

Preferences for Redistribution and Perception of Fairness: An Experimental Study^{*}

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Abstract

Why is there significant political support for progressive taxation and equalizing government transfers in western democracies? Possibilities include individual social preferences for a less unequal distribution than what market forces alone would dictate, demand for social insurance, or successful political coalitions to redistribute away from the rich. We study the relative importance of fairness preferences, risk aversion, and self-interest in determining support for redistribution through a set of experiments in which a large number of subjects are asked to choose what level of taxation to implement under different decision conditions and with four alternative determinants of pre-tax income (two task-based, one random, and one based on socio-economic background). Treatments using varying costs of redistribution to the decision-maker and efficiency losses to recipients are used to study willingness to pay for redistribution and concern for aggregate inefficiency. Most of our subjects prefer that there be less inequality among others and demand for redistribution responds in predictable ways to the cost of taxation and to the dead-weight loss associated with it. The external validity of the experiment is supported by the high correlation between tax decisions and political preferences. We also find evidence that preferred levels of redistribution are highly responsive to whether pre-tax incomes are determined according to task performance, a trend that is much more evident among men than among women. Comparisons between redistributive choices under different experimental conditions provide interesting insights with regard to the relative importance of inequality aversion and self-interest when choosing under uncertainty and when uncertainty is resolved. In the first case, individuals' expectation about their future position in the income distribution has a considerable impact on their tax choices. When sure of the effect on their own earnings, subjects' tax choices are primarily governed by self-interest, but fairness preferences continue to play a role.

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1 Introduction

Redistribution of income through government taxes and transfers has long been normal practice in industrial democracies. Using data from the Luxembourg Income Surveys, Branco Milanovic (2000) estimated that the income share of the bottom two quintiles of households in 14 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 in the U.S., the least redistributive of the wealthy industrialized countries, Milanovic found a difference of almost 8% between the income share of the bottom 40% of households after versus before taxes and transfers.

The question of how much redistribution there ought to be is one that in the end must cross the boundary between positive and normative discussion. But there are many points on which positive economic analysis can be helpful. Studies that attempt to estimate the magnitude of the trade-off between equality and efficiency are one example. An understanding of why income is redistributed can also be pursued as a matter of positive analysis.

Among the possible explanations of why redistribution occurs in democracies is that there is a social consensus behind it, that is, a large majority of citizens feel better off living in a society with less inequality because it reflects their ethical values, increases their perceived personal and property security (Thurow, 1971), or some combination of these or other reasons. In the limit, redistribution could be Pareto improving, i.e. even those with high incomes could prefer some degree of redistribution to occur despite the material cost to them. If redistribution were universally preferred, then an efficient amount of redistribution could in principle be found, whether using the Pareto criterion or by a Benthamite social welfare function.

At the other end of the spectrum of explanations is the possibility that redistribution results from the combination of majority rule and self-interest, as emphasized in traditional political-economic models of redistribution (Meltzer and Richard, 1981; Alesina and Rodrik, 1994; Sinn, 1995 among others).¹ The distribution of incomes in most societies is right-skewed, with the income of the median individual or household being far below the arithmetic mean. Thus, assuming that a given amount of revenue has to be raised by either a head tax (taking a fixed amount per person), a flat tax (taking an equal proportion of income from each person), or a progressive tax (taking a proportion of income that is higher the greater the individual's income), a self-interested median voter will always prefer the flat over the head tax and the progressive over the flat tax, assuming absence of incentive considerations. If government expenditure benefits all more or less equally, political economy models that assume equal participation in elections always predict that progressive taxes will be adopted in market democracies. In the absence of incentive and other dynamic considerations, however, such models predict the complete leveling of incomes, something

¹In contrast with this view, however, there is evidence of high levels of support for redistributive programs even among those who are unlikely to benefit from them (Gillens, 1999, Fong 2003) and, on the other hand, of relatively strong opposition to redistributive policies among those who are likely to benefit from them (Fong, 2001)

not observed in practice. The addition of incentive concerns could explain this, although other factors may also be operating.

The above discussion leaves out one more important reason why self-interest might lead to redistribution: in the absence of adequate means of insuring themselves against negative shocks, individuals with average or above-average incomes may favor redistributive taxation as a form of social insurance (Benabou, Ok, 2001; Alesina and La Ferrara, 2005). For this to happen, tax regimes must be relatively persistent over time, and voters must have some degree of uncertainty about how they will fare in the future. Both these assumptions are reasonable in real contexts.

Our remarks about social or ethical preferences for redistribution are also incomplete insofar as they fail to consider that the value judgments in question may depend on the nature and causes of pre-tax inequality, and on how these are perceived by the voters. Some authors have suggested that differences in voter preferences may depend, at least in part, on their perceptions of whether the distributive outcomes of the market economy are perceived as fair or not (Piketty 1995; Ravillion and Lokshin, 2000, Graham and Pettinato 2002; Alesina, Di Tella, and McCulloch, 2004, Alesina and Angeletos, 2005; Benabou and Tirole, 2006). Using survey data from several sources Fong (2001, 2003) finds supporting evidence for the United States that such fairness considerations matter to people.

Extensive experimental literature have investigated how agents' choices may be dictated by forces other than self-interest, such as aversion to inequality (Frohlich and Oppenheimer, 1992; Cowell and Schokkaert, 2001; Camerer, 2003) and how the origin of initial entitlements affects the extent of non-self-interested behavior (Hoffman and Spitzer, 1985; Burrows and Loomes, 1994). Nevertheless, most of these studies have focused on small group interactions, and it is unclear how these findings can be generalized to explain attitudes toward equality and redistribution at the societal level. Our experiment joins a relatively small existing set of studies of preferences on redistribution that are designed with a macro-political economy application in mind and which involve choices that are potentially costly in real money terms to the decision-maker (Beck, 1994; Ackert, Martinez-Vazquez and Rider, 2004; Beckman, Formby and Smith, 2004).

To investigate the extent of social preferences for redistribution, their sensitivity to the determinants of inequality and to perceptions of fairness, and the more general role that self-interest plays in voting for redistributive taxes, we conducted a series of laboratory decision experiments involving a large number of subjects. One goal was to shed light on the degree to which observed redistributive outcomes in democracies are explained by self-interest versus social preferences for equality. Thus, each subject in our experiments was asked to express a preference for redistribution among the micro community of participants both under the condition of being an outside observer of a distribution of income among others, and in the situation of being an affected party with a specific interest stemming from the expectation or knowledge of having a higher or lower

pre-tax income. To investigate subjects' willingness to pay for income equalization and their concern over the possibly "leaky" nature of taxation and redistribution, we varied across treatments both a direct cost to the decision-maker and an administrative or efficiency loss to recipients. We also had subjects make decisions both under uncertainty about their relative position in the pre-tax distribution and when uncertainty had been resolved. We used mainly student subjects but also a non-student adult comparison group. Our design contains several new elements, including large group size and multiple income determination methods, both in combination with multiple decision contexts.

We find most subjects willing to pay to increase equality of earnings among others whom they do not know. This willingness varies in predictable ways with the direct cost to the decision-maker, and with their political views and incomes. It varies in an intuitive way with whether subjects "earn" their unequal pre-tax incomes, although this difference itself is sensitive to gender in a manner echoing the political "gender gap" (females are more reluctant to accept even "earned" inequality). Subjects value efficiency, redistributing less when more income is thereby lost. Despite the clear evidence of "social preferences," most subjects' choices regarding redistribution reflect their personal interest when this is also at stake. Evidence for this includes a greater desire for redistribution when own income is more difficult to predict. We provide estimates of the relative weights placed on social preferences and self-interest.

The remainder of the paper is organized as follows. Section 2 describes the design and rationale of our experiments. Section 3 provides a theoretical framework for predicting and interpreting the results. In section 4 we illustrate and discuss our main results. Section 5 concludes.

2 Experiment Design

Experimental sessions took place in a computer lab and lasted approximately ninety minutes. Each session involved twenty-one subjects. A \$5.00 participation fee was given to each subject who completed the session. Participants' additional earnings were contingent on the outcome of the experiment, averaging around \$21.30 but with a range unusual for laboratory experiments (from \$0.11 to \$103).

The sessions began with a set of instructions. The instructions appeared on the computer screens and were simultaneously read aloud by the experimenter so that all subjects were aware of the rules and procedures. At the end of the instruction stage, subjects were invited to ask questions and then answered five questions to test their comprehension of the procedures.

