

In Front of and Behind the Veil of Ignorance: An Analysis of Motivations for Redistribution Inside and Outside the Lab

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Abstract:

This paper uses a laboratory experiment and real world data to explore individuals' motivations for redistribution. The laboratory results show that as income uncertainty diminishes, participants become more extreme in their preferences for redistribution. The findings suggest that for most people, the motivation for redistribution is financial self-interest--namely as insurance against future bad luck--rather than furthering equity. However, a non-negligible fraction propose redistribution levels inconsistent with financial self-interest, and this fraction increases when participants can communicate prior to proposing. Data from the GSS show that these experimental findings help shed light on the ways preferences for redistribution evolve with age.

Key words: Redistribution, laboratory experiment, veil of ignorance, progressive tax, aging (JEL H2, D3,)

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I – Introduction

Recently, Warren Buffet made headlines when he wrote an op-ed article in the *New York Times* arguing that the very rich should feel obligated to pay more taxes (Buffet 2011). Similarly, Jeffrey Sachs argues that Americans, in particular the richest Americans, need to be more willing to pay higher taxes in the interest of society as a whole (Sachs 2011). On the other end of the spectrum, Republican presidential candidate Herman Cain has proposed a tax reform scheme that not only aims to lower tax rates, but also effectively eliminates any progressivity in the income tax system.

While there are several reasons for taxation, including funding public goods and internalizing externalities, much of the current debate seems to revolve around taxation as a means to redistribute earnings and wealth away from those at the top of the distribution towards those at the bottom. There are a variety of motivations for why a population of citizens may demand such redistribution. For example, individual notions of justice may include achieving some desired amount of equality in financial outcomes in a society. Alternatively, the motivation for redistribution could be more self-interested---individuals may demand a certain amount of guaranteed redistribution as a form of insurance to protect themselves from possible spells of bad luck in the future.

This paper aims to help shed some further light on the relative strength of these different motivations for redistribution. In particular, this study first considers an experiment where participants earn money by successfully completing a series of tasks (e.g., answering vocabulary, math, and trivia questions correctly), where the payoff to a successful task is randomly and differentially determined across participants. Given this earnings generation mechanism, I then consider two primary treatments regarding how

participants propose different levels of redistribution of earnings. In the first primary treatment, participants begin by performing their tasks and subsequently learning their earnings, *after* which they are asked to propose a redistribution level (through a simple one parameter method that allows for a continuum of possible levels). This treatment will be referred to as the *Earnings Known* treatment. In the second primary treatment, participants must propose a redistribution level “behind-the-veil of ignorance,” or in other words, they must propose a level of redistribution *before* performing any tasks, knowing anything about what their earnings will end up being, or where their earnings will lie in the subsequent distribution of earnings. This will be referred to as the *Earnings Unknown* treatment. Under both treatments, all those with earnings above the mean will have some of their earnings taxed away, while all those with earnings below the mean will receive an earnings subsidy, where the tax and subsidy rates are higher under a higher level of implemented redistribution. The implemented redistribution level is determined at random from the distribution of redistribution levels proposed by the participants.

Under the *Earnings Unknown* treatment, where participants make their redistribution proposals before they know anything about their earnings outcome, those who propose any strictly positive level of redistribution can be motivated either by financial self-interest, namely they propose positive levels of redistribution to act as a form of insurance, or be motivated by some sense of what they feel is a just or more equitable distribution of final earnings. However, under the *Earnings Known* treatment, where participants propose a redistribution level after their earnings are realized, complete financial self-interest would lead participants to propose either no redistribution (for those with earnings above the mean) or complete redistribution (for those with

earnings below the mean), where complete redistribution means splitting aggregate earnings equally across all participants. Proposing a level of redistribution that is not one of these two extremes can only be motivated by some demand for a more "fair" or "just" distribution of final payouts. Therefore, comparing the distribution of proposed redistribution levels under the *Earnings Known* treatment to the *Earnings Unknown* treatment should give some indication about how much of the demand for redistribution under the *Earnings Unknown* treatment is due to financial self-interest and how much is due to concerns about justice and fairness of outcomes.

The results from this experiment show that under the *Earnings Unknown* treatment, over eighty-five percent of participants propose a strictly positive amount of redistribution, with most proposing a relatively modest amount of redistribution and less than ten percent proposing complete redistribution. As stated above, any strictly positive proposed redistribution under this treatment could either be motivated by financial self-interest or by some other sense of justice. By contrast, in the *Earnings Known* treatment, behavior was very different. Specifically, the distribution of proposed levels of redistribution was bimodal, with roughly seventy percent of participants proposing either complete redistribution or no redistribution whatsoever, with the majority of those who ended up in the upper half of the earnings distribution proposing no redistribution and the majority of those who ended up in the lower half of the distribution proposing complete redistribution.

Given the two treatments differed only in the timing of when participants were asked to propose a level of redistribution, and the vast majority of participants acted with complete financial self-interest under the *Earnings Known* treatment, these results

suggest that for most individuals, the demand for redistribution under the *Earnings Unknown* treatment was actually motivated by monetary self-interest, namely as a form of insurance against a bad earnings outcome, rather than some desire for a particular distribution of payoff outcomes for the group. However, a small but non-negligible fraction of participants seem to have other motivations besides self-insurance for positive levels of redistribution, as roughly thirty percent of participants chose an interior level of redistribution in the *Earnings Known* treatment, a choice that cannot have been motivated by pure financial self-interest.

Interestingly, under a new treatment that was identical in all ways to base *Earnings Known* treatment discussed above except that where earnings were determined completely at random rather than via the random rate-of-return for each correctly answered question, behavior with respect to redistribution was essentially identical to the base *Earnings Known* treatment. However, under a second subsequent treatment, that again was identical to the base *Earnings Known* treatment except that participants were now allowed to anonymously communicate with each other prior to proposing their preferred amount of redistribution, a substantially higher fraction of individuals who ended up in the upper half of the earnings distribution now chose to propose a relatively high level of redistribution rather than zero. This suggests that even a little dialog between “winners” and “losers” can cause the winners to empathize enough with the losers to substantially alter their preferences with respect to redistribution and prefer more redistribution even if it is financially costly to them.

This experimental setup also allows us to consider the extent to which the distribution of preferred redistribution levels that arise under the different treatments

would lead to different actual levels of redistribution under some sort of voting procedure. While the actual levels of redistribution in the experiments analyzed here were determined by choosing one of the participants' proposed levels of redistribution at random, the mechanism by which participants propose a level of redistribution allows us to calculate a Condorcet winning redistribution level for each treatment, or the redistribution level that would beat all other redistribution levels under pairwise voting, using only relatively minor assumptions on preferences.

Interestingly, the distribution of redistribution proposals that arises under the *Earnings Known* treatment actually leads to a higher Condorcet winning level of redistribution than what arises under the *Earnings Unknown* treatment, even though a much higher fraction of individuals propose a positive level of redistribution under the *Earnings Unknown* treatment. Intuitively, while almost all participants propose a positive level of redistribution under the *Earnings Unknown* treatment, most propose only a relatively small level, causing the winning "compromise" level of redistribution (i.e., the Condorcet winning level) to also be quite modest. By contrast, under the *Earnings Known* treatment, a high fraction of participants propose no redistribution whatsoever, but such individuals are offset by a similar number of individuals who propose complete redistribution, leading to the final winning "compromise" level to be quite substantial. Moreover, while allowing for communication in the *Earnings Known* treatment altered the distribution of proposed levels of redistribution, this distributional change actually did not alter the Condorcet winning compromise level of redistribution.

Finally, the results from this experiment arguably provide notable implications for what we should observe in the "real" world outside of the lab. In particular, if preferences

for redistribution are primarily driven by financial self-interest, as suggested in the experiment discussed above, then as people become more and more certain about where they will end up in the earnings distribution, their preferences for redistribution should move toward the extremes of either preferring a lot of redistribution or preferring very little redistribution. Using data from the General Social Survey (GSS), I show that the way in which stated preferences for redistribution evolve with age are consistent with this implication.

II - Related Literature

Much of the motivation for the experimental environment examined here arises from John Harsanyi (1955), and John Rawls' books *A Theory of Justice* (1971) and his follow-up *Justice as Fairness: A Restatement* (2001). In these books, Rawls' considers the question "(w)hat would a just democratic society be like under reasonably favorable but still possible historical conditions, conditions allowed by the laws and tendencies of the social world?" (Rawls, 2001: p 4). To consider this question, he posits that to create a just society,

"(a) set of principles is required for choosing among the various social arrangements which determine the divisions of advantages and for underwriting an agreement on the proper distributive shares. These principles are the principles of social justice: they provide a way of assigning rights and duties in the basic institutions of society and they define the appropriate distribution of the benefits and burdens of social cooperation." (Rawls, 1971: p 4)

His question then becomes what this set of just principles should be? To answer this question, he attempts to consider what type of principles free and rational individuals would agree upon in a situation where "no one knows his place in society, his class position or social status, nor does anyone know his fortune in the distribution of natural

assets and abilities, his intelligence, strength, and the like.” (Rawls, 1971: p 12) He terms this situation the “Original Position” where decisions must be made “behind the veil of ignorance.” He argues that making decisions about how society is organized from *behind the veil of ignorance* “ensures that no one is advantaged or disadvantaged in the choice of principles by the outcome of natural chance or contingency of social circumstances.” (Rawls, 1971: p 12)

For Rawls, the original position and the veil of ignorance were meant to be a stepping off point for delving into his broader theory of justice. While Rawls’ actual conclusions regarding the just principles that arise from this thought exercise have been the subject of voluminous discussion and criticism (see for example Harsanyi 1975), the initial thought exercise certainly illuminates a interesting question---to what extent are people’s notions of distributive justice influenced by their realized outcomes in society? And relatedly, to what extent are people's notions of what constitutes a just organization of society motivated by their uncertainty regarding what their future holds?

