working.
[13] Subjects were told the offers were made by students in another unspecified university.
[14] For a division scheme in the gain domain, the standard rule of the ultimatum game was applied. For a division scheme in the loss domain, an "acceptance" decision would mean that the participant would get panelized for the amount offered and the proposer would get the rest, and a "rejection" decision would mean that each of them would incur a loss of 10 dollars. For example, the 2/8 offer in the gain domain indicates, if accepted, the sender and the responders receive 2 and 8 dollars, respectively. If rejected, both get zero. The -8/-2 offer in the loss domain indicates the sender and the responder lose 8 and 2 dollars, respectively. If rejected, both lose 10 dollars.

IV. Conclusion

In this paper, I examine the framing effect of redistribution policy on work effort decisions in a laboratory environment. Relying on two theoretically equivalent but distinctively framed treatments, I find evidence that supports the existence of a framing effect: subjects in the redistributive transfer treatment group chose higher effort levels than those in the redistributive tax treatment group. This result contributes to a long-lasting discussion in the literature on the disincentive effects of taxes and transfers by making a direct comparison between these two policy tools. I also use regression analysis to further investigate possible mechanisms that may account for the framing effect. My results suggest a limited role for cognitive limitation being the explanation for the framing effect. By contrast, I propose a plausible explanation, which is closely related to loss aversion, to account for my findings. Individuals that judge the system in their treatment to be unfair may incur a much greater psychological cost when providing more effort means paying more taxes (a loss) than when providing more effort means receiving fewer transfers (an absence of gain). Such individuals may thus reduce work effort level by a larger amount in the TAX treatment than in the TRANSFER treatment.

Before I extrapolate policy implications from my results, several questions need to be discussed. First, this research shares the same limitation as most laboratory experiments — lack of external validity (Kessler and Vesterlund, 2012). The effort levels measured in this research were experimental (rather than naturally occurring) and chosen (rather than actual). I cannot speculate about the generalizability of this research to the field. However, as mentioned before, it is difficult to examine the framing effect in the real world. A real-effort laboratory experiment or small-scale field experiment may both be viable ways to improve the external validity of the study and thus provide a direction for future work. The second concern regards feasibility. The two treatments in the experiment are on the two different sides of the spectrum of redistribution policy: redistribution is either through taxes only (TAX treatment) or through transfers only (TRANSFER treatment). It should be noted that the lump-sum tax scheme on which the TRANSFER treatment relied has rarely been implemented in the real world (Mankiw et al., 2009).

These complications aside, my results indicate that, for a given level of redistribution, using transfers is less detrimental to work effort than using taxes. This suggests that the government may recover some efficiency loss from the redistributive system by adopting a less progressive taxation system (such as lowering marginal income tax rate) coupled with a more progressive transfer system (such as reducing or eliminating benefits to the rich). Furthermore, this finding may shed some light on the justifications for the current design of the U.S. Social Security system. Similar to the tax-and-transfer system, a social security system is a combination of taxes and benefits: participants pay social security tax on a regular basis and receive benefits when retired. The current design emphasizes a regressive taxation system (a flat tax rate is applied to annual earnings up to $110,100; any wages earned above the cap are untaxed) and a progressive benefit system (a redistributive function of average indexed monthly earnings). Based on my results, this design has smaller disincentive effect than that with a more progressive tax structure and a less progressive benefit structure.

One final discussion on which my findings shed light is the labeling issue of the Earned Income Tax Credit (EITC): should we remove "tax" from the title, calling it simply the "Earned Income Credit (EIC)?" People may perceive this benefit differently depending on how it is labeled. EITC could be perceived as a loss recovered and EIC be perceived as a gain earned. Based on my findings, because people weight the loss more heavily than the gain, labeling it as EITC may facilitate higher incentive to work for the low-income workers.