As part of the on-screen instructions, we presented a table describing the set of provisional experimental payoffs to be assigned to each of the twenty participants (Table 1). The distribution of the payoffs, ranging from \$0.11 to \$100.00, reproduced the distribution of the average pre-tax

incomes of the lowest to highest earning twentieths of the US population, which was also included in the table. Participants were informed that the provisional earnings might be altered by a tax and transfer process.

Each experimental session consisted of two main parts ('Part I' and 'Part II' henceforth) in which participants were asked to make a set of redistributive choices under different experimental conditions. At the end of the session one of the two parts was randomly selected to be the basis for payments.²

In Part I each subject was asked to choose a proportional tax rate (0%, 10%, 20%, ..., 100%) to be applied to the pre-tax payoff distribution among the other twenty participants with the proceeds being distributed equally among all subjects. Participants were informed that, at the end of the session, one person would be randomly selected as the "decisive individual", and his preferred tax rate would be applied to the pre-tax earnings distribution of the other twenty participants to determine their final payoff. The decisive individual himself, however, would be affected neither by Table 1's pre-tax income profile nor by the tax and transfer to be implemented. By requiring all subjects to indicate their tax preferences at the outset, we aimed at eliciting "outside observer" preferences from the entire subject pool. We used a dictator rather than a median voter design so that subjects would have no reason to vote strategically.

Two additional dimensions of treatment variation were included in order to study both agents' willingness to pay for a more equal earnings distribution, and their concern for aggregate efficiency. The first parameter (which we will refer to as 'tax cost') measures the cost of each additional 10% tax in terms of a direct reduction in the decisive individual's payoff (following Andreoni and Miller, 1998). The tax cost parameter could take four alternative values: \$0, \$0.25, \$0.5, or \$1. For example, in a session with tax cost equal to \$0.5, the decisive individual was charged 50 cents for imposing a tax of 10%, \$1 for a tax of 20%, continuing up to \$5 for a tax of 100%. The second parameter measures 'efficiency loss', or the loss in the aggregate payoff of the other participants associated with each additional 10% tax, in line with Okun's (1975) "leaky bucket" argument (Amiel, Creedy and Hurn, 1999; Beckman, Formby and Smith, 2004)³. This could take three alternative values: 0%, 12.5%, or 25%. For instance, in a session with efficiency loss of 25%, for each \$10 collected as tax, \$2.50 is lost and \$7.50 is divided equally among the twenty affected subjects.

Formally, the post-tax earnings of the twenty affected subjects are given by:

$$y_i = (1 - t)x_i + t(1 - e) \frac{1}{20} \sum_{j=1}^{20} x_j \quad (1)$$

²As it will be explained later, a subsidiary stage, Part III, also occurs in certain sessions.

³The efficiency loss parameter could be interpreted as the a measure of the dead weight loss associated with distortionary taxation, or alternatively, as the cost of administering the tax

with x_i being individual i 's pre-tax earnings, t being the tax rate chosen by the decisive individual, and e the dead weight loss associated with a 10% tax). The expected payoff of the decisive individual is given by:

$$E(y_D) = \bar{x}_D - c(10 \cdot t)$$

with \bar{x}_D being the decisive individual's expected base-payoff, t his preferred tax rate, and c the cost of each 10% tax. Participants were informed that the base payoff of the decisive individual would be randomly drawn from the interval from \$19.80 (the mean pre-tax payoffs of the other 20 subjects), and \$21.80.⁴ Therefore, the final earnings of the decisive individual was either entirely unaffected by taxes and transfers (when $c = \$0$, our pure "outside observer" benchmark), or else was affected only by the cost of the tax he would choose to impose (modified "impartial observer" scenario). Both the tax cost and the efficiency loss parameters were held constant during a given session, allowing their effects to be measured only by between-subject comparisons. The four alternative tax costs and the three alternative efficiency settings yielded 12 treatments. The effects of taxation were explained to subjects verbally, graphically, in a table (using Table 2), and by means of an equation resembling (1), so that both more and less mathematically inclined subjects could understand them. Subjects were required to pass a comprehension test before making any decision.

Prior to making their Part I choice, participants were also informed that the pre-tax earnings distribution would be determined by one of four possible methods: a) randomly ("Random"); b) based on the average income of their place of origin ("Where From"; derived from their home ZIP code or, home country income for subjects from countries other than the US); c) according to their performance on a general knowledge quiz ("Quiz"; similar to the SAT II); d) according to their score on a computer-based game of skill ("Tetris"). The actual method to be employed would be randomly selected at the end of the experiment. Each subject was asked to choose a tax rate for each of the methods. The four methods were designed to mimic different determinants of economic success in real life (luck, initial conditions, effort and/or ability, respectively) and were used to assess differences in agents' attitude toward redistribution relative to their perception of fairness.

After each subject chose four preferred tax rates for Part I, the nature of Part II was explained, questions were invited, and subjects again took a comprehension test.

In Part II each participant was again asked to choose a tax rate for each the four methods, this time on the understanding that if selected to be the decisive individual, his base payoff would

⁴Although it was impossible to totally eliminate comparisons between his own income and that of the other twenty subjects, we chose a base income at least equal to the group average for the decisive individual with the aim of moderating the salience of such concerns. A higher base income would reduce the likelihood of invidious comparisons with higher earners, but increase the likelihood of guilty comparisons with low earners. The impact of the choice of base income can be explored in future experiments.

be one of the twenty earnings levels described in Table 1 and his preferred tax rate would be applied to the pre-tax earning distribution among twenty participants, including himself (‘involved observer’ scenario).⁵ This section was designed to analyze the effect of involvement on subjects’ distributional judgment. The tax cost and efficiency loss parameters did not vary between Part I and II.

Before choosing Part II tax rates, subjects were asked to report how they expected to rank under each of the four earnings determination methods, and how confident they were about their guess. They then chose the tax rates, took the 20 question Quiz, practiced the Tetris game for two minutes, and played the Tetris game for five minutes. After this, a coin was tossed to determine whether payments would be based on Part I or II. If Part II was selected, participants were informed of their actual ranking in each of the four methods and were offered the possibility of revising their tax choice (we will refer to this stage as ‘Part III’). There was no reconsideration stage if Part I was selected. This arrangement was designed in order to remove subjects’ uncertainty about their relative position in the pre-tax distribution and to isolate the effect of self-interest on agents redistributive choices.

Then the earnings-determination method was selected (by the roll of two dice), the decisive individual was chosen⁶ (by drawing from a hat), and the final payoffs were announced.

Before exiting the session, subjects were asked to make a series of choices between earning a dollar with certainty and participating in a lottery with a 50% probability of earning nothing and a 50% probability of earning a positive amount which increased from one question to the next (\$1.80 in the first choice, \$2.00 in the second, \$2.33 in the third, \$2.67 in the fourth, and \$3.00 in the last). This section, which was not pre-announced to the subjects, contributed on average an extra \$1.50 (about 6%) to total earnings, and was included in order to generate an indicator of subjects’ risk aversion. After completing it, subjects answered a series of background questions regarding their gender, area of study, socioeconomic background, political inclination, and views on inequality and taxation, while cash payments were counted out and handed to them. The timing of the experimental session is summarized in Table 3. All the instructions are available at: <http://www.brown.edu/Research/IDE/walkthrough>.

Overall, sixteen experimental sessions were held, involving a total of 336 Brown University

⁵In this case, another subject was randomly selected to receive \$19.80 to \$20.80 and be unaffected by either the redistribution or the tax cost

⁶Subjects were told that the identity of the decisive individual would never be revealed, a measure we adopted to eliminate worry over the social tension that he might feel from anyone unhappy with the chosen t . The decisive individual’s base income had a random element to make it difficult even for that individual to be sure he had been chosen, again to reduce worries about feelings of tension at the end of the session (this is also the reason why a revision stage was not added in cases in which Part I was randomly selected. Had it been included, his payoff would be to reveal his identity to the decisive individual). We wanted each subject to focus as much as possible, when choosing tax rates, on the consequences for the others’ earnings, and not on any consequences for their own social interactions with the others at the close of the experiment.

undergraduate students from a wide range of disciplines. Table 4 summarizes the number of sessions and subjects organized by the exogenous parameters tax cost and efficiency loss. To check the sensitivity of the results to the subject pool, additional sessions were conducted involving a total of 55 adult non-student subjects recruited from the surrounding community. Results of the analysis of these additional sessions are not reported in this version, but in general they are not qualitatively different than those with students.