Rawls' argues that from this behind-the-veil of ignorance construct, individuals would agree upon policies and mechanisms in society that would maximize the well-being of the worst off members of society. While he denoted this outcome as “justice,” much of the motivation he gives for why individuals behind-the-veil of ignorance would choose such a criteria is actually individual risk-aversion to ending up at the bottom of society and the difficulties that would entail. In other words, while Rawls' contends that maximizing the well-being of those worst off in society is what constitutes a just society, this is in some sense based on an argument that free and equal people would agree to this

behind-the-veil of ignorance because of a self-interested desire to insure themselves against a bad outcome.

This behind-the-veil thought exercise has motivated several different experiments in the lab. Most directly, Frohlich, Oppenheimer, and Eavey (1987a), Frohlich, Oppenheimer, and Eavey (1987), and Frohlich and Oppenheimer (1990) explicitly try to replicate Rawls' proposed environment and test his conclusions in a laboratory setting. In particular, they ask participants to come to consensus on one of four possible alternatives for redistribution of laboratory payouts while in a laboratory version of the "behind-the-veil of ignorance" construct, after which money which is distributed according to the agreed upon distribution rule. Their main findings show that indeed subjects could generally reach consensus, but subjects do not arrive at the option most closely replicating Rawls' prediction. Namely, rather than maximizing the lowest income, subjects overwhelmingly choose to maximize average income with a floor constraint.

As discussed in the introduction, the experiment developed here also has a type of "behind-the-veil of ignorance" treatment, where individuals must choose their preferred level of redistribution prior to knowing where they will end up in the earnings distribution. However, of interest in this paper is how the preferences for redistribution differ between such a behind-the-veil treatment (the *Earnings Unknown* treatment) and a treatment where individuals choose their preferred level of redistribution after they know where their earnings lie in the overall distribution of earnings (the *Earnings Known* treatment).

In some ways, the *Earnings Known* treatment has similarities to a large swath of the experimental literature on altruism and public goods, most notably Dictator games. In

such games, two participants are matched together, with one being randomly designated the Dictator and the other the Recipient, and the Dictator simply decides how much of a fixed monetary endowment to keep for herself and how much to redistribute to her Recipient partner. The results of these games have by and large shown that on the order of 60 percent of the people assigned to the Dictator role decide to share a positive fraction of their monetary allotment, with a mean transfer of roughly 20 percent of their allotment (Camerer 2003).

However, one could argue that such Dictator experiments are not necessarily looking at individual's tastes for redistribution in a society, but rather individual's tastes for altruism or charity within a particular context. In general, the literature on games where subjects must decide how much of their realized wealth to share with others reveals that behavior is very much affected by the way the game is set up. As argued by Levitt and List (2007), simply considering the relationship between behavior and some form of immutable preferences is too narrow, one must also consider the properties of the situation in question.

For example, as discussed by List (2007), behavior is drastically different when the dictator's decision is framed as taking rather than giving, or when dictators are also given the option of taking some of their partner's allotment rather than just sharing some of their own allotment with their partner (Bardsley 2008). A variety of other similar games in which participants must decide how much of their realized wealth should be redistributed show that such behavior is affected by whether allotments are "earned" rather than randomly allocated (Krawczyk 2010), how many people will benefit from such redistribution (Andreoni 2007), when subjects are placed in identifiable groups

together (Klor and Shayo 2010), when the recipient is generally agreed to be "more deserving" (Eckel and Grossman 1996), and when the dictator is guaranteed greater anonymity (Hoffman, McCabe, and Smith 1996).

Rutstrom and Williams (2000) look more explicitly at preferences for redistribution in a laboratory framework from a context where each individual knows where he or she lies in the income distribution when he or she proposes a level of redistribution. They find that most subjects propose the level of redistribution that maximizes their own personal payoff, and these proposals do not seem to be affected by how each subjects' initial entitlement is allocated.

One of the key aspects of the experiment performed here is that it allows for a direct comparison between participants' willingness to redistribute earnings after they know where in the earnings distribution their own earnings lie, to such willingness to redistribute earnings from behind-the-veil of ignorance where they do not yet know where in the earnings distributions their own earnings will lie. This allows us not only to see how this difference in timing as to when the redistribution decision has to be made affects behavior, but also may help us understand better the motivations behind the decisions made in the explicit behind-the-veil experiments discussed above.

Several other papers consider preferences for redistribution outside of the lab. For example, Fong (2001) uses the 1998 Gallup Poll Social Audit Survey to examine the connection between an index measuring a person's self-reported belief about whether inequality should be reduced and a variety of individual measures regarding such things as income and beliefs about whether bad luck or lack of effort causes poverty. She finds evidence that while self-reported preferences for redistribution are to some extent

predicted by financial self-interest, an even stronger predictor are an individual's beliefs about the role of effort and luck in determining outcomes. Relatedly, using data from the General Social Survey (GSS) and the Panel Study of Income Dynamics (PSID), Alesina and Ferrara (2005) find that demand for redistribution depends on not only the extent to which individuals expect to personally benefit or be hurt by redistribution, but also their beliefs regarding what determines where each individual ends up in the income distribution in the United States. Similarly, Ravallion and Lokshin (2000) and Corneo and Gruner (2002) find evidence that individuals' stated demand for redistribution is related to their self-assessed likelihood of being upwardly mobile in Russia and several OECD countries respectively.

While these studies are certainly insightful in helping us understand what determines the demand for redistribution, one inherent constraint in such study designs is that preferences for redistribution are taken from self-reported hypotheticals, rather than obtained via revealed preference. One advantage of the laboratory environment is that preferences for redistribution can be measured through revealed behavior. However, this comes at the cost of questionable external validity (Levitt and List 2007). Therefore, the study below attempts to not only study revealed preferences regarding redistribution directly through choices made in a controlled lab environment, but also consider and evaluate the implications of this behavior in a setting outside of the lab.

III - Experiment

III(a) - Basic Design

The experiment developed here has two primary treatments that differ only in the timing of when certain decisions must be made. In each round of each treatment, a group

of n participants will be asked to complete a series of “tasks” (e.g., answer general academic questions of the form posed by the GRE verbal and mathematics sections, or sport and entertainment trivia, etc.). For each successfully completed task (i.e., correct answer) a participant i earns r_i tokens, where r_i is randomly drawn variable each round that differs across participants but is known to the participant at the time he or she performs his or her tasks. An individual’s “Earnings” in a given round, π_i , are then equal to $s_i r_i$, where s_i is individual i ’s number of successfully completed tasks and r_i is individual i ’s return to each successfully completed task.

In addition to completing tasks, each player must also propose a “redistribution rule” denoted by p , which is a number between zero and one (in increments of 0.01), where p represents what fraction of *each* participant’s task earnings should be taken from each participant and split equally across *all* participants. The actual redistribution rule p that is implemented in any given round is chosen at random from all of the participants’ proposed redistribution rules in a given round. This is sometimes known as a “random dictator” mechanism and is meant to ensure that it is in each player’s best interest to truthfully reveal his or her preferred redistribution rule.

Given a particular implemented redistribution rule p , a player i ’s net payoff from a given round is then given by

$$V(\pi_i, p) = (1-p)\pi_i + \sum_{j=1}^n (p\pi_j)/n,$$

or equivalently

$$(1) \quad V(\pi_i, p) = (1-p)\pi_i + p\pi_{\text{mean}}.$$

So, for example, suppose player i has task earnings of 12 tokens in a given round and the mean task earnings of all participants in that round is 8 tokens. Then, if player i chose a p

= 0.25 and he was chosen to be the random dictator in this round, his net payoff in this round would equal $(1-0.25)*12 + 0.25*8 = 11$ tokens. Alternatively, if someone else was chosen to be the random dictator who chose a $p = 0.50$, then player i 's net payoff in this round would be $(1-0.5)*12 + 0.5*8 = 10$ tokens. Similarly, if a player j has task earnings of 4 tokens in this round (and the mean task earnings is still 8 tokens), then under a $p = 0.25$, player j 's net payoff this round would be $(1-0.25)*4 + 0.25*8 = 5$ tokens.

There are several things to note about this method of redistributing earnings and the net payoff function. First, this redistribution mechanism is not equivalent to a flat earnings tax since all of the earnings that are taxed are redistributed equally. Rather, it is essentially equivalent to a progressive income tax/subsidy. Specifically, note that the “tax” associated with any given task earnings and p can be denoted $t(\pi_i, p) = \pi_i - [(1-p)\pi_i + p\pi_{\text{mean}}]$, or by simplifying,

$$(2) \quad t(\pi_i, p) = p(\pi_i - \pi_{\text{mean}}).$$

To determine the implicit tax rate, we can divide this expression by task earnings π_i and simplify, giving us

$$(3) \quad \tau(\pi_i, p) = p(1 - \pi_{\text{mean}}/\pi_i)$$

Note, this tax and tax rate will be positive (meaning an individual's net “after-tax” payoff will be lower than his/her task earnings) if $\pi_i - \pi_{\text{mean}} > 0$, but will be negative (meaning an individual's net “after-tax” payoff will be higher than his/her task earnings) if $\pi_i - \pi_{\text{mean}} < 0$. Moreover, for those with a positive tax rate, it is straightforward to see from both equations (2) and (3) that the size of both the tax and the tax rate are increasing in an individual's task earnings π_i . Similarly, for those with a negative tax rate, meaning they

receive a tax subsidy, the size of this subsidy and the size of this subsidy relative to their earnings is decreasing in an individual's task earnings π_i .

Finally, looking again at the net payoff function in (1) and taking the derivative with respect to task earnings π_i and re-arranging we get

$$(4) \quad \partial V(\pi_i, p) / \partial \pi_i = 1 - p(n-1)/n.$$

Note that the above expression is always positive, meaning a participant's payoff is always increasing in his or her task earnings π_i . However, as p increases, the marginal effect of an individual's task earnings on his final payoff gets smaller and smaller. At the extremes, if $p = 0$, a participant's payoff simply equals his or her task earnings.

Alternatively, at $p = 1$, each participant's payoff equals the average task earnings, meaning an individual's own payoff is increasing in his own earnings only to the extent to which his own higher task earnings increase the average task earnings for the group as a whole.