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Tables and Figures

Figure 1: The Distribution of Effort Level by Treatment

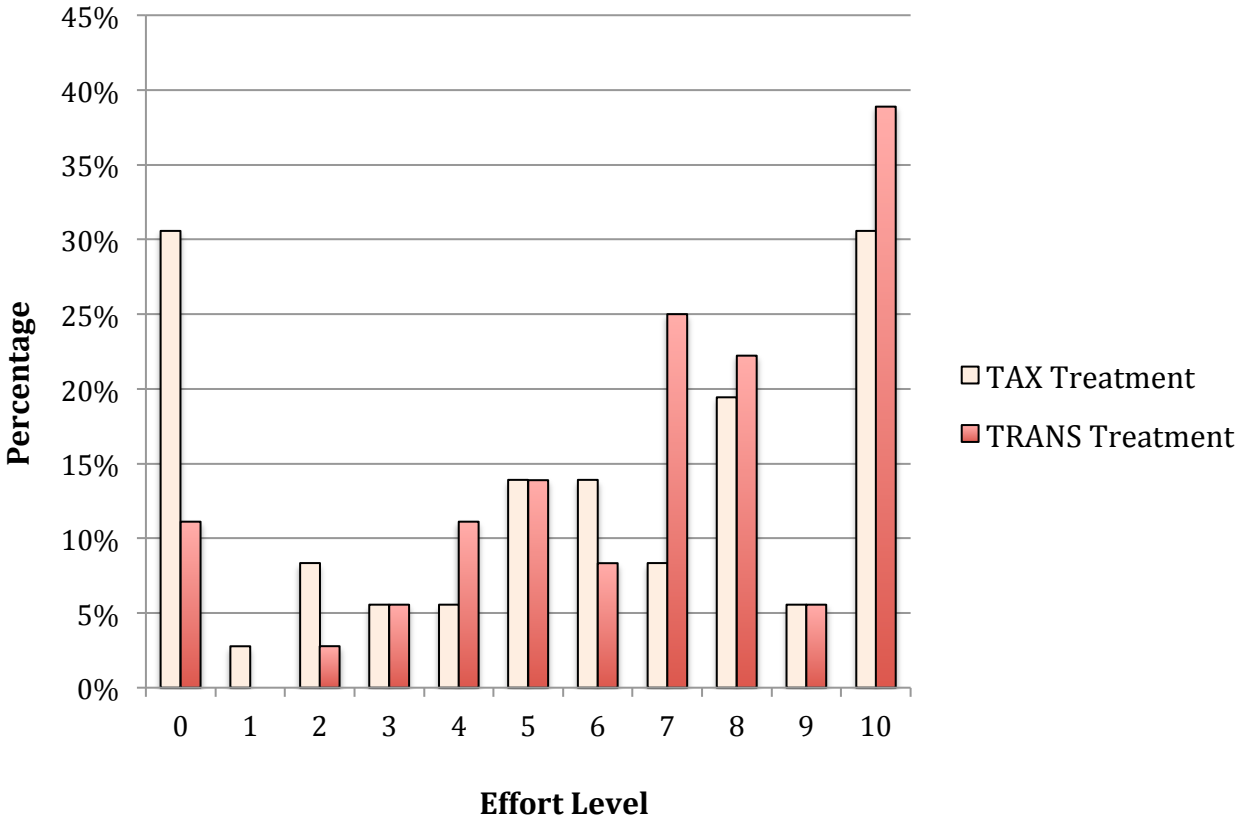
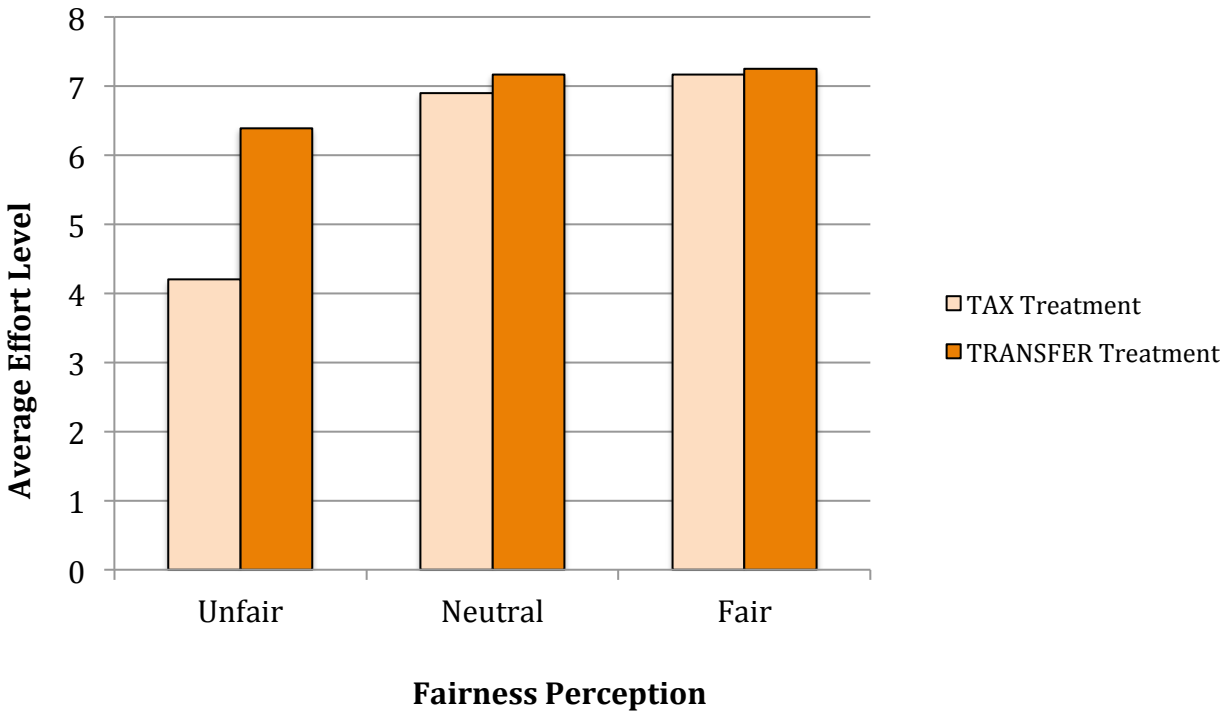