3 Hypothesis and Predictions

In order to predict how subjects will behave in the experiment we need to make some assumptions about their utility function. A general form for subject i 's utility function is given by:

$$U_i = f(\tilde{y}_1, \tilde{y}_2, \dots, \tilde{y}_i, \dots, \tilde{y}_{21})$$

where $\tilde{y}_{j \neq i}$ represent the earnings of each of the twenty other participants potentially affected by agent i 's decision. \tilde{y}_i , which can be also written as $\tilde{y}_i = E(y_i) - t \cdot c$, represents instead i 's expected payoff if he is selected as the decisive individual, net of the total cost of taxation.

If individual i is purely self-interested, arguments other than \tilde{y}_i can be ignored without loss of predictive power. Under this assumption, we can predict:

H_{0a}: In the "outside observer" scenario (Part I) a purely self-interested individual will never select $t > 0$ if $c > 0$, namely if tax cost is strictly positive. When $c = 0$ a purely self-interested agent will be equally likely to select any of the possible tax rates $(0, 0.1, \dots, 1)$.

In the "behind a veil of ignorance" condition (Part II under random assignment), agent i 's choice will depend on the values of c (tax cost), and e (efficiency loss), as well as on his degree of risk aversion. The following hypothesis can be formulated:

H_{1a}: In Part II under random income determination, a purely self-interested agent will never select $t > 0$ if he is risk-neutral, and if both $c > 0$ and $e > 0$. The more risk-averse the agent is, the higher the tax he will choose, with $t = 0$ remaining a possible option and being more likely the larger c and e .

For the other three methods in Part II, we predict:

H_{2a}: In Part II under income determination methods Where From Tetris, and Quiz, subjects confident of their predictions about their relative standing will choose 0% or 100% taxation, depending on which maximizes their own expected income. In order to maximize their expected utilities, risk-averse subjects lacking confidence in their predictions may select positive tax rates which will be higher the lower the tax cost or efficiency loss, the greater is their risk aversion, and the less is their confidence (ability to predict their standing).

Consider now an individual who, due to social preferences, attaches a positive weight to the earnings of other subjects. We are interested in two types of preferences, preferences for equality and preferences for efficiency.

Assuming that agents' utility increases with equality in the distribution of incomes, and that equality is monotonically increasing in the tax rate, under our set-up, we can write $h(t)$ as a general function linking utility and equality, with $h' \geq 0$.

Abstracting from agents' concern for their own income, preference for aggregate efficiency can be formalized in relation to the sum of others' aggregate payoffs. Intuitively, the more efficient redistribution is, the larger the total pie will be, *ceteris paribus*. Thus, the utility individual i gets from aggregate efficiency can be written as: $g(\sum_{j \neq i} y_j)$, with $g' \geq 0$.

We allow the degree of risk aversion, the extent of concern for inequality, and for efficiency, to vary across individuals. Formally:

$$U_i = f_i(y_1, x_i) + h_i(t, x_i) + g_i \left(\sum_{j \neq i} y_j, x_i \right)$$

The functions $f_i(\cdot)$, $h_i(\cdot)$, and $g_i(\cdot)$ vary across individuals both randomly and in relation to a vector of measurable characteristics x_i such as gender, ethnicity, political inclination, and socioeconomic background.

Finally, we allow functions $h_i(\cdot)$ and $g_i(\cdot)$ to vary depending on what are the determinants of pre-tax inequality. That is, individual i may have a strong desire for income equalization if pre-tax incomes have been determined according to a method that i perceives as unfair (for example based on socioeconomic background), but a much weaker or possibly no desire to redistribute if pre-tax incomes have been determined, to some extent at least, by effort or ability in performing a task (in our context, by playing a computer game or answering a general knowledge quiz).

Hence, we can write:

$$U_i = f_i(y_1, x_i) + h_{m,i}(t, x_i) + g_{m,i} \left(\sum_{j \neq i} y_j, x_i \right)$$

where subscript m indicates the pre-tax income distribution method.

We propose the following compound hypothesis:

H_{0b}. Both in Part I and Part II (under random assignment), a subject displaying some level of social preferences may select $t > 0$ even if $c > 0$.

Several sub-hypotheses can be spelled out:

1. The larger c (tax cost) and e (efficiency loss), the smaller the value of t that will be selected, *ceteris paribus*.

2. The greater i 's preference for equality under the pre-tax income determination method in question, the larger the value of t the agent will select at every stage, *ceteris paribus*
3. In sessions with positive efficiency loss, the greater i 's concern for efficiency under the pre-tax income determination method in question, the smaller the value of t the agent will select at every decision stage, *ceteris paribus*.

Concern for equality or efficiency does not imply the absence of simultaneously operating self-interest. For example, in both Part II (for any methods other than Random) and Part III, an agent's tax choice will be affected by his expected rank in the pre-tax income distribution via the $f_i(\cdot)$ function. Individuals with higher (lower) expected pre-tax incomes will have a stronger bias toward a low (high) tax. However, concerns (2) and (3) may have effects countervailing those self-interest, which will be stronger the closer i 's (expected) rank is to the point at which $\partial y_i / \partial t = 0$ (i.e., between ranks 7 and 8, when there is no efficiency loss). Also, since Part II decisions are taken prior to learning one's rank according to the various methods, subjects are expected to prefer higher taxes the greater their lack of confidence in their estimate of their relative performance and the greater their degree of risk aversion.

4 Results

The following analysis focuses on the results of the sixteen experimental sessions in which all participants were undergraduate students. Students from a wide range of disciplines participated in the experiment. Subjects were not drawn from particular courses; hence they were not likely to know each other before the sessions. The large majority of participants appeared to have no difficulty understanding the instructions, and answering the control questions. Accordingly, all subjects took full part, making tax choices for each of the four methods - both in Part I and II, and in Part III when this occurred (7 out of 16 sessions involving a total of 147 subjects). All but one subject also completed the debriefing questions as well as the test for the assessment of risk aversion.

We next present the descriptive statistics and discuss some preliminary results before proceeding to the econometric analysis.

4.1 The "outside observer" scenario: Part I

Do agents' tax choices suggest the existence of a demand for redistribution among the micro-community of the twenty other participants? As shown in Table 5, the large majority of subjects display some degree of egalitarianism, in the sense that, all things being equal, they prefer earnings to be distributed more equally than the *status quo*, no matter which method is used to determine pre-tax income distribution. Considering all the experimental sessions taken together, in 76.4%

of the cases subjects favored some equalization of earnings ($t > 0$), in 44.2% of the cases a tax rate of 50% or higher was chosen, and 14% of the time subjects decided to fully equalize earnings among other participants (mean tax rate: 42.4%). However, this result could be due to the choices of many of those individuals participating in sessions in which redistribution was free or very cheap. Nevertheless, when only those sessions with a positive tax cost are considered (12 sessions, 251 participants, 1004 tax choices) we observe a very similar pattern. Furthermore, even restricting the analysis to those sessions in which redistribution was more expensive (tax cost = \$1 per 10%) the qualitative result remains the same. A large majority of the participants still opted for a positive level of taxation (69.9%), more than a third for a tax rate of 50% or higher (34.8%), and 7.7% were willing to pay a full \$10.00 (approximately half of their expected payoff⁷) to equalize earnings among the other participants. This evidence supports hypothesis H_{0b} against the alternative hypothesis H_{0a} .

Does the existence of widespread support for redistribution imply that agents are not responsive to the cost of taxation? The data suggest that this is not the case. In fact, as shown in Figure 1, participants in sessions characterized by high values of tax cost chose lower levels of taxation than participants in sessions with zero tax cost. The difference is negligible for low levels of tax cost but significant when taxation becomes relatively expensive. Performing a series of Mann-Whitney tests for between-subject comparison we do not find any significant difference in the preferred tax between subjects facing \$0 up to \$0.5 cost per 10% tax, but do find tax choices to be significantly lower at \$1 tax cost than at lower levels (significant at the 5% level in a two-tailed test). This pattern is consistent with the view that redistribution is a conventional good with demand being downward sloping in the price of taxation. Despite their willingness to reduce inequality via taxation, individuals take into consideration the effect of their decision on their own (expected) payoff. In particular, agents' demand for redistribution appears to be fairly inelastic for low levels of tax cost, but decreases significantly when the price of redistribution is high. The same result holds for any level of efficiency loss, although with different intensity (see Table 6).