III(b) – Primary Treatments

As stated in the introduction above, there are two primary treatments that differ only with respect to timing of decisions and information. In particular, in the *Earnings Known* Treatment, participants first learn their rate-of-return on task successes r_i for that round, then answer questions (i.e., perform tasks), then observe how many task successes s_i they achieve, and finally are told not only what their resultant earnings are for that round, but also where their earnings lie in the distribution of all participants earnings for that round. After learning all of this, each participant is asked to propose a re-distribution rule p which can vary from zero to one in increments of 0.01.

The other primary treatment is the *Earnings Unknown* Treatment in which participants must each propose their desired re-distribution rule p before they learn either their rate-of-return on task successes r_i , how many task successes s_i they achieve, or even the nature of the questions they will be answering that round. In other words, the *Earnings Unknown* treatment is arguably a Behind-the-Veil type environment, as participants propose their desired re-distribution rule p not only before they learn how successful they are at the tasks, but also before they learn how their task successes will be rewarded or even what kind of tasks they are going to be asked to complete.

III(c) - Game Procedures

Participants were recruited from the student population at UCLA. Each participant participated in only one treatment per session. A session consisted of one practice round and six "real" rounds. Prior to the practice round, participants were carefully instructed on the rules of the game (for their treatment only), as well as how final payoffs are determined in each round and for the experiment as a whole. The number of people in each session ranged from 16 to 23.

The type of questions that participants were asked in the "task" completion stage differed by round. Types of questions included math questions, general trivia questions, movie trivia questions, sports trivia questions, GRE type analogy questions, and GRE type vocabulary questions. Participants knew that the type of questions would differ every round, but did not know the exact nature of the questions until they commenced a given round.

Participants answered questions and made redistribution proposals via a computer. All questions were multiple choice and participants were informed as to

whether their selection was correct before moving onto the next question. Redistribution proposals each round were made via an electronic slider that moved from zero to one in increments of 0.01. Earnings and payoffs were stated in terms of "tokens," but participants were told at the beginning of the experiment that each token was worth \$0.10.

As alluded to in the introduction, the actual redistribution level p that was implemented at the end of each round was chosen at random from all of the participant proposals that round. At the end of each round, participants were informed again of their own earnings from that round, the level of redistribution they proposed, the level of redistribution that was implemented, and their final payoff for that round after redistribution. Final experiment payouts were determined by using the net payoffs for each participant from one of the six "real" rounds chosen at random.

The mean final earnings participants walked away with was just over \$10 plus a \$5 show up fee. Median earnings were just under \$10 (plus \$5 show up fee), with the top 1% earning in excess of \$20 (plus the \$5 show up fee) and the lowest 1% earning just under \$4 (plus a \$5 show up fee). Sessions generally lasted around 45 minutes from start to finish.

The instructions that were read to the participants in the *Earnings Unknown* treatment are included in the Appendix. Instructions that were read to participants in the other treatments are very similar and available from the author upon request.

IV - Results

Figure 1 shows the key results coming from the two primary treatments. There were forty-three total individuals in each treatment, coming from four separate sessions,

with each participant providing data from six rounds of play. Each participant participated in only one session and therefore only one treatment. Looking first at the results for the *Earnings Unknown* treatment we can see that while participants proposed redistribution rules ranging from zero to one, the bulk of the distribution lies below $p = 0.5$ with a mean of 0.4 and a median of 0.35. However, it is also notable that less than 15 percent of participants proposed no redistribution whatsoever (i.e., $p = 0$). As discussed above, the motivations for positive proposed re-distribution rules in this *Earnings Unknown* treatment could be either as personal insurance against a subsequent low-earning outcome, or due to preferences over what constitutes a “just” distribution of payoffs, or some combination of the two.

Comparing these results to the results for the *Earnings Known* treatment suggests that, at least under this setup, most of the demand for redistribution under the *Earnings Unknown* treatment was due to individuals attempting to insure themselves against a low earning outcome, not underlying preferences for a certain amount of redistribution on some sort of justice grounds. Specifically, as Figure 1 shows, the vast majority of participants in the *Earnings Known* treatment (almost 70 percent) chose a re-distribution rule p equal to zero or one, leading to a mean and median of 0.5 for the proposed redistribution rules. A joint F-test can reject the hypothesis that this distribution is equal to the distribution of proposed redistribution rules under the *Earnings Unknown* treatment at the one percent level.¹

¹ The F-test jointly tested the null hypothesis of equality for each of the deciles in the two distributions. Standard errors, and therefore statistical significance levels, were adjusted for the fact that each individual provided multiple data points by clustering at the individual level. Such a clustering adjustment was done for all the statistical tests that follow in this paper.

Essentially, in the *Earnings Known* treatment, the vast majority of those whose earnings were above the mean earnings in a given round proposed a redistribution rule for that round that entailed no redistribution ($p = 0$), while those who earned below the mean level of earnings in a given round proposed complete redistribution of earnings ($p = 1$), or perfect payoff equality, for that round. This can be seen in Figure 2a, which shows the distribution of proposed redistribution rules under the *Earnings Known* treatment stratified by whether the individual earned more or less than the mean in his or her round. As can be seen, over 70 percent of those with earnings above the mean proposed no redistribution, while only 6 percent of those who earned below the mean proposed no redistribution. Alternatively, only 6 percent of those with earnings above the mean proposed complete redistribution, while almost 60 percent of those with earnings below the mean proposing complete redistribution.

Figure 2b shows the analogous results for the *Earnings Unknown* treatment. In general, this graph shows that the distribution of proposed redistribution rules is quite similar for those who ended up earning above the mean in their round compared to those who ended up earning below the mean in their round. Indeed, a joint F-test cannot reject the hypothesis that these two distributions are equal. However, looking at these two distributions at least suggests that those whose earnings ended up above the mean are slightly more likely to propose no redistribution and slightly less likely to propose complete redistribution compared to those whose earnings ended up being below the mean. Therefore, while relatively minor, this suggests that participants in the *Earnings Unknown* treatment may not have been completely "behind-the-veil of ignorance." While there was randomness in the rate-of-return to correct answers, and randomness with

respect to what types of questions would subsequently be asked (e.g., sports trivia, math, vocabulary), a few participants appear to have been sufficiently confident in the strength of their general knowledge level to predict that they would have a relatively high likelihood of ending up in the upper half or bottom half of the earnings distribution regardless of their realized rate-of-return or the type of questions asked, and proposed a redistribution rule to reflect that. However, as discussed above, this effect appears to be quite small.

While a large majority of the participants in the *Earnings Known* treatment acted in their own financial self-interest by proposing either no redistribution or complete redistribution, it is notable that there still is a non-negligible thirty percent of participants who proposed an "interior" level of redistribution (i.e., p not equal to one or zero). Indeed, twenty-two percent of participants actually choose a p between 0.3 and 0.8. Looking at Figure 2a, we can see this type of behavior even more clearly. For example, while over seventy percent of those with earnings above the mean in the *Earnings Known* treatment proposed no redistribution ($p = 0$), about six percent actually proposed complete redistribution ($p = 1$). Similarly, while over sixty percent of those with earnings below the mean in this treatment proposed complete redistribution ($p = 1$), over six percent proposed no redistribution ($p = 0$).

In summary, the vast majority of participants in the *Earnings Known* treatment appear to be motivated by their own financial self-interest when proposing redistribution levels---a finding quite consistent with Rutstrom and Williams (2000) who perform an experiment much like this *Earnings Known* treatment. However, a small but significant minority of participants appear to be motivated by other concerns, with these deviations

from financial self-interest being somewhat more prevalent than what Rutstrom and Williams found. One possible explanation for this difference is that in Rutstrom and Williams' design, participants had to select from only four different redistribution schemes, where participants effectively selected from arguably a continuum of redistribution schemes in the design used here.

Looking at the data a bit deeper, there does not appear to be significant differences in behavior across rounds under either treatment. In particular, Figures 3a and 3b show the distribution of proposed redistribution rules divided between the first three rounds and the latter three rounds, for *Earnings Unknown* and the *Earnings Known* treatments respectively. Under both treatments, participants' behavior in the first three rounds appears to be quite similar to the latter three rounds. Indeed, under either treatment, we cannot reject the hypothesis that the distribution of proposed redistribution rules is the same in the first three rounds as it is in the latter three rounds at any standard level of significance.

Finally, Table 1 shows that the timing of the redistribution decision did not seem to have any impact on the effort put forth in answering questions. The first two columns of numbers show that the distribution of earnings by round was quite similar across treatments.² Moreover, noting that earnings depend not only on the number of correct answers but also the randomly determined rates-of-return for each answer, the second two columns simply shows the distribution of correct answers by round for each treatment. Note that they are almost identical. This result should maybe be expected

² Earnings are shown in tokens, which was how they were revealed to participants during the course of the experiment. However, participants were explicitly told at the outset of each session that each token would be worth \$0.10.

given the participants did not know what redistribution rule p will actually be implemented, or even the distribution for proposed p 's, under either treatment.

V - Additional Treatments

I also conducted two additional treatments that supplement the base *Earnings Known* treatment discussed above. The first considers whether the bimodal financial payoff maximizing behavior exhibited in the base *Earnings Known* treatment was simply a byproduct of the fact that earnings are partially due to the participants' "skill" in answering questions. Namely, while earnings were due to both a randomly determined rate-of-return and correct answers to questions in the base *Earnings Known* treatment, individuals who obtained high earnings may have felt that their "skill" made it fair for them to keep their entire earnings. However, it may be the case that if participants did not view "skill" as an important component by which earnings were determined, but rather focused on the random nature of how earnings were allocated, they might consider a greater amount of redistribution to be a more favored outcome due to equity principles. As discussed in Section II, whether earnings/endowments are determined randomly or through some aspect of "skill" has been shown to affect individuals' willingness to redistribute wealth under some experimental setups (Krawczyk 2010).

To consider this issue, I ran a further treatment identical in all dimensions to the base *Earnings Known* treatment described above, but instead of earnings being determined via both the randomly determined rate-of-return on correct answers and the number of correct answers, earnings were entirely determined at random. In other words, participants simply learned their completely randomly determined earnings for a given

round and then proposed a redistribution rule. The question and answer portion of the experiment was completely omitted. Participants were also explicitly told that each player's earnings each round were completely randomly determined. A total of 35 new participants participated in this treatment over two sessions, again each playing six rounds.