Figure 2: Effort Level by Fairness Perception



Note: Fairness perception is a self-reported measure on a scale of 1 (very unfair) to 7 (very fair). Scale: Unfair:1-3; Neutral:4; Fair:5-7.

Table 1: Descriptive Statistics of Demographic Variables

	TAX treatment	TRANSFER treatment	All subjects
Male	0.46	0.40	0.43
	(0.50)	(0.50)	(0.50)
White	0.44	0.56	0.50
	(0.50)	(0.50)	(0.50)
Hispanic	0.10	0.10	0.10
	(0.30)	(0.30)	(0.30)
Family Income	2.59	2.92	2.75
	(1.64)	(1.52)	(1.58)
Economics Major	0.29	0.24	0.26
	(0.46)	(0.43)	(0.44)
Democratic	0.54	0.49	0.51
	(0.50)	(0.50)	(0.50)
Liberal	5.02	4.80	4.91
	(1.08)	(1.08)	(1.08)
Observations	52	52	104

Note: Standard deviations reported in parentheses. Mann-Whitney tests are used to test the difference of means. None of the means is significantly different at the 10% level. 3 observations are missing for White, 2 for Family Income, 1 for Economics Major, 1 for Democratic, and 1 for Liberal.

Table 2: Descriptive Statistics of Non-demographic Variables

	TAX treatment	TRANSFER treatment	All subjects
SATM	722.35	722.49	722.40
	(77.91)	(77.55)	(77.34)
SATV	709.51	699.38	704.55
	(67.25)	(84.27)	(75.85)
CRT	1.50	1.37	1.43
	(1.21)	(1.17)	(1.19)
NUM	2.90	2.94	2.92
	(0.89)	(1.06)	(0.97)
Fairness	3.38	3.44	3.41
	(1.66)	(1.38)	(1.52)
Observations	52	52	104

Note: Mann-Whitney tests are used to test the difference of means. None of the means is significantly different at the 10% level. Standard errors reported in parentheses. 4 observations are missing for SATM and SATV.

Table 3: Correct Rates for Comprehension Quiz

Treatment	1	2	3	4	5	6	7	Average number of correct answers
TAX	67.31%	98.08%	78.85%	94.23%	96.15%	98.08%	75.00%	6.08
TRANSFER	69.23%	94.23%	86.54%	92.31%	88.46%	90.38%	76.92%	5.98

Note: Mann-Whitney tests are used to test the difference of means. None of the means is significantly different at the 10% level. The comprehension questions are in Appendix III.