Another interesting question is whether individuals are concerned with aggregate inefficiency when choosing their preferred tax rate. By comparing sessions with different efficiency settings, we find that subjects tend to choose lower levels of redistribution when taxation involves a higher cost in terms of aggregate payoffs, even when this does not have an impact on their own expected pay-off. As depicted in Figure 2, this effect is important only when transfers entail a 2.5% leakage per each 10% tax, which, in the case of complete equalization, implies that a fourth of the total pie is foregone. Again, this result is confirmed by Mann-Whitney two-tailed tests, which show no difference in preferred tax between 12.5% and 0% efficiency loss, but a lower preferred tax at 25% efficiency loss than at 12.5% (significant at the 10% level) and 0% efficiency loss (significant at the 5% level).

⁷Excluding the earning from the risk aversion test which subjects did not then know about.

Individual demand for redistribution may also be influenced by beliefs about the determinants of inequality. The set up of Part I, which lets subjects choose different tax rates for each of the four methods, allows us to study how perception of fairness informs redistributive decisions. If agents are indifferent about how initial income is determined, we should observe no systematic differences in tax choices across different methods. However, such differences are, in fact, observed. In particular, as depicted in Figure 3, subjects tend to express a greater desire for redistribution when pre-tax earnings are determined according to the Random and the Where From methods (mean tax rates of 49.3% and 45.1%, respectively) than when relative performances in the Tetris and Quiz games are used (37.7% and 37.3 respectively). The distribution of tax choices is also consistent with this result (Table 7).⁸ To make sure these differences are not driven by a relatively small number of extreme observations, we perform a series of Wilcoxon matched pair tests for within-subject comparisons. The tests confirm our main finding, showing that subjects were somewhat more likely to choose a higher tax for the Random than for the Where From method (p-value: .021), and much more likely to choose a higher tax for both the Random or Where From methods than for the Quiz or Tetris ones (p-values below .001 in all four comparisons). Finally, there was no evidence of significant differences in preferences between the Tetris and Quiz methods (p-value: .276). These results are in line with recent evidence supporting the view that individuals demand less redistribution when they perceive the pre-tax earnings to be "deserved", which in our experiment, is presumably the case for methods based on effort and ability in performing some simple tasks rather than pure luck or family background.

Our data allow us to go a step further and to address a related question: how much more are agents willing to pay to reduce inequalities when they consider these inequalities unjustified? To answer this question, in Figure 4 we compare average tax rates for different groups of methods (combining on the one hand, Random and Where From, and, on the other, Quiz and Tetris) in sessions with high tax cost (\$1 per 10%) and low tax costs (\$0 up to \$0.50 per 10%). When redistribution is cheaper, agents tend to select much higher taxes for methods they perceive as less fair (an 11.5 percentage point difference between Random-Where From and Tetris-Quiz methods). However, when the cost of redistribution is higher, despite remaining statistically significant, this difference is much smaller (4.5 percentage points). We interpret this as evidence that, despite attaching different social judgements to different determinants of inequality, and hence being inclined to tax "undeserved" earnings more heavily, people tend to do so much less when redistribution is more costly.

We do not observe such a clear pattern with respect to the "leakage" associated with redistribution (Figure 5). In fact, the difference in taxation between "fair" and "unfair" methods is similar

⁸When all sessions are considered, the percentage favoring some equalization ranges from 80% when pre-tax payoffs are determined randomly, to 74.3% when the Tetris method is used. Similarly, the share of choices supporting a tax rate of 50% or higher varies from 54.9% (Random) to 36.7% (Quiz). Finally, the percentage of subjects choosing complete equalization ($t = 1$) declines from 19.1% (Random and Where From) to 8.4% (Tetris)

in sessions with high and low dead weight loss (10.2 and 8.3 percentage points, respectively).

We now turn to the question as to whether different types of people express different preferences for equality and fairness.

Based on the background questions, we can group subjects relative to the following personal characteristics: gender, self-reported ethnic background, self-reported political ideology, home area income (from their ZIP code or country), self-reported socioeconomic status, economics courses taken. These are presented in Table 8. These variables, as well as the risk aversion indicator,⁹ will be employed in the econometric analysis. The questions used to construct the indicators are reported in the Appendix.

The comparison of the average tax rates (Table 9) provides some interesting insights about differences in redistributive choices across groups. With respect to political inclination, those subjects who identify themselves as liberal chose much higher levels of redistribution compared to moderates and, especially, to conservatives (average tax rates of 45.2%, 36.2%, and 31.8 %, respectively). With regard to ethnic background, we do not observe any particular difference across groups, with average tax rates ranging between 40% (African-Americans) and 43.8% (Hispanics).

The difference seems also negligible across income groups, with the exception of participants coming from relatively poor locations, which, on average, chose higher taxes (47.8% against averages ranging between 39.8% and 41.8% for middle to high income groups).

Apart from political-ideological cleavages, the most striking differences are between women and men. Female subjects choose much higher taxes than males, with an average difference of about 12.6 percentage points (49.3% versus 36.7%). This result is in line with previous experimental evidence describing women as more socially oriented than men (Eckel and Grossman, 1998).

A related, and possibly more interesting question, is whether men and women's choices vary in a similar fashion when taxation becomes more expensive to the decision-maker, or when redistribution entails larger loss in aggregate income. To shed light on this aspect, in Figure 6 and 7 we compare average tax rates between sessions with high and low levels of tax cost and efficiency loss, disaggregating the results by gender. All subjects decide to redistribute less when taxation is more costly. However, the difference is much larger for men than for women both in absolute value (-13.1% against -8.3%) and relative to choices in sessions with low tax cost (-32.7% and -16.2%, respectively)¹⁰. The result is even more striking when comparing sessions with different efficiency

⁹Of the 335 subjects completing these parts, 308 answered the risk-aversion questions consistently and 27 in an inconsistent fashion, that is they rejected a gamble with high expected value but accepted one with lower expected value. To keep the sample as large as possible, we defined a second measure of risk aversion which could be calculated for both consistent and inconsistent responders. To check robustness, we carried out each piece of analysis also for the restricted sample composed by those who replied consistently. Since the results turn out to be quite similar, we present in what follows, the analysis for the larger sample. *Define riskaversion2 here*

¹⁰This result is in line with Andreoni and Vesterlund (2001) who study gender differences in altruism by examining a modified dictator game with varying incomes and prices and find evidence that men are more responsive to price

settings. The average tax in sessions with 25% leakage is 8 percentage points less than in sessions with lower efficiency loss. When only men are considered, however, this difference rises to almost 10 points (- 25%). Women, by contrast, make very similar choices in sessions with high and low efficiency settings, the difference being less than 3 percentage points. Hence, these findings suggest that not only do women seem to always support higher redistribution than men (larger intercept), but they also tend to be relatively less responsive to the cost of taxation and, even less sensitive to efficiency concerns (lower slope).

Do we observe similar differences between men women in their attitude toward fairness? The answer turns out to be yes. When comparing the mean tax rates for different methods separately for men and women (Figure 8 and 9), it is striking how, on average, women's choices tend to vary much less across methods. For women, in fact, the difference between Random and Where From methods, on the one hand, and Quiz and Tetris methods, on the other, is fairly small (about 4 percentage points). For men, by contrast, we observe relatively high levels of taxation for the Random and the Where From methods, but a much lower demand for redistribution in the Tetris and Quiz methods. Although females choose higher tax in all methods, most of the variation between men and women can be attributed to a very different perception of what is fair and what is not. In other words, on the basis of our evidence, males seem much more reluctant than women to redistribute when they perceive earnings to be "deserved", and hence consider high-performance subjects to be entitled to higher payoffs. Women, on the other hand, are much less affected by this concern, and display high demand for redistribution regardless of how pre-tax incomes are determined.

4.1.1 Econometric analysis

We now proceed to test the preliminary results just presented by estimating a set of multiple regression equations using data from all sessions. In some cases, we will restrict our attention to the sample of tax choices for one of the four methods of pre-tax determination (335 observations). Most of the time, however, we will use the larger sample obtained by pooling together all of the 1340 observations (335 subjects by four choices).

The dependent variable is the tax rate selected by each subject in Part I. The set of explanatory variables includes: tax cost, efficiency loss,¹¹ risk aversion, a gender dummy variable, ethnic dummy variables, political philosophy, home area income, socioeconomic status, number of economics

changes than women. However, these authors also claim that "male and female demand curves for altruism cross", a conclusion that is not supported by our data which shows that women support more redistribution than men at any level of tax cost.