Figure 4 shows the results of this *Earnings Known- Random* treatment compared to the base *Earnings Known* treatment discussed previously. As can be seen, the bimodal nature of the proposed redistribution rules holds across both treatments. More generally, one cannot reject the hypothesis that the distributions of proposed distribution rules under the two treatments are the same. In words, it appears that the all-or-nothing nature of the proposed redistribution rules is primarily due to the fact that these choices are made after each participant learns his or her realized earnings, not the way in which earnings are allocated. Again, these results are consistent with Rutstrom and Williams (2000).

The second variation to the *Earnings Known* treatment that I conducted was again similar in all respects to the base *Earnings Known* treatment discussed in the previous section except that participants were allowed to communicate anonymously with each other after learning their earnings for a given round, but before proposing a redistribution rule for that round. Communication was done anonymously via a virtual chat room integrated into the experimental software.³ As shown by Yamamori et al. (2008) in the context of dictator games, simply allowing some form of communication can alter the willingness of dictators to share their endowment. This increased willingness to share due to communication could arise for a variety of reasons, for example people may be

³ To ensure anonymity and an open discussion, I did not archive or review the comments that were posted in during the chat sessions. This was known to the participants at the time of the experiment.

susceptible to peer pressure even when anonymous, or hearing from others may make people more empathetic to those who end up with lower material wealth. A total of 40 new participants participated in this treatment over two sessions, again each playing six rounds.

Figure 5 shows the results coming from this *Earnings Known - Communication* treatment, again in comparison to the base *Earnings Known* treatment discussed above. Interestingly, it appears that for a relatively large fraction of individuals, the anonymous communication that took place prior to proposing redistribution rules impacted their behavior. Specifically, it appears that when communication is allowed, a smaller fraction of individuals end up proposing a $p = 0$, or in other words proposing no redistribution, with a correspondingly higher fraction of individuals proposing a $p = 0.5$, which corresponds to a relatively large amount of redistribution. Indeed, one can reject the equality between these two distributions at the one percent level. Notably, the fraction of participants proposing no redistribution ($p = 0$) falls from almost 35 percent in the base *Earnings Known* Treatment to only about 15 percent in the *Earnings Known - Communication* treatment, and the fraction of participants proposing a $p = 0.5$ grows from about 5 percent in the base *Earnings Known* treatment to over 25 percent in the *Earnings Known - Communication* treatment. Therefore, it appears that even allowing for a very modest amount of anonymous communication can have a significant impact on many individuals' willingness to redistribute some of their wealth to the less fortunate. Note however, that the fraction of individuals proposing complete redistribution ($p = 1$) was a little over 35 percent in both treatments, suggesting communication did not cause individuals with low earnings to become more likely to opt for less redistribution.

VI - Determining Condorcet Winners Across Treatments

The results discussed above showed that while there was very little difference in the distributions of proposed redistribution rules between the base *Earnings Known* treatment and the *Earnings Known - Random* treatment, there were substantial differences in the distributions of proposed redistribution rules between the base *Earnings Known* treatment and both the *Earnings Unknown* treatment and the *Earnings Known - Communication* treatment. However, what is not necessarily obvious is to what extent the different distributions of proposed rules that arose under these various treatments would lead to a different redistribution rule being implemented if the actual redistribution rule was implemented via some sort of democratic voting process (rather than through the random dictator method used in the actual experiment).

The difficulty in answering this question is that there are many different types of voting rules and procedures that could be used---examples include majority voting over a finite subset of options, ranking over a finite subset of options, consensus agreement over a finite subset of options, or pairwise voting over a finite subset of options. The primary difficulty with implementing any of these methods is that the more options allowed to vote over, the more difficult it will be to implement any of the above voting procedures. However, by limiting the number of options to a small number, the researcher runs the risk of omitting what could potentially be a preferred option.

One key advantage of the design used in this experiment is that with only minimal assumptions on preferences we can determine the Condorcet winning redistribution rule, or the redistribution rule that would beat all others in a simple pairwise vote among

"rational" voters, for each treatment. Specifically, there will exist a unique Condorcet winner for any given treatment if we assume that each person's preferences over redistribution rules are "single-peaked" around their proposed re-distribution rule. In the context of this experiment, single-peaked preferences would imply that given an individual proposes a redistribution rule p^* , then in a pairwise vote between any two redistribution rules p' and p'' , the individual would vote for p' if and only if $|p^* - p'| < |p^* - p''|$. If one assumes each individual's preferences over redistribution rules meet this single-peakedness quality, then we can determine the Condorcet winner over an exceedingly large number of options without actually having to have participants vote over each possible pairing.

The top row of Table 2 shows the Condorcet winner that arises under each treatment, where a virtual pairwise voting procedure evaluated each possible redistribution rule pair between 0 and 1 in increments of 0.01. Interestingly, while allowing communication in the *Known Earnings* treatment substantially altered the distribution of proposed redistribution rules, the Condorcet winner is the same under both treatments--- $p = 0.5$. Interestingly, however, while the distribution of proposed redistribution rules under the *Known Earnings – Random* treatment was very similar to the analogous distribution under the base *Known Earnings* treatment, the Condorcet winning redistribution rule under the *Known Earnings – Random* treatment is somewhat lower at $p = 0.43$.

The most notable difference that arises across treatments when it comes to Condorcet winners however, is that the Condorcet winner that arises under the *Earnings Unknown* treatment is substantially lower than all the rest at $p = 0.35$.

These redistribution rules are actually a little hard to interpret on their own, so the bottom four rows of Table 2 show the average tax rates by earnings quintile for each treatment under the Condorcet winning p . As can be seen, average tax rates for those in the top quintile of the earnings distribution in a given round range from 0.21 under the Condorcet winner associated with the base *Earnings Known* treatment, to 0.14 under the Condorcet winner associated with the *Earnings Unknown* treatment. At the other end of the spectrum, those in the bottom quintile of the earnings distribution in a given round would on average receive a subsidy equal to 81 percent of their earnings under the Condorcet winner associated with the base *Earnings Known* treatment, but equal to only 57 percent of their earnings under the Condorcet winner associated with the *Earnings Unknown* treatment.

It is not surprising that the Condorcet winner under the *Earnings Unknown* treatment was different than the Condorcet winner under the base *Known Earnings* treatment given the distributions of proposed redistribution rules differed so substantially under the two treatments. What is notable however, is that amount of redistribution implicit in the Condorcet winner under the *Earnings Unknown* treatment is so much *lower* than under the base *Earnings Known* winner, even though a much higher fraction of participants proposed a positive level of redistribution under the *Earnings Unknown* treatment than under the base *Earnings Known* treatment. In words, it is arguably surprising that under pairwise majority voting, more redistribution would arise when individuals propose levels of redistribution after everyone knows where he or she ends up lying in the earnings distribution, than when each person must consider redistribution

from "behind-the-veil of ignorance," or when he or she is still very uncertain as to his or her future earnings outcome.

The intuition for this result is quite clear however. While almost everyone proposed a positive level of redistribution *Earnings Unknown* treatment, most individuals proposed a quite modest level of redistribution. By contrast, even though a large fraction of individuals in the *Earnings Known* treatment propose zero redistribution, a roughly equal fraction of individuals proposes complete redistribution, so they ending up canceling each other out, causing the "compromise" Condorcet winning level to be exactly in the middle.

VII – Examining Implications of the Experiment Outside of the Lab

While applying lab results such as these to settings outside of the lab is always quite speculative, and therefore must always be done with some caution, it is indeed important to at least consider the extent to which lab results can help further our understanding of the world outside the lab.

One context in which to look at whether the findings from this experiment can help us understand behavior outside of the lab is with respect to how preferences for redistribution evolve with age. In particular, as a person ages, a person becomes more and more certain about where he or she will end up in the income distribution. Therefore, if preferences for redistribution are primarily driven by financial self-interest, as the results of the laboratory experiment suggest, then as people age their preferences for redistribution should become more extreme, with demand for lots of redistribution among

those who ended up at the bottom of the economic well-being ladder, and demand for little redistribution among those at the top of the ladder.

To look at this implication in the population, I use data from the General Social Survey (GSS) years 1980 – 2010. The GSS is a nationally representative survey of the United States non-child population conducted every one or two years since 1972. It is primarily meant to track how Americans' behaviors and attitudes change over time and/or compare to other countries.

In addition to basic demographic information such as age, gender, education, and income, a variety of attitudinal questions are asked including one about preferences regarding the role of government in redistributing income. In particular, the primary question I use for this analysis was *eqwlth*, which asked:

Some people think that the government in Washington ought to reduce income differences between the rich and the poor, perhaps by raising the taxes of wealthy families or by giving income assistance to the poor. Others think that the government should not concern itself with reducing this income difference between the rich and the poor. Here is a card with a scale from 1 to 7. Think of a score of 1 as meaning that the government ought to reduce income differences between rich and poor, and a score of 7 meaning that the government should not concern itself with reducing income differences. What score between 1 and 7 comes closest to the way you feel?

While not directly analogous to the redistribution proposals in the experiment discussed above, this question seems to at least capture some of the same flavor.

Interestingly, the mean response to this question was quite similar for those age 60-65 to those age 20-25 (3.77 vs. 3.50). However, Figure 6 shows that the distributions of responses to this question differ substantially across these two age groups. As can be seen, those age 60-65 are more likely than those age 20-25 to answer one of the extreme choices of 1 or 7. In both cases this difference is statistically significant at the 1% level,

even when taking account of correlation within survey year. While the difference across age groups with respect to the fraction answering 1 (government ought to reduce income differences between rich and poor) is quite small (0.17 for those age 20-25 vs. 0.22 for those age 60-65), the fraction of those age 60-65 answering 7 (government should not concern itself with reducing income differences) is well over twice that of those age 20-25 (0.16 for those age 60-65 vs. 0.07 for those age 20-25). Hence, it does appear that preferences for redistribution become more extreme with age, as would be implied by the experimental results discussed above.