Table 4: Comparison of Effort Levels by Treatments

Treatment	Mean	St. Dev.
TAX	5.40	3.72
TRANSFER	6.77	2.97

Table 5: Tobit Estimation of Effort Level

Variable	(1)	(2)	(3)	(4)	(5)	(6)
Treatment	2.035*	1.957*	3.191**	1.966**	5.913**	5.646**
	(1.048)	(1.007)	(1.581)	(0.971)	(2.471)	(2.424)
Cognitive Ability		-1.187***	-0.766			-0.763*
		(0.430)	(0.591)			(0.413)
Treatment*Cognitive Ability			-0.866			
			(0.851)			
Fairness				1.309***	1.810***	1.607***
				(0.338)	(0.452)	(0.450)
Treatment*Fairness					-1.161*	-1.093*
					(0.665)	(0.651)
Controls						
Gender	No	No	No	No	No	No
Race	No	No	No	No	No	No
Family Income	No	No	No	No	No	No
Economics Major	No	No	No	No	No	No
Political Inclination	No	No	No	No	No	No
Observations	104	104	104	104	104	104
Pseudo R^2	0.008	0.024	0.026	0.040	0.046	0.053

Variable	(7)	(8)	(9)	(10)	(11)	(12)
Treatment	2.066*	1.799*	2.444	1.857*	7.617***	7.454***
	(1.043)	(1.048)	(1.707)	(0.979)	(2.455)	(2.489)
Cognitive Ability		-0.749	-0.557			-0.193*
		(0.570)	(0.695)			(0.538)
Treatment*Cognitive Ability			-0.458			
			(0.953)			
Fairness				1.156***	1.951***	1.905***
				(0.352)	(0.477)	(0.491)
Treatment*Fairness					-1.727**	-1.700**
					(0.673)	(0.676)
Controls						
Gender	Yes[a]	Yes[a]	Yes[a]	Yes[a]	Yes	Yes
Race	Yes	Yes	Yes	Yes	Yes	Yes
Family Income	Yes	Yes	Yes	Yes	Yes	Yes
Economics Major	Yes	Yes	Yes	Yes	Yes	Yes
Political Inclination	Yes	Yes	Yes	Yes	Yes	Yes
Observations	97	97	97	97	97	97
Pseudo R^2	0.038	0.043	0.043	0.063	0.077	0.078

Note: Standard errors reported in parentheses. Dependent variable is the number of points allocated to working.

[a] Gender is significant at 5% or 10% significance level.

*** Significant at the 1 percent level.

** Significant at the 5 percent level.

* Significant at the 10 percent level.

Table 6: OLS Estimation of Effort Level

Variable	(1)	(2)	(3)	(4)	(5)	(6)
Treatment	1.365**	1.261*	1.951*	1.318**	3.681**	3.512**
	(0.661)	(0.640)	(1.005)	(0.617)	(1.536)	(1.517)
Cognitive Ability		-0.773***	-0.540			-0.521*
		(0.270)	(0.376)			(0.265)
Treatment*Cognitive Ability			-0.482			
			(0.542)			
Fairness				0.815***	1.097***	0.978***
				(0.204)	(0.263)	(0.267)
Treatment*Fairness					-0.691*	-0.661
					(0.412)	(0.407)
Controls						
Gender	No	No	No	No	No	No
Race	No	No	No	No	No	No
Family Income	No	No	No	No	No	No
Economics Major	No	No	No	No	No	No
Political Inclination	No	No	No	No	No	No
Observations	104	104	104	104	104	104
Adjusted R^2	0.031	0.031	0.093	0.154	0.169	0.192

Variable	(7)	(8)	(9)	(10)	(11)	(12)
Treatment	1.288*	1.076	1.432	1.158*	4.871***	4.717***
	(0.686)	(0.697)	(1.147)	(0.651)	(1.587)	(1.612)
Cognitive Ability		-0.553	-0.448			-0.224
		(0.382)	(0.468)			(0.365)
Treatment*Cognitive Ability			-0.251			
			(0.639)			
Fairness				0.757***	1.244***	1.204***
				(0.228)	(0.292)	(0.301)
Treatment*Fairness					-1.109**	-1.087**
					(0.435)	(0.438)
Controls						
Gender	Yes[a]	Yes	Yes	Yes	Yes	Yes
Race	Yes	Yes	Yes	Yes	Yes	Yes
Family Income	Yes	Yes	Yes	Yes	Yes	Yes
Economics Major	Yes	Yes	Yes	Yes	Yes	Yes
Political Inclination	Yes	Yes	Yes	Yes	Yes	Yes
Observations	97	97	97	97	97	97
Adjusted R^2	0.077	0.174	0.175	0.249	0.302	0.305

Note: Standard errors reported in parentheses. Dependent variable is the number of points allocated to working.