¹¹Since subjects's choices were fairly similar for levels of tax cost other than \$1 per 10%, in order to simplify the interpretation of the coefficient we use a dummy variable which equals 1 for sessions with tax cost = \$1, and 0 for the others. Similarly for the efficiency loss parameter, we use a dummy which equals 1 for sessions with efficiency loss = 25%, and 0 for the others.

courses taken.¹² The regression models were estimated using ordinary least squares (OLS). To address the concern that, if allowed, some subjects may have chosen a tax rate less than 0 % (regressive) or more than 100%, we also estimate the same set of regressions using a Tobit model, censored at 0 and 1. Since the results turn out to be very similar, below we report only the OLS regressions.

In the first set of regressions we use all 1340 observations to estimate the effect of both the cost of taxation and the efficiency loss on subjects' redistributive choices. As shown in Table 10, both coefficients have the expected sign, and remain large and highly statistically significant (1% level) when several controls are included. According to this result, when tax cost rises to \$1 per each additional 10% tax, the preferred tax rate falls by approximately 10%. This is in line with the average tax falling from 45%, in sessions with 0 tax cost, to 34%, in sessions with tax cost of \$1. Similarly, when the leakage associated with redistribution rises to 2.5% per 10% tax, the preferred tax rate falls by about six percentage points, *ceteris paribus*.

Table 10 presents other interesting results, some of which support the findings presented in the previous section. An example is the existence of a difference in demand for redistribution between men and women. As predicted, the coefficient on female is positive, and remains large and statistically significant (1% level) when variables such as risk aversion, political beliefs, income, and socioeconomic status are controlled for. We will return to this issue shortly to try to elucidate what factors are driving this result.

Individual political beliefs are also highly correlated with redistributive choices. A more liberal political philosophy is associated with a preference for higher taxation. More precisely, for every additional point on the 7-point ideological scale (going from very conservative to very liberal), the preferred tax rate increases by 3.5% , with a potential maximum difference of about 21 percentage points. Furthermore, this pattern holds for all methods. This result supports the view of egalitarianism as a preference. Furthermore, its intuitiveness provides welcome reassurance that the laboratory environment of our experiment succeeded in eliciting social preference information from which valid inferences at the more macro-social level might be made.

Interestingly, the coefficient on risk aversion is also positive, significant at the 1% level, and robust to the introduction of controls. Even if the coefficient is relatively small, considering the scale of the variable (from 0 to 15), the difference between a (very) risk averse and a risk loving subject can reach 10 percentage points. This result is also very stable across methods and it suggests that even when the tax choice has no direct impact on the decision-maker's expected payoff, there may be some correlation between risk aversion and inequality aversion.

¹²Some of these variables are very highly correlated with each other (e.g. political philosophy, attitude toward equality, and attitude toward redistribution; or home area income and socioeconomic status) and when including them together on the right hand side do not add any predictive power. As a consequence, in order to reduce problems of multicollinearity, in each specification we will usually include only one of them. The correlation matrix is included in appendix.

Ethnic background does not seem to have a considerable impact on agents' redistributive choices. The only exception is the relatively surprising result of the African American dummy which, when observations for all methods are pooled together, displays a negative coefficient, significant at the 10% level (column 7). This pattern, however, is essentially driven by the relatively extreme behavior of black males¹³ who chose lower tax rates than other men in all methods, but especially in the Random one (Table 11)¹⁴. Considering the relatively small number of African-American subjects included in our sample, this result should be treated with caution.

Subjects' preferred level of redistribution is also correlated with the number of economics courses attended. In fact, the coefficient is negative (-0.008) and significant, but only at the 10% level. This result is essentially driven by tax choices for the Random and Tetris methods. For the other methods the relationship is unclear.

Turning to the income variable, this shows a negative and statistically significant coefficient (at the 10 % level). This result, however, is not homogenous across methods. In fact, income is highly correlated with tax choices in the Where From method (Table 12), but has no predictive power for the other methods. A similar pattern holds for socioeconomic status, which is significant only in the Where From and the Quiz methods (Table 12). The interpretation of this result is not so straightforward, since there is no clear-cut prediction of the relationship between socioeconomic background and redistributive preferences under the "outside observer" condition. One possible interpretation, however, is that individuals with high socioeconomic background may carry a self-interested aversion to redistribution over into this quite different context. Even when the motive of direct self-interest is absent, they may still express this aversion when earnings are determined according to family background (in terms of income or educational attainment). Similarly, it might be the case that agents display some form of solidarity towards other participants with similar socioeconomic status, and are hence reluctant to tax earnings based on those characteristics.

With regard to the fairness issue, we now test whether there are any significant differences in tax rates across methods. One way to do so is by running the same regression presented in Table 10 but including a method dummy variable. In the second column of Table 13 we follow this procedure for both Tetris and Quiz methods. Both coefficients turn out to be large, negative, and highly significant, suggesting that, all things being equal, subjects chose lower redistribution in Tetris and Quiz methods compared to Random and Where From. This finding supports the view

¹³In fact, a deeper analysis reveals a considerable difference between African American female and male subjects (see Table 17). When the African-American dummy is interacted with the gender dummy, the coefficient on the interaction term is positive, very large (0.233), and statically significant at the 1% level, while the coefficient on the African American dummy becomes even more negative (-0.188) and highly significant. This suggests very different levels of support for redistribution between African American men and women, with females choosing much higher taxation than their non-black counterparts, and males considerably less redistribution than men with other ethnic background.

¹⁴Similarly, Asian males tended to choose higher tax rates in the Random method than both non-Asian men and Asian women. Hispanic subjects (both men and women) chose on average higher tax rates in the Where From method (see table 18).

that, in large communities, aversion to inequality and demand for redistribution may crucially depend on agents' beliefs about what causes one to be rich or poor, and, in general, about how fair is the process that generates income distribution.

In order to test differences in attitudes toward fairness between men and women, in column 4 we interact a dummy Tetris-Quiz (which equals 1 for Tetris and Quiz tax choices and 0 for the other methods) with the gender dummy. When we do so, the interaction term is large (0.105), positive, and highly significant (1% level). At the same time, the coefficient on Tetris-Quiz increases from -0.097 to -0.145 and, interestingly, the coefficient on female gets smaller (going from 0.087 to 0.034) and statistically insignificant¹⁵. According to this result, the difference in tax choice under the Random and Where From versus the Quiz and Tetris methods is much larger for men than for women (14.5 compared to 4 percentage points).

In the following column we interact the gender dummy with both tax cost and efficiency loss, in order to test whether men and women's choices respond differently to changes in these parameters. Here too, the result supports that previously predicted: both terms are positive and relatively large, suggesting that women's choices vary less than men's when taxation is more costly or inefficient. However, only the interaction between the female dummy and efficiency loss is statistically significant (10% level). Consistent with this, when interactions are included, the tax cost and the efficiency loss coefficients increase (from -0.105 to -0.127, and from -0.063 to -0.096, respectively), and the effect of the gender dummy disappears.

To summarize, the econometric results support the view that much of the difference between men and women's attitudes towards redistribution reflects differences in their perception of fairness and entitlement, in their concern for aggregate efficiency, and, to a lesser extent, in their willingness to pay for more equality¹⁶.

Finally, to test if subjects' willingness to pay for redistribution and concern for efficiency varies across methods, in the last column of Table 13 we interact both tax cost and efficiency loss with a Tetris-Quiz dummy. As expected, both terms are positive, although only the coefficient on the interaction between tax cost and Tetris-Quiz is sizable (0.074) and statistically significant (10% level). Furthermore, when interactions are included, the coefficients on tax cost and efficiency loss increase even more¹⁷. This finding confirms that which was previously anticipated, that the rise in

¹⁵The same result is obtained when running separate regressions including only the observations from the Random and Where From methods, and the Tetris and Quiz methods, respectively (see Table 20). When the Random-Where From sample is considered, the coefficient on the gender dummy is small and insignificant. With the Tetris-Quiz sample, by contrast, female dummy has a positive, large (.150), and highly significant coefficient.

¹⁶Again, the same result is obtained when running separate regressions for male and female samples (Table 21). The coefficient on tax cost in the regression for women is larger than the one in the regression for men (-0.096 and -0.122 respectively). Even clearer is the result for efficiency loss, which displays a large, negative, and highly significant coefficient in the regression for male subjects, but is almost 0 and non-significant in the corresponding regression for women.

¹⁷The same result is obtained when running separate regressions only for the observations from the Random and

tax cost is likely to have a large negative impact on redistributive choices when pre-tax earnings are assigned randomly or in accordance with family background.

4.2 The "involved observer" scenario: Part II

In Part II of the experiment respondents were invited to select a tax rate for each of the four earnings assignment methods, knowing that if selected, their preferred tax would be applied to the earning distribution among twenty participants, including themselves. When making their choice, individuals were uncertain about which position they would eventually occupy in the distribution of payoffs.