One concern is that maybe these findings do not reflect how preferences over redistribution evolve as individuals age, but rather simply reflect changes in preferences for redistribution across cohorts. To look at this, Figures 7a and 7b show similar graphs to Figure 6, but done separately for the 1980-1989 waves (Figure 7a) and the 2000-2010 waves (Figure 7b). In both time periods, those age 60-65 are significantly more likely than those age 20-25 to answer 1 or 7 (the two extreme answers) to the question regarding the government's role in the redistribution of income shown above.

To analyze this issue in another way, I separately examined how the likelihood of answering 1 or 7 to the income redistribution question (the two extreme choices) was related to family income, and how this relationship changed with age. In particular, I ran two probit regressions where the dependant variable in the first equaled 1 if an individual answered 1 to the income redistribution question (i.e., thinks there is a large role for government redistribution), and the dependant variable in the second equaled 1 if an individual answered 7 to the income redistribution question (i.e., thinks there is no role for government redistribution), with right-hand side variables of family income (in

\$10,000s), an indicator variable for being in the 60-65 age group (as opposed to the 20-25 age group), as well as a linear time trend.

The results of these probit regressions are shown in Table 3. Looking first at column (1), where the dependant variable equals one if the person answers 1 to the redistribution question (i.e., thinks the government should play a large role in redistribution of income), the marginal effect of family income is significantly negative, suggesting that poorer individuals are more likely to prefer the maximal role for government redistribution of income than richer individuals. Even more notably, the marginal impact of interaction term between the indicator for age 60-65 and family income is also significantly negative, suggesting that lower income older individuals are even more likely than lower income young individuals to prefer the maximal role for government redistribution.

Looking at column (2) in Table 3, where the dependant variable now equals one if the person answers 7 to the redistribution question (i.e., thinks the government should play no role in redistribution of income), the marginal effect of family income is significantly positive, suggesting that richer individuals are more likely to prefer no role for government redistribution of income. And moreover, the marginal impact of interaction term between the indicator for age 60-65 and family income is also significantly positive, suggesting that higher income older individuals are even more likely than higher income young individuals to prefer no role for government redistribution.

Finally, note that the coefficient on the age 60-65 dummy variable is positive and significant in both specifications. This confirms again that the older cohort is more likely

to have extreme redistribution preferences than the younger cohort. It is also not surprising that this doesn't get fully taken into account by the age/income interaction terms since it is well known that a one year measure of income is a noisy measure of actual economic status at any given time.

Another way to visualize this larger impact of income on preferences for redistribution by age is shown in Figures 8a and 8b. These figures show the distributions of responses to the redistribution question in the GSS for those in the bottom quartile of the income distribution in their age group versus those in the top quartile of the income distribution in their age group, for those ages 20-25 and those ages 60-65 respectively. While both figures show that those in the bottom quartile of the income distribution are more likely to prefer the maximal role for government redistribution (i.e., answered 1 to the redistribution question), and those in the top income quartile are more likely to prefer no government redistribution (i.e., answered 7 to the redistribution question), the differences at these extremes across income groups are much more pronounced for the age 60-65 group than the age 20-25 group. In particular, while there is only about a *seven* percentage point differential in likelihood of answering 1 to the redistribution question between the bottom income quartile and the top income quartile among the age 20-25 group, this differential is *eighteen* percentage points among the age 60-65 group. Similarly, while there is only about a *three* percentage point differential in likelihood of answering 7 to the redistribution question between the bottom income quartile and the top income quartile among the age 20-25 group, this differential is *ten* percentage points among the ages 60-65 group.

In percentage terms, among the age 20-25 group, the fraction of the bottom income quartile answering 1 to the redistribution question group is about *fifty-six* percent higher than the analogous fraction for the top income quartile in this age group, while the fraction of the bottom income quartile answering 1 to the redistribution question is almost *one-hundred and twenty* percent higher than the analogous fraction for the top income quartile among the age 60-65 group. Similarly, the fraction of the top income quartile answering 7 to the redistribution question is about *thirty* percent higher than the analogous fraction for the bottom income quartile among the age 20-25 group, while the fraction of the top income quartile answering 7 to the redistribution question is over *eighty-four* percent higher than the analogous fraction for the bottom income quartile among the age 60-65 group.

In general, these results are consistent with the notion that as individuals age, and their uncertainty with respect to where they will fall in the income distribution diminishes, they become more extreme in their preferences for redistribution. In particular, as individuals get older, those with higher incomes become increasingly likely to prefer no government redistribution while the opposite holds true for those with lower incomes. These results give further evidence that preferences for redistribution generally reflect financial self-interest rather than some more philosophical justice ideal.

VIII - Summary and Conclusion

The results of the experiment described in this paper show that individuals' revealed preferences for the amount of redistribution of earnings they would like to see imposed depends substantially on whether they know where they will lie in the earnings

distribution when they state their preferred redistribution level. When participants were asked to propose a level of redistribution before they knew where they were going to end up in the earnings distribution, the vast majority of participants propose a positive but relatively modest amount of redistribution. By contrast, when participants were asked to propose a level of redistribution after they knew where they ended up in the earnings distribution, the vast majority (roughly seventy percent) of participants proposed either no redistribution or complete redistribution (i.e., perfect payoff equality), depending on whether they ended up in the upper half or the lower half of the earnings distribution. This behavior did not seem to be affected by whether earnings were partially earned through skill at answering questions or determined completely at random.

As argued above, this transition to bimodal preferences for redistribution as uncertainty about where each person will end up lying in the earnings distribution diminishes is generally consistent with financial self-interest being the primary motivator for redistribution. A key "real-world" implication of these experimental findings is that as individuals age, and their uncertainty about where they will end up in the earnings distribution decreases, their preferences for redistribution should become more extreme---an implication found to be consistent with data from the General Social Survey. Clearly, such differences across age cohorts with respect to demand for redistribution may have important political consequences. For example, these more extreme preferences over redistribution may partially help explain why the elderly population generally has a much stronger voter turnout than the young.

However, while behavior consistent with such financial self-interest was observed from roughly seventy percent of the participants in the lab experiment, there was the non-

negligible remaining thirty percent who did not appear to act with complete financial self-interest. And notably, this fraction grew to fifty-five percent when anonymous communication was allowed after earnings outcomes were known but before redistribution proposals were made. Almost all of the increase in behavior that was inconsistent with financial self-interest appears to have come from individuals who had relatively high earnings proposing relatively higher levels of redistribution, rather than from relatively low earning individuals proposing lower levels of redistribution.

In conclusion, while some of the experimental literature has shown a relative prevalence of altruistic motives for redistributing wealth in some contexts, for example in dictator games, the results of this paper suggest that in an income tax and transfer context, individuals' motivations for redistribution primarily appear to be as a means to insure themselves against bad outcomes---a finding also consistent with how stated preferences for redistribution evolve with age outside the lab. However, at least in the laboratory, for many people this purely financially self-interested motivation for redistribution appears to be quite fragile, as even a small amount of anonymous communication can make the high earners more willing to redistribute some of their earnings to lower earners. Hence, while the democratically determined level of redistribution may be quite high among a population with relatively little income uncertainty, possibly much to the chagrin of the high earners, some form of communication between the low earners and the high earners may actually make the higher earners feel better about the high level of redistribution.

IX – Appendix (Instructions read to participants for *Earnings Unknown Treatment*)

Instructions to Participants

Thank you very much for your participation. Please read the following instructions closely. They describe the game you will be playing and how your final payoff for participating in the experiment will be determined. At no time will you be lied to or misled at any point in the experiment regarding how the experiment will proceed and how your final payoff will be determined.

The Experiment

This experiment will consist of a practice match and six real matches. In each real match you will be presented a series of questions and given four minutes to answer as many as you can. For each question you answer correctly, you will earn some amount of tokens, where the number of tokens you earn for each correct answer is said to be your “rate-of-return” (ROR) and is a randomly determined number between 2 and 17, which will be revealed to you prior to your answering of questions. So, your *earnings* in a given match in tokens will equal the number of questions that you answer correctly times your realized ROR for that match. At the end of the experiment, each token will be worth \$0.10. This means each correct answer can earn you between \$0.20 and \$1.70 depending on your realized ROR.

After your four minutes for answering questions are up you will learn your total earnings (in tokens) for that match, as well as where your earnings fit in the overall distribution of all participants’ earnings for that match.

However, the key component of this game is that prior to answering any questions or knowing your ROR in a given match, you will be asked to propose a re-distribution rule p , where p is a number between zero and one. Your choice of p works as a re-distribution rule in the following way: at the end of a match, the re-distribution rule p that is proposed by one of the participants in this room will be randomly selected, revealed to all participants, and then implemented by the experiment administrator. If we denote the implemented re-distribution rule as p^* , then implementation means that a fraction p^* of *each* participant’s earnings for that match will be taken from each of participant and split evenly across all of the participants here today.

Thus, if there were three participants and if a participant i ’s earnings in a given match are denoted E_i , then for a given implemented distribution rule p , participant 1’s final payoff from that match will be equal to $(1-p)E_1 + p(E_1 + E_2 + E_3)/3$. Note that this is equivalent to $(1-p)E_1 + pE_{Avg}$. Therefore, if the implemented p is zero, each person’s final payoff for that match simply equals his or her earnings from that match. Alternatively, if the implemented p equals one, each person’s final payoff for that match will all be identical and equal to the average earnings over all participants in that match. Obviously, if the implemented p is greater than zero and less than one, each person’s final payoff for that match will be between his or her own earnings from that match and the average earnings over all participants in that match. Therefore, the lower the implemented re-distribution rule p , the closer each participant’s final payoff for that match will be to his or her earnings from that match, while the higher the implemented p , the more equal each participants’ final payoff will be to the average earnings across all participants.

To help illustrate how this game works more concretely, consider the following example. Suppose there are three participants: Annie, Bill, and Charlie. In a given match, Annie drew a rate-of-return of 8 and answered 5 questions correctly, meaning her earnings for that match were 40 tokens. Similarly, suppose Bill drew a rate-of-return of 4 and answered 8 questions correctly. This would mean his earnings that match were 32 tokens. Finally, suppose Charlie drew a rate-of-

return of 2 and answered 10 questions correctly, meaning his earnings for that match were 20 tokens.