[a] Gender is significant at 5% or 10% significance level.

*** Significant at the 1 percent level.

** Significant at the 5 percent level.

* Significant at the 10 percent level.

Table 7: Distribution of Fairness Perception by Treatment

Fairness Perception	TAX treatment	TRANSFER treatment
Unfair	30	28
Neutral	10	12
Fair	12	12

Note: Fairness perception is a self-reported measure on a scale of 1 (very unfair) to 7 (very fair). Scale: Unfair:1-3; Neutral:4; Fair:5-7.

Appendix I: Theoretical Equivalence of the Two Treatments

Assume subjects are divided into groups of n. Let X_i be the pre-tax wage earnings for each subject in the group, i=1,2,……,n. Let t be the proportional tax rate levied in the TAX treatment. t is between 0 and 1. The amount of tax subject i pays is $T_i = t \cdot X_i$. Total tax revenue collected is $\sum_{i=1}^{n} T_i = \sum_{i=1}^{n} t \cdot X_i = t \cdot \sum_{i=1}^{n} X_i$. The amount of transfer each subject receives equals $t \cdot \sum_{i=1}^{n} X_i / n = t \cdot \bar{X}$. Subject i's net wage earnings are described as follows:

$$Y_i = (1-t) \cdot X_i + t \cdot \bar{X} \tag{A1}$$

Rearranging the right-hand side, (A1) becomes

$$Y_i = X_i - t \cdot (X_i - \bar{X}) \tag{A2}$$

where $\bar{X}$ denotes the average group wage earnings.

In the TRANSFER treatment, each subject is taxed by a total of F points. Total tax revenue collected is $F \cdot n$. Let M_i be the amount of transfer subject i receives. Because the net wage earnings distribution should be identical between the two treatments. I solve for the amount of transfer in equation (A3)

$$Y_i = X_i - F + M_i = X_i - t \cdot (X_i - \bar{X}) \tag{A3}$$

Thus, the amount of transfer subject i receives is

$$M_i = F + t \cdot (\bar{X} - X_i) \tag{A4}$$

The transfer system is progressive because the higher the pre-tax earnings, the lower the amount of transfer.

I illustrate the above two treatments with a simple example. In accordance with the setting in the experiment, the group size (n) is four, the proportional tax rate (t) is 50% and the amount of lump-sum tax (F) is 5 points. Suppose the four subjects A, B, C, and D allocate 4, 6, 8, 10 points to working, respectively. Their wage earnings are 4.8, 7.2, 9.6 and 12 points. Table A1 shows the amount taxes and transfers associated in the two treatments. The wage earnings and net wage earnings are identical for each subject in

both treatments. In the TAX treatment, redistribution is through taxes. In contrast, redistribution is through transfers in the TRANSFER treatment.

Table A1: A Numerical Example of the Two Treatments

	TAX Treatment				TRANSFER Treatment			
Subject	A	B	C	D	A	B	C	D
Wage earnings	4.8	7.2	9.6	12	4.8	7.2	9.6	12
- Tax paid	2.4	3.6	4.8	6.0	5.0	5.0	5.0	5.0
+ Transfer received	4.2	4.2	4.2	4.2	6.8	5.6	4.4	3.2
= Net wage earnings	6.6	7.8	9.0	10.2	6.6	7.8	9.0	10.2

Appendix II: Experimental Instructions

Welcome

Thanks for your participation. This session consists of the main experiment and a few shorter tasks. I expect the whole thing to take about 1 hour.

Depending on your actions and the actions of other participants, you will be able to earn money in addition to the $3 guaranteed for your participation.

Please read the following instructions carefully.

NO communication between participants is allowed at any time during the experiment. If you have any questions, please raise your hand and I will come to assist you.

Please now turn off your mobile phone and any other electronic devises. These must remain off until you leave this room.

During the experiment, your earnings will be calculated in "points." You will be paid in U.S. dollars at the following conversion rate:

1 point = $1

To ensure anonymity, your actions in this session are linked to your Participant ID number and at the end of this session you will be paid by Participant ID number. All payments will be put in an envelope. No other participants will see how much you have been paid.

Instructions (TAX Framing)

At the beginning of the experiment, you will be assigned to a group with 3 other people in this room. Each group will be composed of 4 participants. You will interact with other members in your group one time only. Please note that group members will not learn the identities of the others in their group during or after the experiment.