When directly affected by redistribution, agents' choice is influenced by obvious self-interest considerations. In fact, based on the self-assessment of their qualities and background, subjects would form a more or less accurate expectation of their possible ranking, and would take this into account when deciding how much to redistribute. If confident enough about their guess, subjects with relatively high (low) expected rank would have an interest in choosing a low (high) tax rate. Presumably, as in Part I, individual tax choice would also reflect agents' social preferences and aversion to inequality.

Before turning to the crucial question of how expectations about one's future position in society affect demand for redistribution, we will first address another important question. When individuals have uniform information about their future relative position in the distribution of resources, does their demand for redistribution differ when they are directly affected by the decision? In other words, does individual distributional judgment vary with the position of the decision-maker ("detached" versus "involved" observer)?

This issue has been extensively investigated in the literature (Vickrey, 1945; Harsanyi 1953, 1955, 1977, 1978) but has received limited empirical scrutiny (Amiel, Cowell, and Gaertner, 2006 is one example), probably due to the practical difficulty of disentangling the effect of involvement from other competing forces. Our experimental design provides us with the opportunity to explore this question, by comparing tax choices in Part I and those in Part II when pre-tax earnings are determined randomly. In fact, whereas decision in Part I can be seen as example of the outside observer condition, Part 2 under random assignment constitutes a choice behind 'a veil of ignorance,' since all participants have an equal probability of occupying each of the twenty possible positions¹⁸.

Where From methods, and the Tetris and Quiz methods respectively (presented in table 20).

In fact, the coefficient on tax cost in the Random-Where From regression is almost twice the coefficient in the Tetris-Quiz regression (-0.136 and -0.075 respectively). Similarly, the coefficient on efficiency loss is -0.079 (significant at the 5% level) in the Random-Where From regression, and only -0.046 (significant at the 10 level) for the Tetris-Quiz sample.

¹⁸According to Harsanyi's own words (1953, p.435), a value judgment on the distribution of income is truly

Do we observe any significant difference in tax choices for the Random method when subjects are involved and when they are not?

Table 16 shows the average tax rates for the Random method in Part I and II, for different groups, under different tax costs and efficiency settings. Regardless of what sub sample we consider, we see that, on average, agents tend to choose higher tax rates under the "involved observer" condition. The average difference between Part I and II is fairly heterogeneous across ethnic, income, and ideological groups, but usually ranges between 3 and 7 percentage points.

The first regression in Table 17 supports this result. When Random tax choice for Part I and II are pooled together (670 observations) and a dummy for Part II is included in the standard specification, this has a positive and statistically significant coefficient (at the 5% level). The magnitude of the coefficient suggests that, on average, participants chose a tax rate about 5 percentage points higher when directly affected by redistribution. A very similar result is obtained using a Tobit regression model censored at 0 and 1¹⁹.

One potential explanation has to do with an "insurance motive" and the role of risk aversion, since uncertainty, combined with involvement, could lead risk-averse subjects to support higher redistribution. According to this argument, we would expect to see a positive correlation between risk-aversion and tax choices in Part II. However, when interacting our measure of risk aversion with the dummy for Part II (Table 17, column 2), the coefficient is negligible and statistically insignificant. We find the same result when using our alternative measure of risk aversion, and when estimating a Tobit regression model. However, we want to be very careful in emphasizing this result since it could be partly due to potential problems/shortcomings with the construction of our measures of risk aversion. To summarize, our analysis provides new evidence that involvement has indeed an impact on agents' propensity to redistribute; however the question of whether is risk aversion or some other factor which is driving this result remains open.

We now go back to the issue of whether, and to what extent, demand for redistribution is influenced by the expectation about what position one will occupy in society in the future. We can address this question by looking at the difference between choices in Part I and part II for methods other than the Random one.

At first glance, average tax rates for the three other methods seem very similar between Part I and Part II (Table 19).

For the Where From method, for example, the average tax in Part I and II are essentially the same (about 45.1%); for the Tetris method the difference is less than 1 percentage point (37.7% in

impersonal "if the evaluating person had exactly the same chance of obtaining the first position (corresponding to the highest income) or the second or the third, etc., up to the last position (corresponding to the lowest income) available within that scheme".

¹⁹Amiel and his coauthors use different subject pools (in Germany, the UK and Israel) and find contrasting evidence. Our result is consistent with their findings for the Israeli sample, but contrasts with the results for the Germany and the UK. Unlike Amiel et al., we do not find significant differences in females' and males' choices.

Part I, 36.8% in Part II), and for the Quiz method about 2.6% (37.3% in Part I against 39.9% in Part II). However, this result masks important variations at the individual level. In fact, almost a half of the subject population changes their preferred tax choice in Part II relatively to Part I, although these changes are generally small. This pattern holds for all methods, with a slight tendency for larger changes in the Where From method. The proportion of participants who choose a higher tax is similar to the share of those choosing a lower tax, both ranging around 20%.

Interestingly, as depicted in the first two columns of Table 20, many of the results discussed in Part I continue to hold in Part II. In particular, average tax rates decrease with tax cost and efficiency loss; female, liberal, and more risk averse individuals tend to choose more redistribution than male, conservative and less risk averse subjects. Both income and socioeconomic status continue to be negatively correlated with preferred tax rates.

As in Part I, also in Part II subjects support more redistribution when pre-tax earnings are determined according to the Where From method (average tax: 45.1%), than when performances in Tetris (36.7%) and quiz (39.8%) are used. Again, this difference is very marked for men, and almost negligible for women (Figures 10 and 11).

Before making their tax choice and performing the tasks, participants were asked to predict their ranking in each of the three methods (we did not ask this question for the Random method) and to report how confident they were about their guess²⁰.

In what follows, we will use participants' self-reported expected ranking to represent their personal interest in a higher or a lower tax in Part II. Intuitively, the higher (lower) an individual expect to rank, the lower tax he should be expected to chose, *ceteris paribus*. On the other hand, for any given expected rank, the more confident an individual is about his guess (hence the more skewed the distribution of his beliefs about his future position), the stronger should be the effect of his expected rank on his tax choice. The expected rank measure works fairly well in predicting participants' actual rank. The pair wise correlation between expected and actual rank is positive and significant at 1% level. Interestingly, the magnitude of the correlation coefficient varies considerably across methods (0.569 in the Where From, 0.258 in the Quiz method, and 0.174 in the Tetris). Evidently, people are more accurate in predicting how they will rank among twenty other unknown individuals with regard to something they know relatively well (the relative socioeconomic standing of their home community) than with respect to the performance in a particular game, or in a quiz they do not know much about (they make their guess before learning details about the games). More importantly for the current analysis, besides being actually more accurate in their prediction, participants also feel more confident about their guess in the Where

²⁰With regard to the expected rank participants could select one of the following options: "Positions 1 – 2" (where 1 is the highest income); "Positions 3 – 5"; "Positions 6 – 8"; "Positions 9 – 11"; "Positions 12-14"; "Positions 15 – 17"; "Positions 18 – 20". With regard to the level of confidence, three options were: "Very confident"; "Somewhat confident"; "Not at all confident".

From method. Indeed, when asked how confident they felt about their guess, subjects reported that they felt “very confident” in almost 30% of the cases in the Where From method, versus 15.2% in the Tetris and only 12.8% in the Quiz method.

We test the effect of expected rank on redistributive choices in Part II by running an OLS regression using Part II observations, and including expected rank in our usual specification (Table 20). As predicted, the coefficient on expected rank in Part II regression is positive, large and statistically significant (the worse one expects to rank, the higher his preferred tax rate). Furthermore, when expected rank is controlled for, both income and socioeconomic status become insignificant (column 2) and can be excluded without loss of explanatory power (column 3). The fact that the R-squared rises from .13 in column 1 to .31 in columns 2 and 3 suggests that more than half of the variance in tax choices that we can explain, in Part II, can be attributed to the perceived self-interest of the decision-makers. To further explore the impact of expected rank, we also estimate the same regression for Part I (Table 21) with this variable included. Interestingly we find that expected rank is also significantly correlated with tax choice in Part I, when expectation about future rank is irrelevant to any self-interest motive. Again, due to the high correlation between expected rank in the Where From method and socioeconomic background, when expected rank is included in the regression income and socioeconomic status has no significance.

Why, even when redistribution has no direct effect on their own payoff, are people tax choices affected by their expected rank?