Now, suppose Annie proposed a re-distribution rule p equal to 0, Bill proposed a p equal to 0.25, and Charlie proposed a p equal to 0.75. Given these choices and the above earnings, if Annie's proposed p (equal to 0) turns out to be the randomly selected re-distribution rule that is implemented, no tokens will be re-distributed. Therefore, in this scenario, each person's final payoff from that match will simply equal his or her earnings from that match, meaning Annie will have a payoff of 40 tokens that match, Bill will have a payoff of 32 tokens that match, and Charlie will have a payoff of 20 tokens that match.

Alternatively, if Bill's proposed p (equal to 0.25) is randomly selected to be the redistribution rule that is implemented, then 25% of each person's earnings are re-distributed equally to everyone, so Annie's payoff for that match will equal $(1-0.25)*40 + 0.25*(32 + 40 + 20)/3 = 37.67$ tokens, Bill's payoff for that match will equal $(1-0.25)*32 + 0.25*(32 + 40 + 20)/3 = 31.67$ tokens, and Charlie's payoff for that match will equal $(1-0.25)*20 + 0.25*(32 + 40 + 20)/3 = 22.67$ tokens.

Finally, if Charlie's proposed p equal to 0.75 is randomly selected to be the redistribution rule that is implemented, then 75% of each person's earnings are re-distributed to everyone, so Annie's payoff for that match will equal $(1-0.75)*40 + 0.75*(32 + 40 + 20)/3 = 33$ tokens, Bill's payoff for that match will equal $(1-0.75)*32 + 0.75*(32 + 40 + 20)/3 = 31$ tokens, and Charlie's payoff for that match will equal $(1-0.75)*20 + 0.75*(32 + 40 + 20)/3 = 28$ tokens.

This example is summarized in the table below. Please take a minute to look it over.

| | rate-of-return | correct answers | earnings | chosen p | Final payoff in tokens for this round | | |
|---------|----------------|-----------------|----------|------------|---------------------------------------|---------------------------|------------------------------|
| | | | | | if Annie's p is selected | if Bill's p is selected | if Charlie's p is selected |
| Annie | 8 | 5 | 40 | 0 | 40 | 37.67 | 33 |
| Bill | 4 | 8 | 32 | 0.25 | 32 | 31.67 | 31 |
| Charlie | 2 | 10 | 20 | 0.75 | 20 | 22.67 | 28 |

Match Progression and Final Payoff for Participation in this Experiment

As stated previously, this experiment will consist of one practice match and six "real" matches. Each match will follow the procedure listed above. The only difference across matches will be the type of questions asked. While the practice match will contain all types of questions, in the subsequent real matches, questions will all be of a certain type for a given match but will differ across matches. For example, questions in one match may all relate to vocabulary, while in the next match may all relate to mathematics, and the next match may all relate to movie trivia. Furthermore, matches will all be completely independent. Your performance, your ROR, or your choice of a re-distribution rule in one match will have no relation to what happens in subsequent matches.

At the end of all the matches, one of the "real" matches will be randomly selected to be the one that "counts," meaning each participant will receive his or her payoff from that match as his or her final payoff for the experiment, where each token is worth \$0.10. You will also earn a \$5 participation fee just for being here today.

X – References

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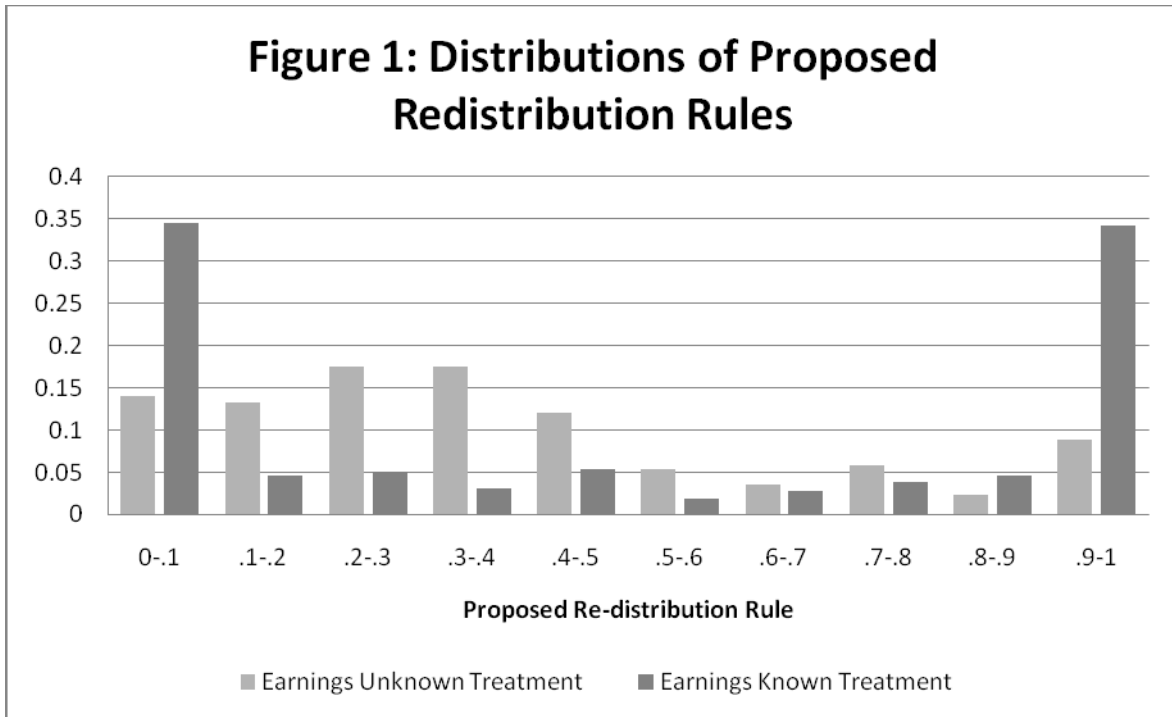
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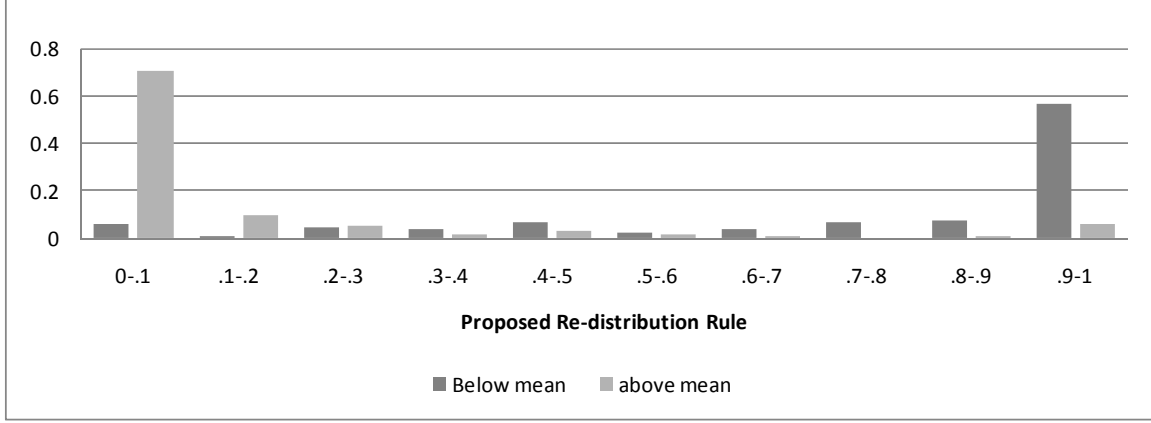
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Figure 1: Distributions of Proposed Redistribution Rules



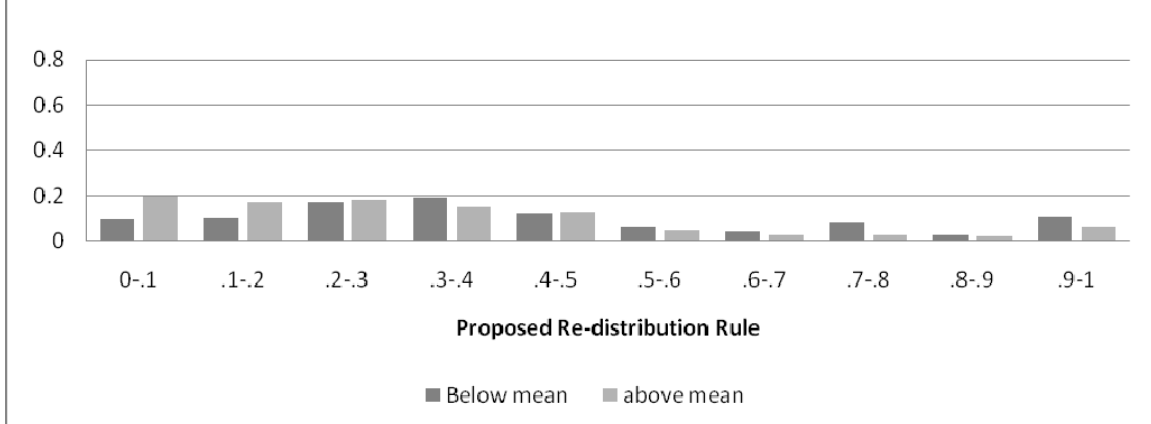
Note: Each treatment consisted of 43 individuals each playing six rounds of the same treatment. Each individual only participated in one treatment. A joint F-test, taking into account multiple observations per individual, rejects the equality of these two distributions at the 0.0001 level.