Each group member, yourself included, begins with an **endowment of 10 points**. You and the three others in your group simultaneously decide how to use your endowments. There are two possibilities: **working** and **leisure**.

You will be asked to indicate the number of points you want to allocate to working. Only integers between 0 and 10 are allowed for this purpose. The remaining points will automatically be allocated to your leisure.

Wage Earnings

For each point you allocate to working, you will receive **1.2 points** as your wage earnings. Your wage earnings equal

1.2 × (your working points)

A tax-and-transfer system is applied to reduce the inequality of wage earnings among the members in your group. This tax-and-transfer system causes those with higher wage earnings to pay more taxes than those with lower wage earnings; each group member then receives an equal amount of transfer.

Your wage earnings are taxed at a rate of 50%. The amount of tax you will pay equals

50% × (your wage earnings)

All of the tax revenue collected from each member of your group will then be distributed to the members of your group as a set of transfer payments that are of equal size for all members. The transfer payment that each of you receives is simply the sum of the taxes collected divided by the number of group members, four.

Your net wage earnings equal

(your wage earnings) - (tax) + (transfer)

Note that, on balance, those with higher wage earnings still earn more net wage earnings than those with lower wage earnings.

Final Earnings

Your final earnings are the total of your net wage earnings and your leisure points, that is, whatever part of your endowment you don't devote to working.

Final earnings = (net wage earnings) + (leisure points)

Instructions (TRANSFER Framing)

At the beginning of the experiment, you will be assigned to a group with 3 other people in this room. Each group will be composed of 4 participants. You will interact with other members in your group one time only. Please note that group members will not learn the identities of the others in their group during or after the experiment.

Each group member, yourself included, begins with an **endowment of 10 points**. You and the three others in your group simultaneously decide how to use your endowments. There are two possibilities: **working** and **leisure**.

You will be asked to indicate the number of points you want to allocate to working. Only integers between 0 and 10 are allowed for this purpose. The remaining points will automatically be allocated to your leisure.

Wage Earnings

For each point you allocate to working, you will receive **1.2 points** as your wage earnings. Your wage earnings equal

1.2 × (your working points)

A tax-and-transfer system is applied to reduce the inequality of wage earnings among the members in your group. This tax-and-transfer system causes each group member to pay a fixed and equal amount of taxes; those with lower wage earnings then receive more transfers than those with higher wage earnings.

Your wage earnings are taxed by **a total of 5 points**.

All of the tax revenue collected from each member of your group will then be distributed to the members of your group as a set of transfer payments.

The amount of transfer you will receive equals half of the value of the average wage earnings of your group minus your wage earnings plus 10 points. That is,

Your transfer = 50% × [(the average wage earnings of your group) - (your wage earnings) + 10]

Your net wage earnings equal

(your wage earnings) - (tax) + (transfer)

Note that, on balance, those with higher wage earnings still earn more net wage earnings than those with lower wage earnings.

Final Earnings

Your final earnings are the total of your net wage earnings and your leisure points, that is, whatever part of your endowment you don't devote to working.

Final earnings = (net wage earnings) + (leisure points)

Appendix III: Comprehension Quiz, Cognitive Reflection Test, Numeracy Test and Questionnaire

A. Comprehension Quiz

To make sure everyone understands the instructions, please complete this short quiz.

Please click on the Submit button after you enter the answer to each question.

You will receive 0.2 points for each question you answer correctly.

_____ 1. How many periods will you be playing in the experiment?

A. 1

B. 2

C. 3

Answer: A, You will interact with other members in your group **one time only**.

_____2. If you earn 10 points in the experiment, how much will you be paid in cash, including the guaranteed $3 participation fee?

A. $10

B. $13

C. $15

Answer: C, 1 point = $1 USD. So, 10 points are worth $10 USD. Adding the guaranteed $3 participation fee, you will be paid $13 USD.

_____3. Suppose member A allocates 4 points on working, member B allocates 6 points, member C allocates 8 points, and member D allocates 10 points. Please calculate each member's wage earnings and select an appropriate answer.