One possible interpretation is that individuals may exhibit some solidarity towards subjects with similar prospects. In other words, if I expect to perform poorly in the quiz game (which is going to be reflected in my self-reported expected rank) I may tend to identify with other subjects who will end up in lower ranks and, hence, support higher redistribution, even if I am not going to benefit from it. Conversely, if I believe I have good chances in Tetris, I may be reluctant to impose high taxes on those who are good and will probably rank high.

What is important is that the expected rank has a stronger impact on individual tax choice when redistribution affects the decision-maker directly. In fact, the coefficient on expected rank is 0.036 in the regression for Part II, and only 0.023 in the regression for Part I. Furthermore, when expected rank is included in the regression for Part II, the R-square raises from .13 in column 1 to .31, against a rise from of only 80% for Part I regression. Hence, a higher (lower) expected rank induces individuals to support more (less) redistribution under both conditions, but especially in Part II²¹. For example, a person who expects to occupy the first two positions would select, on average, a tax rate about 40% higher than someone expecting to rank among the last three in Part II, and about 63% more in Part II.

²¹We obtain the same result when pooling together observations from Part I and II. The interaction term between expected rank and a dummy variable for Part II is positive and highly significant (Table 22, column 1). A similar result is obtained when instrumenting expected rank with actual rank (Table 22, column 2)

This result is consistent with the distribution of responses in Part I and II (Figure 12 and 13) and supports the view that the prospect of higher income has a powerful influence on people support for redistribution, and that individuals tax choices are more polarized when they are directly affected by redistribution than when they are not. Figure 14 provides a graphical representation of this result based on the regression coefficients.

Overall, when there is uncertainty, this tendency towards increased polarization is not very strong. Interestingly, however, the effect is larger when agents are more confident in their guess, as is the case with the Where From method. When we run separate regressions for the different methods using Part II observations (Table 23), the coefficient on expected rank is larger for the Where From (0.042) method than for Tetris (0.032) and Quiz (0.021)²². Furthermore, when expected rank is controlled for, the R-square in the Part II regression increases much more in the Where From than in the Tetris and Quiz methods (respectively from 0.07 to 0.41, from 0.15 to 0.30, and from 0.15 to 0.21).

4.3 The "involved observer" under perfect information: Part III

The revised decision in Part III, presents a pure opportunity for the expression of self-interest, since it is made after learning of one's precise rank in each of the four methods of earnings assignment.²³ Risk aversion has no direct relevance, and a purely self-interested subject should choose either a 100% tax or a 0% tax, depending on his revealed rank under the particular earnings method. Deviation towards redistribution by those whose earnings would be maximized by a 0% tax must reflect concern for lower earners or a preference for equality. By contrast, downward deviations by subjects whose self-interest favors a 100% tax could be motivated by a belief that the higher incomes are rightfully earned or deserved or by some other source of reluctance to alter the unequal earnings pattern.

Overall, 147 subjects in 7 experimental sessions were offered the opportunity to revise their initial tax choice in each of the four methods (for a total of 588 observations). In addition to the usual tax cost, when revising their preferred tax, individuals took into account their potential additional payoff from redistribution. This was positive, if their ranking was such that they would benefit from taxation, or negative, if they were net losers. However, since the exact cut-off point between those who benefit and those who lose from redistribution depended on the efficiency loss and the tax cost²⁴, for each subject we calculated the tax rate that would maximize individual

²²We obtain the same result when pooling together observations for all three methods for Part I and II (Figure 22, column 3).

²³Unlike some previous studies (e.g. Herne, Suojanen, 2004) in our experiment participants are not allowed to communicate after having learned their actual position in the distribution.

²⁴In sessions with no efficiency loss, for example, redistribution harms the decisive individual if he is ranked between the 1st and the 7th position, when tax cost is zero, the 1st and the 8th position, when tax cost is \$0.25, the 1st and 12th position when tax cost is \$1. The cut-off point is between the 14th and the 15th position when efficiency loss is 12.5% and tax cost is \$1, between the 9th and the 10th position when efficiency loss is 25% and

earnings under each assignment method (0% or 100%), taking into account the effects of both parameters.

Agents had no difficulty in recognizing and pursuing what was in their interest. Nonetheless, about one third of subjects (34.2%) chose a tax rate that did not maximize their own earnings.²⁵ There were proportionally slightly more deviations toward more redistribution (35.3% of those with income-maximizing tax of 0%) than toward less redistribution (33.2% of those with income-maximizing tax of 100%). The average deviation was also higher among those with income maximizing tax of 0% (+ 19.6 %), than among those with income-maximizing tax of 100% (-17.5%). In both cases, most of the deviations from the earnings-maximizing tax were not very large.²⁶ Nevertheless, in 52 cases (25.8% of the total deviations), subjects decided to deviate a full 100% from what was in their self-interest.²⁷

Even among subjects with the same income-maximizing tax, the cost of deviating varied significantly depending on the actual rank. Intuitively, the cost or redistribution in terms of foregone earnings for someone at the top of the ranking is higher than for someone ranked 2nd, and so on. To account for this, we calculated the net cost of a 10% deviation based on the actual vector of payoffs and the tax cost parameter in each experimental session. For example, someone ranked 1st in a session with zero efficiency loss and \$1 tax cost, would sacrifice about \$9 of his potential payoff per each additional 10% tax he would impose if selected to be decisive. By contrast, in the same session, someone ranked 9th would still have a positive incentive to choose a zero tax, but deviation would only cost him about 65 cents per 10% tax. Similarly, for subjects who would potentially benefit from redistribution, low ranked participants had a much greater incentive to choose a 100% tax than subject ranked toward the middle.

We first analyze the redistributive choices of those individual who, given their revealed ranking, should support zero redistribution (net losers from redistribution). Figure 15 reports the distribution of the average deviation from the 0% income-maximizing tax by the total cost of deviation. As expected, pro-redistribution deviations from self-interest are decreasing in the cost of deviating, the distribution being approximated fairly well by a quadratic form. When their position in the pre-tax earnings distribution is high and deviating is very costly in terms of foregone earnings, subjects choose a tax rate very close to 0. However, when deviating from the purely selfish option becomes sufficiently cheap, individuals tend to support higher levels of redistribution and their choices are much more responsive to small variations in the cost of taxation.²⁸ This pattern

taxcost is \$0 and between the 11th and the 12th position when efficiency loss is 25% and taxcost is \$0.25

²⁵This proportion is high compared with the findings of previous similar experiments involving no income uncertainty and no strategic considerations, such as Rutstrom and Williams (2000).

²⁶In 37.8% of the cases the absolute difference between actual tax choice and earnings-maximizing tax was between 10% and 30%; in 25.9% of the cases between 40% and 60%; and in about 10% of the cases between 70% and 90%.

²⁷Of the 52 full deviations, 31 were deviations upward to 100%, while 21 were deviations downward to 0%

²⁸When the net cost of taxation is between \$0 and 1\$ per 10%, the average tax rate is 37%, close to the average

is intuitive and certainly reassuring of the fact that subjects had a good understanding of the experiment and a relatively clear perception of the incentives they faced.

How do preferences for equality affect individuals' redistributive choices when uncertainty is resolved? In principle we would expect individuals with more egalitarian views to be more inclined than others to deviate from the purely self-interested zero tax choice.

One possible way to test this prediction is by using the tax rate chosen by the same individual for the same method under the "outside observer" condition (Part I) as a indicator of his genuine "uninterested" attitude toward equality. In Figure 16 we present the distribution of Part III tax choice by cost of deviation separately for individuals who had selected a high tax rate in Part I (50% or higher), and for those who had chosen a low tax (less than 50%). The relationship between Part III tax choices and cost of deviation has a similar form/shape for both groups. However, individuals who selected higher taxes in Part I tend to deviate relatively more than others from the 0% earning-maximizing tax in Part III, for any level of the cost of deviation.

Table 24 shows a series of regression equations which explain Part III tax choice as a function of the cost of deviation and Part I tax choice. In column (1), only deviation cost is included. It obtains a highly significant negative coefficient but explains only 9% of the variance in the dependent variable. Column (2) shows that a quadratic specification captures considerably more of the variance: both the linear and square terms for cost of deviation obtain significant coefficients, and the R-squared rises to 20%. Column (3) shows that, as predicted, the explanatory power of the model increases significantly when Part I tax choice is included in the regression. The R-square rises from .197 to .254 and the coefficient on Part I tax is positive, large and highly significant.