Figure 2a: Distribution of Proposed Redistribution Rules - Below vs. Above Mean (Earnings Known Treatment Only)



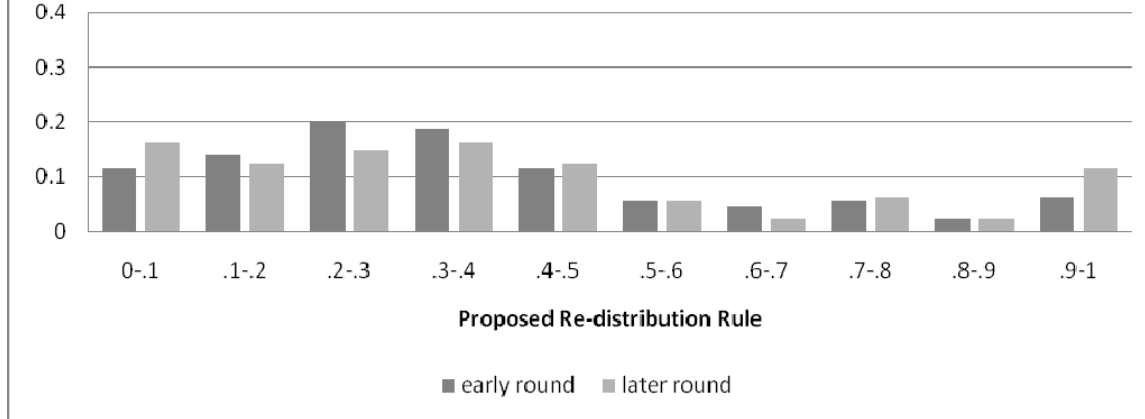
Note: A joint F-test, taking into account multiple observations per individual, can reject the equality of these two distributions at even the 0.0001 level.

Figure 2b: Distribution of Proposed Redistribution Rules - Below vs. Above Mean (Earnings Unknown Treatment Only)



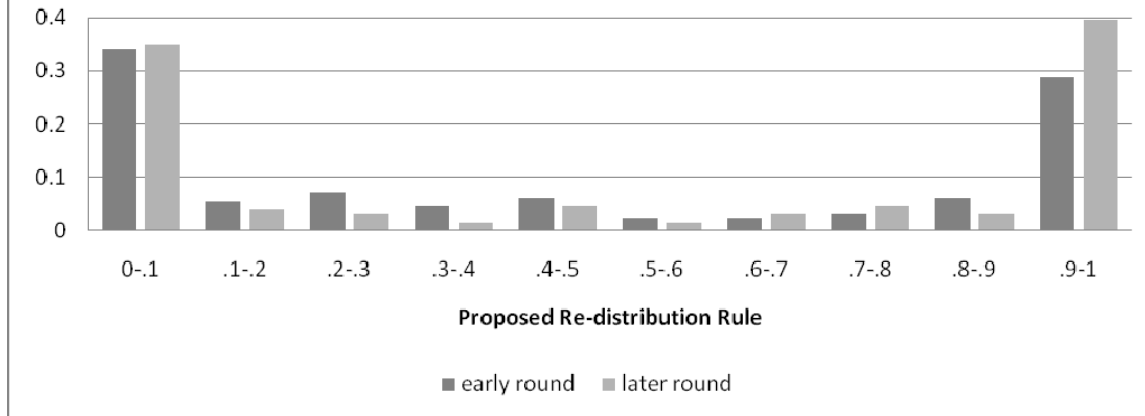
Note: A joint F-test, taking into account multiple observations per individual, cannot reject the equality of these two distributions at even the 0.15 level (p-val 0.50).

Figure 3a: Distribution of Proposed Redistribution Rules - Early vs. Later Rounds (Earnings Unknown Treatment Only)



Note: A joint F-test, taking into account multiple observations per individual, cannot reject the equality of these two distributions at even the 0.15 level (p-val 0.19).

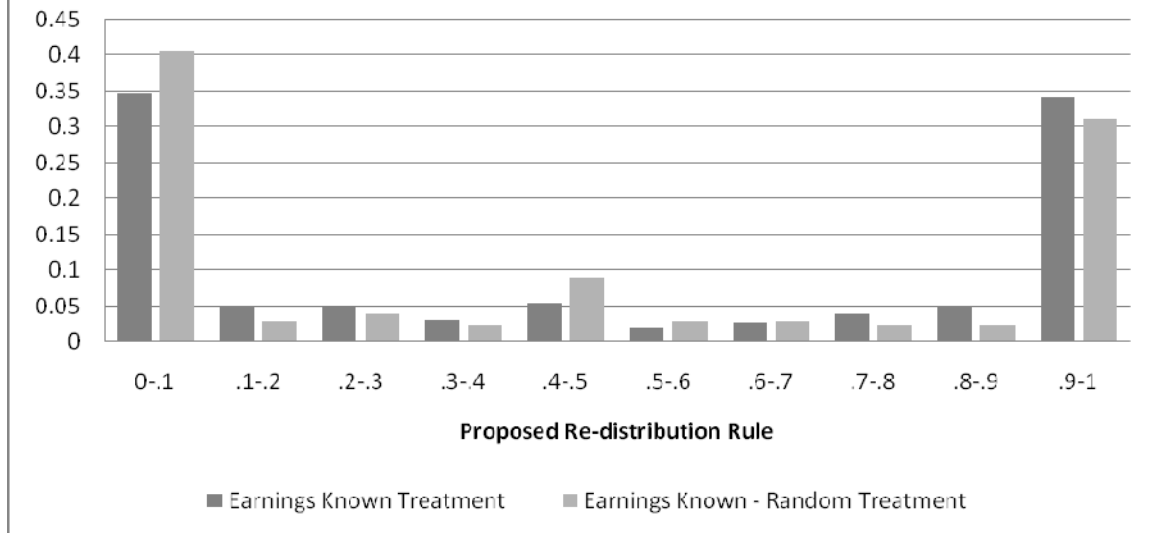
Figure 3b: Distribution of Proposed Redistribution Rules - Early vs. Later Rounds (Earnings Known Treatment Only)



Note: A joint F-test, taking into account multiple observations per individual, cannot reject the equality of these two distributions at even the 0.15 level (p-val 0.70).

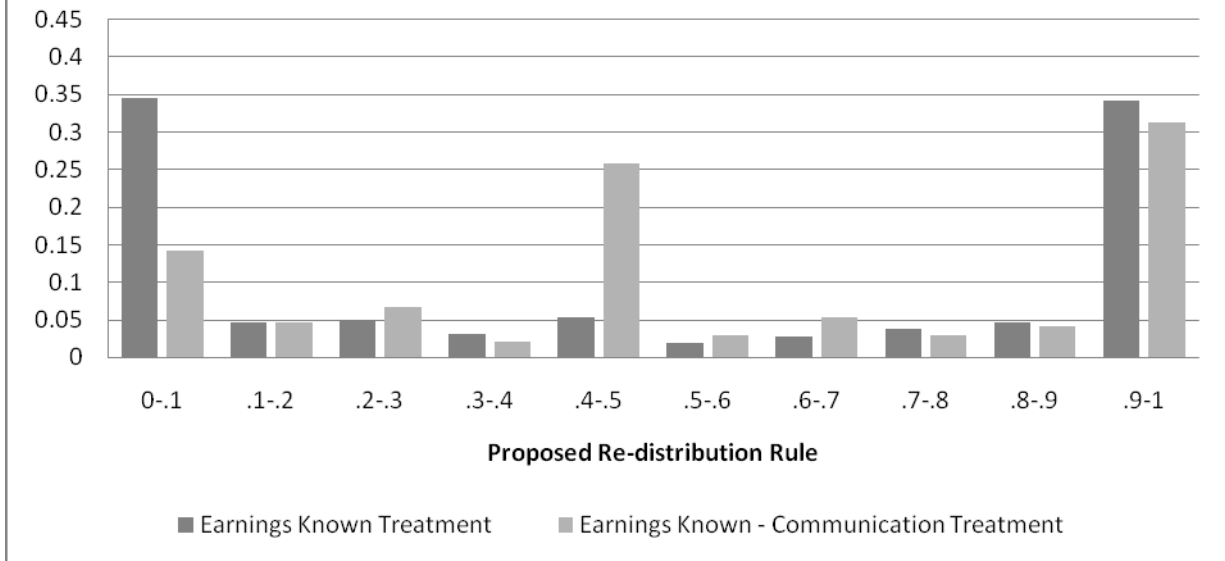
| Table 1: Earnings and Correct Answers by Treatment | | | | |
|-----------------------------------------------------------|--------------------------|-----------------|------------------------|-----------------|
| | Earnings (tokens) | | Correct Answers | |
| | <i>Earnings</i> | <i>Earnings</i> | <i>Earnings</i> | <i>Earnings</i> |
| | <i>Unknown</i> | <i>Known</i> | <i>Unknown</i> | <i>Known</i> |
| mean | 89.43 | 92.9 | 9.83 | 9.84 |
| 10th percentile | 35 | 40 | 5 | 5 |
| 25th percentile | 54 | 56 | 7 | 7 |
| 50th percentile | 81 | 84 | 9 | 9 |
| 75th percentile | 120 | 121 | 12 | 12 |
| 90th percentile | 168 | 180 | 15 | 15 |
| obs | 258 | 258 | 258 | 258 |

Figure 4: Distributions of Proposed Redistribution Rules



Note: The *Earnings Known* treatment consisted of 43 individuals, and the *Earnings Known-Random* treatment consisted of 35 individuals, each playing six rounds of the same treatment. Each individual only participated in one treatment. A joint F-test, taking into account multiple observations per individual, cannot reject the equality of these two distributions at the 0.15 level (p-val 0.49).