A. Member A: 4, Member B: 6, Member C: 8, Member D: 10.

B. Member A: 4.8, Member B: 7.2, Member C: 9.6, Member D: 12.

C. Member A: 12, Member B: 9.6, Member C: 7.2, Member D: 4.8.

D. None of the above

Answer: Wage earnings =1.2 × (working points). Member A's wage earnings =1.2×4=4.8 points; member B's wage earnings = 1.2×6=7.2 points; member C's wage earnings= 1.2×8=9.6 points; member D's wage earnings= 1.2×10=12 points.

	Member A	Member B	Member C	Member D
Working points	4	6	8	10
Wage earnings	4.8	7.2	9.6	12
Tax paid				
Transfer received				
Net wage earnings				

4. (Tax Framing) Please refer to the table below. Following the previous question, please calculate the amount of tax each member will pay and select an appropriate answer.

A. Member A: 2.4, Member B: 3.6, Member C: 4.8, Member D: 6.

B. Member A: 5, Member B: 5, Member C: 5, Member D: 5.

C. Member A: 4.8, Member B: 3.6, Member C: 3.6, Member D: 3.6.

D. None of the above

	Member A	Member B	Member C	Member D
Working points	4	6	8	10
Wage earnings	4.8	7.2	9.6	12
Tax paid				
Transfer received				
Net wage earnings				

Answer: A. Tax=50%×(wage earnings). So, member A will pay 50%×4.8=2.4 points; member B will pay 50%×7.2=3.6 points; member C will pay 50%×9.6=4.8 points; member D will pay 50%%×12=6 points.

4. (Transfer Framing) Please refer to the table below. Following the previous question, what is the amount of tax each member will pay?

   A. Member A: 2.4, Member B: 3.6, Member C: 4.8, Member D: 6.

   B. Member A: 5, Member B: 5, Member C: 5, Member D: 5.

   C. Member A: 4.8, Member B: 3.6, Member C: 3.6, Member D: 3.6.

   D. None of the above

	Member A	Member B	Member C	Member D
Working points	4	6	8	10
Wage earnings	4.8	7.2	9.6	12
Tax paid				
Transfer received				
Net wage earnings				

Answer: B. Your wage earnings are taxed by a total of 5 points.

.

_____5. (Tax Framing) Please refer to the table below. Following the previous question, please calculate the amount of transfer each member will receive and select an appropriate answer.

A. Member A: 6.8, Member B: 5.6, Member C: 4.4, Member D: 3.2.

B. Member A: 4.2, Member B: 4.2, Member C: 4.2, Member D: 4.2.

C. Member A: 4.8, Member B: 3.6, Member C: 3.6, Member D: 3.6.

D. None of the above

	Member A	Member B	Member C	Member D
Working points	4	6	8	10
Wage earnings	4.8	7.2	9.6	12
Tax paid	2.4	3.6	4.8	6
Transfer received				
Net wage earnings				

Answer: A. The transfer payment that each member in a group receives is the sum of the taxes collected divided by the number of group members, four. Therefore, the amount of transfer = (2.4+3.6+4.8+6)/4=4.2 points.

_____5. (Transfer Framing) Please refer to the table below. Following the previous question, please calculate the amount of transfer each member will receive and select an appropriate answer.

A. Member A: 6.8, Member B: 5.6, Member C: 4.4, Member D: 3.2.

B. Member A: 4.2, Member B: 4.2, Member C: 4.2, Member D: 4.2.

C. Member A: 4.8, Member B: 3.6, Member C: 3.6, Member D: 3.6.

D. None of the above

	Member A	Member B	Member C	Member D
Working points	4	6	8	10
Wage earnings	4.8	7.2	9.6	12
Tax paid	5	5	5	5
Transfer received				
Net wage earnings				

Answer: A. The average wage earnings of the group is (4.8+7.2+9.6+12)/4=8.4 points. Member A would receive 50%×(8.4-4.8+10)=6.8 points as transfer; member B would receive 50%×(8.4-7.2+10)=5.6 points; member C would receive 50%×(8.4-9.6+10)=4.4 points; member D would receive 50%×(8.4-12+10)=3.2 points.

_____6. (Tax) Please refer to the table below. Following the previous question, please calculate each member's net wage earnings and select an appropriate answer.