Figure 5: Distributions of Proposed Redistribution Rules

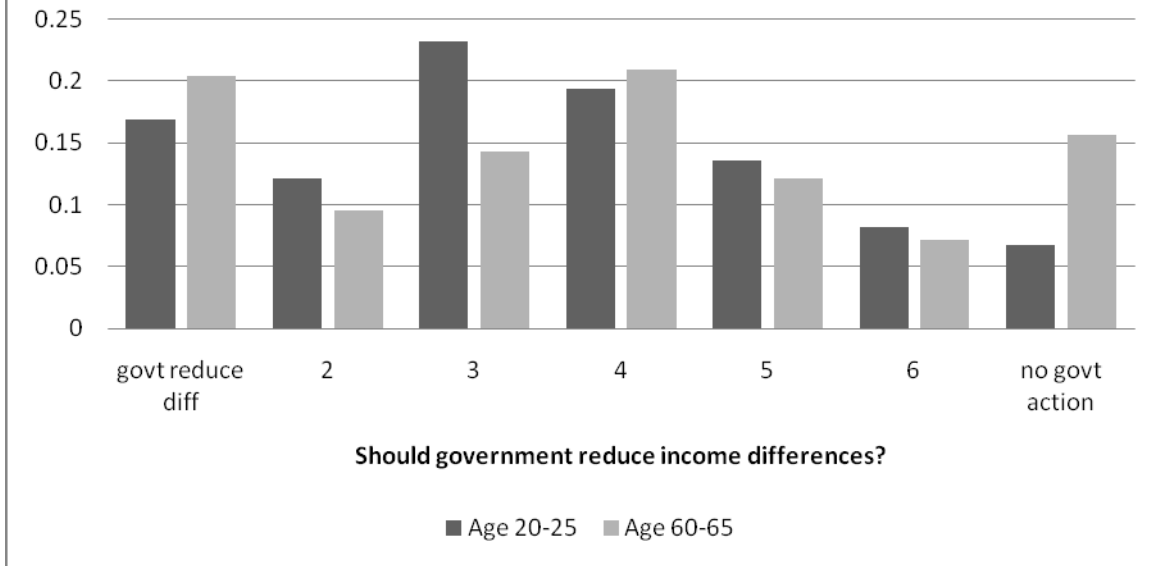


Note: Again, the *Earnings Known* treatment consisted of 43 individuals, and the *Earnings Known-Communication* treatment consisted of 40 individuals, each playing six rounds of the same treatment. Each individual only participated in one treatment. A joint F-test, taking into account multiple observations per individual, can reject the equality of these two distributions at the 0.005 level.

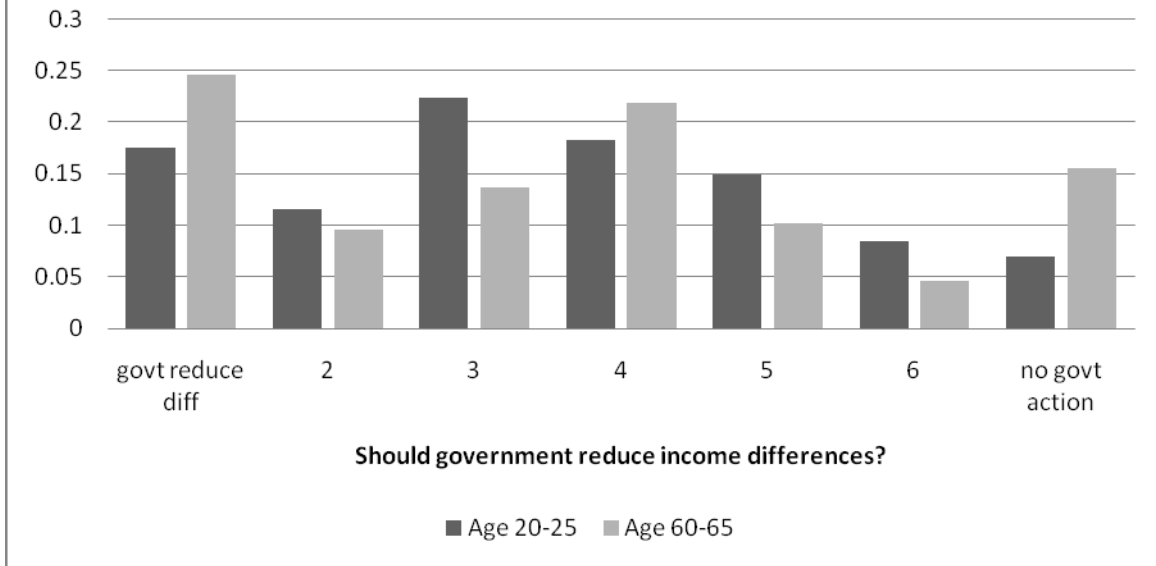
| Table 2: Condorcet Winners and Associated Average Tax Rates by Earnings Quintile by Treatment | | | | |
|------------------------------------------------------------------------------------------------------|-------------------------|-----------------------|------------------------|------------------------|
| | Treatment | | | |
| | | | Earnings Known- | Earnings Known- |
| | Earnings Unknown | Earnings Known | Communication | Random |
| Condorcet Winning p | 0.35 | 0.5 | 0.5 | 0.43 |
| Implied Avg Tax Rates | | | | |
| By Earnings Quintile | | | | |
| 5th | 0.14 | 0.21 | 0.18 | 0.20 |
| 4th | 0.08 | 0.11 | 0.09 | 0.11 |
| 3rd | -0.02 | -0.03 | -0.02 | -0.03 |
| 2nd | -0.18 | -0.26 | -0.22 | -0.26 |
| 1st | -0.57 | -0.81 | -0.70 | -0.81 |

Note: a negative "tax rate" is an earnings subsidy rate.

**Figure 6: Preferences for Redistribution
(GSS 1980-2010)**



**Figure 7a: Preferences for Redistribution
(GSS 1980-1989)**



**Figure 7b: Preferences for Redistribution
(GSS 2000-2010)**

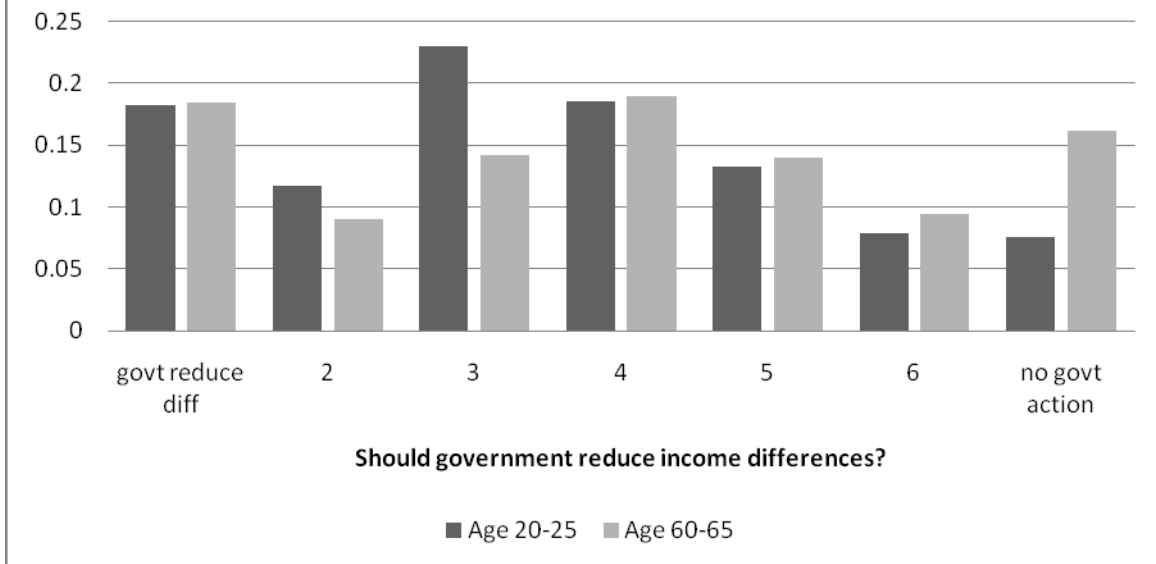
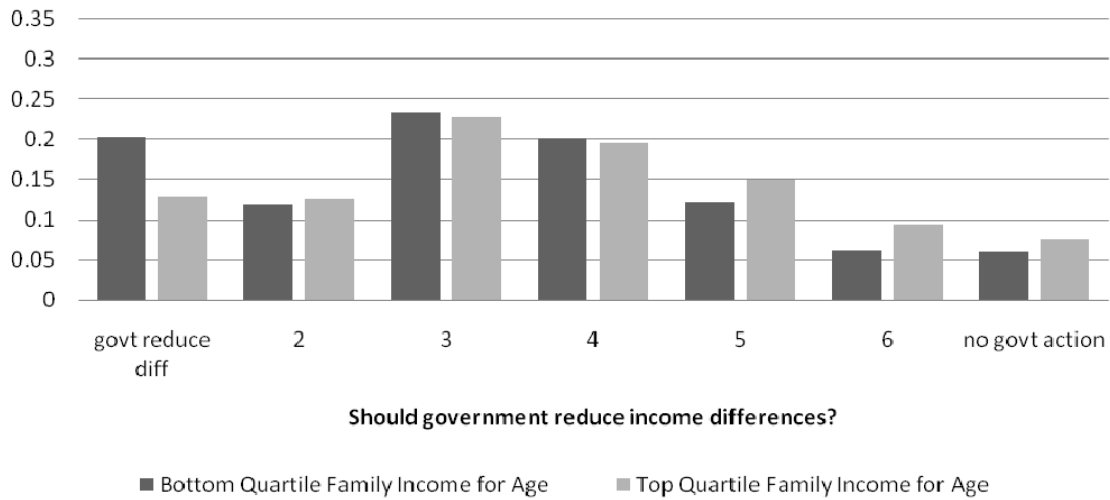


Table 3 - Probit Regression Results from GSS

| | Dependant Variable | |
|----------------------------|------------------------------------------------------------|------------------------------------------------------------|
| | (1) = 1 if think large role for gov't redistribution | (2) = 1 if think no role for gov't redistribution |
| Family Income (in 10,000s) | -0.014*** (0.003) | 0.004* (0.002) |
| Age 60-65 | 0.082*** (0.020) | 0.052*** (0.015) |
| Age 60-65*Family Income | -0.009** (0.004) | 0.005* (0.003) |
| year | -0.0004 (0.0007) | 0.0001 (0.0005) |

*Standard errors in parentheses. Marginal effects computed at the mean are shown. *** indicates significance at 1%, ** significance at 5%, and * significance at 10%

**Figure 8a: Preferences for Redistribution
(GSS 1980-2010, Age 20-25)**



**Figure 8b: Preferences for Redistribution
(GSS 1980-2010, Age 60-65)**