A. Member A: 6.2, Member B: 7.6, Member C: 10, Member D: 10.8.

B. Member A: 4.8, Member B: 7.2, Member C: 9.6, Member D: 12.

C. Member A: 6.6, Member B: 7.8, Member C: 9, Member D: 10.2.

D. None of the above

	Member A	Member B	Member C	Member D
Working points	4	6	8	10
Wage earnings	4.8	7.2	9.6	12
Tax paid	2.4	3.6	4.8	6
Transfer received	4.2	4.2	4.2	4.2
Net wage earnings				

Answer: C. Member A's net wage earnings are 4.8-2.4+4.2=6.6 points; member B's net wage earnings are 7.2-3.6+4.2=7.8 points; member C's net wage earnings are 9.6-4.8+4.2=9 points; member D's net wage earnings are 12-6+4.2=10.2 points.

_____6. (Transfer) Please refer to the table below. Following the previous question, please calculate each member's net wage earnings and select an appropriate answer.

A. Member A: 6.2, Member B: 7.6, Member C: 10, Member D: 10.8.

B. Member A: 4.8, Member B: 7.2, Member C: 9.6, Member D: 12.

C. Member A: 6.6, Member B: 7.8, Member C: 9, Member D: 10.2.

D. None of the above

	Member A	Member B	Member C	Member D
Working points	4	6	8	10
Wage earnings	4.8	7.2	9.6	12
Tax paid	5	5	5	5
Transfer received	6.8	5.6	4.4	3.2
Net wage earnings				

Answer: C. Member A's net wage earnings are 4.8-5+6.8=6.6 points; member B's net wage earnings are 7.2-5+5.6=7.8 points; member C's net wage earnings are 9.6-5+4.4=9 points; member D's net wage earnings are 12-5+3.2=10.2 points.

_____7. Which of the following is the correct way to calculate your final earnings in the experiment?

A. Final earnings = net wage earnings

B. Final earnings = (net wage earnings) + (10-working points)

C. Final earnings = (net wage earnings) + (working points)

D. None of the above

Answer: B. Your final earnings are the total of net wage earnings and your leisure points, that is, whatever part of your endowment you don't devote to working.

B. Cognitive Reflection Test and Numeracy Test

You have 30 seconds to answer each question.

For each question you answer correctly, you will receive 0.2 points.

Please click on the Submit button after you enter the answer to each question.

1. A bat and a ball cost $1.10 in total. The bat costs $1.00 more than the ball. How much does the ball cost? [CRT question]

2. In a lake, there is a patch of lilypads. Every day, the patch doubles in size. If it takes 48 days for the patch to cover the entire lake, how long would it take for the patch to cover half of the lake? [CRT question]

3. If it takes 5 machines 5 minutes to make 5 widgets, how long would it take 100 machines to make 100 widgets? [CRT question]

4. Please identify the missing number at the end of the series.
   25, 28, 33, 40, ?

5. A total of 400 copies of a textbook were sold. One third of them were sold at 50% discount. One third of them were sold at 25% discount and the remainder were sold at the full price of $120. What was the average price of the textbook sold in dollars?

6. Suppose you drive at 30 mph and it takes you 4 minutes to cross a bridge. How long is the bridge in miles?

7. Please identify the missing number.
   4, 8, ?, 16, 20

8. In an election with only two candidates: candidate A and candidate B. Candidate A receives 50% more votes than candidate B. The total number of votes is 2,500. How many votes were cast for candidate A?

Answer: 1. $0.05 2. 47 3. 5 4. 49 5. 90 6. 2 7. 12 8. 1,500

C. Questionnaire

1. Are you? Male; Female
2. Are you an Economics concentrator (including Economics, Applied Mathematics-Economics, Mathematical Economics, COE-Business Economics, and Computer Science-Economics)? Yes; No
3. How many college-level economics courses have you taken, including the present semester? 1; 2; 3; 4; 5; 6; 7; 8; more than 8
4. What was your SAT Math score?
5. What was your SAT Verbal score?
6. What is your total household income? Less than $10,000; $10,000 to $49,999; $50,000 to $99,999; $100,000 to $149,999; $150,000 to $200,999; $200,000 or more

Political philosophy

7. Which of the following best describes your political inclination (affiliation)? Republican; Democrat; Independent; don't know; other
8. Which of the following best describes your political philosophy (ideology)? Select a number on a scale of 1 to 7. 1 (very conservative); 2; 3; 4; 5; 6; 7 (very liberal)

Support for redistribution

9. Do you think the government should or should not make possible effort to reduce the income gap between the rich and the poor? Select a number on a scale of 1 to 7. 1 (should); 2; 3; 4; 5; 6; 7 (should not)