To check that the preferences for equality as assessed in Part I affects in a similar fashion individuals facing high and low cost of deviation, we also interact cost of deviation with Part I tax choice. The qualitative results remain unchanged and the coefficient on the interaction term is statistically insignificant, which confirm that the deviation from self-interest in Part III is highly correlated with Part III tax choice, regardless of the cost of deviation. Nevertheless, the coefficient on the interaction term is negative, consistent with the expectation that preferences for equality receive less weight when they are more costly to indulge, and about 1% is added to the explained variance. That preferences for a more equal distribution matter when individuals have perfect information about their relative position in the community of participants is also confirmed by the regression in Table 25. When the usual set of personal characteristics are included on the right hand side, the R-square increases from .20 to .24. Furthermore, both the coefficients on gender and political philosophy – the two most important predictors of attitude toward redistribution in the previous sections – have the expected positive sign, although only political philosophy is statistically significant at the 5% level.

tax choice in Part I (42.3%).

We now turn to those subjects who, based on their revealed rank, would profit from redistribution (the net winners) and should hence choose complete equalization to maximize their post-tax experimental earnings. As expected, the large majority of these individuals (about three quarters) selected a very high tax rate (70% or higher), and about two thirds chose to fully equalize earnings (average tax rate 82.5%, standard deviation .30). Figure 17 reports the distribution of average tax rates by cost of deviation from a 100% tax which, for these subjects, ranged between \$0 and \$2. Interestingly, the pattern of tax choices is relatively stable, and we do not observe a tendency toward higher taxation when deviating from 100% tax means a larger loss in terms of foregone payoffs.

On the other hand, a number of those who would benefit from full equalization deviate from the 100% earning-maximizing tax and display some reluctance to completely eliminate pre-tax differences.

Again, we use Part I tax choices to investigate how preferences for equality affect redistributive choices when subjects are certain about their position in the pre-tax earning distribution. Figure 18 reports Part III tax choices for subjects having chosen high and low taxation under the "outside observer" condition. The relationship between preferred tax rate and the cost of deviation is similar for both groups. However, subjects who supported a less egalitarian distribution in Part I tend to choose a lower tax rate also in Part III, and this for any level of cost.

The regressions in Table 26 seem to support these conclusions. Unlike in the regression for the net losers, when only observations with 100% earning-maximizing tax are considered, the cost of deviation has a coefficient close to zero and statistically insignificant, and the model explains only a negligible part of the variance in the dependent variable. The result is unchanged when the square of the cost term is also included on the right-hand side. In column 3 we include Part I tax as an explanatory variable. The coefficient has the expected sign and is large and statistically significant. This suggests that fairness preferences are playing a part here: in this case, some subjects, under some methods, believe that full equalization of payouts is unfair, even though it benefits them personally. The R-square increases but nevertheless remains very low.

Further and deeper analysis of Part III responses remains to be done in order to better understand what drives redistributive decisions when individuals have no uncertainty about their position in the pre-tax distribution. Nevertheless, according to the preliminary evidence presented above, the maximization of their own experimental payoff appears to be the most important force governing participants' choices. As expected, in fact, individuals at the lower end of the distribution support very high taxation while those at the higher end oppose redistribution. Nevertheless, even in this context of marked polarization, preferences for equality, or beliefs in the fairness of an unequal distribution, continue to play a role in determining to what extent that one-third of subjects who do so deviate from the purely self-interested alternative.

5 Conclusions

What is the relative importance of social preferences for equality as opposed to other forces such as self-interest and risk aversion in determining support for redistribution at the societal level? Does demand for redistribution vary with the perception of whether earnings are ‘deserved’ or not?

Our contribution addresses these two fundamental issues by presenting the results of a set of experiments involving large groups in which subjects were asked to choose what level of redistribution to implement among participants under different decision conditions, and when different methods were used to determine the initial distribution of earnings.

According to our results, a large majority of subjects are willing to sacrifice a significant fraction of their anticipated payoffs in order to realize a more equal distribution among the other twenty participants. The demand for redistribution is responsive to the cost of taxation incurred by the decision maker. However, the relationship is discontinuous: the supported level of taxation is fairly inelastic for low and intermediate levels of tax cost, but displays a sharp decline when redistribution becomes relatively costly²⁹. When making their redistributive choices, participants also seem to be concerned with aggregate inefficiency, even when this does not directly impact their expected payoff. In fact, the demand for redistribution decreases when taxation generates a larger dead-weight loss. However, for the values considered, this effect is large only when taxation is associated with a 25% dead-weight loss.

We also find evidence that personal characteristics such as gender, socio-economic status, risk aversion, political self-identification, and the number of economics courses taken have a significant effect on participants’ redistributive choices. In particular, women appear to choose systematically higher tax levels than men. Furthermore, their choices tend to vary less with changes in the private cost of taxation and in the dead-weight loss associated with redistribution.

With regard to the fairness perception, intra-subject comparisons show that participants tend to choose significantly higher levels of taxation when pre-tax earnings are determined either randomly, or according to socio-economic background, rather than on the basis of the performances in some simple games, which are perceived as relatively fairer mechanisms of resource allocation. Interestingly, this trend is much more evident among men than among women, whose choices appear to be less sensitive to the perception of ‘entitlement’.

Finally, comparisons between redistributive choices made under different ‘original positions’ provide interesting insights with regard to the effect of both involvement and uncertainty on individual demand for redistribution. Our subjects tended to chose higher taxation when they were

²⁹In a subsequent version, we plan to extend our analysis of the impact of tax cost on demand for redistribution by estimating the elasticity of demand for redistribution using both Part I decisions and the decisions of net losers from taxation in Part III.

an affected party in the redistributive process than when they were acting as outside observers. When choosing under uncertainty individuals' expectation about their future position in the income distribution has a considerable impact on their tax choices. When sure of the effect on their own earnings, subjects' tax choices are primarily governed by self-interest, but preferences for equality and beliefs in the fairness of earned inequalities continue to play a role for at least a third of subjects³⁰.

³⁰We hope to provide a more integrated quantitative assessment of the relative importance of social preference versus self-interest factors in our subjects' choices in a later version of the paper. We also plan to use a social welfare function to determine what levels of redistribution maximize subjects' aggregate utilities under the various income-determination methods, and we will compare preferred redistribution levels to those observed in a range of OECD member countries.

Table 1. U.S. Individual Income Distribution, and Possible Experiment Earnings

Twentieth/Rank	Income	Earning
1	\$157,423	\$100.00
2	\$72,488	\$46.05
3	\$57,538	\$36.55
4	\$48,516	\$30.82
5	\$41,776	\$26.54
6	\$36,697	\$23.31
7	\$32,458	\$20.62
8	\$28,991	\$18.42
9	\$25,637	\$16.29
10	\$22,795	\$14.48
11	\$20,028	\$12.72
12	\$17,525	\$11.13
13	\$15,052	\$9.56
14	\$12,818	\$8.14
15	\$10,715	\$6.81
16	\$8,699	\$5.53
17	\$6,792	\$4.31
18	\$4,878	\$3.10
19	\$2,383	\$1.51
20	\$166	\$0.11

Table 2. Part I subjects' earnings under different tax rates (for the case of efficiency loss=0%)

Rank	t=0	t=0.1	t=0.2	t=0.3	t=0.4	t=0.5	t=0.6	t=0.7	t=0.8	t=0.9	t=1
1	100	91.98	83.96	75.94	67.92	59.9	51.88	43.86	35.84	27.82	19.8
2	46.05	43.42	40.8	38.17	35.55	32.92	30.3	27.67	25.05	22.42	19.8
3	36.55	34.87	33.2	31.52	29.85	28.17	26.5	24.82	23.15	21.47	19.8
4	30.82	29.72	28.61	27.51	26.41	25.31	24.21	23.11	22	20.9	19.8
5	26.54	25.86	25.19	24.52	23.84	23.17	22.49	21.82	21.15	20.47	19.8
6	23.31	22.96	22.61	22.26	21.91	21.56	21.2	20.85	20.5	20.15	19.8
7	20.62	20.54	20.45	20.37	20.29	20.21	20.13	20.05	19.96	19.88	19.8
8	18.42	18.55	18.69	18.83	18.97	19.11	19.25	19.38	19.52	19.66	19.8
9	16.29	16.64	16.99	17.34	17.69	18.04	18.39	18.75	19.1	19.45	19.8
10	14.48	15.01	15.54	16.08	16.61	17.14	17.67	18.2	18.74	19.27	19.8
11	12.72	13.43	14.14	14.85	15.55	16.26	16.97	17.68	18.38	19.09	19.8
12	11.13	12	12.87	13.73	14.6	15.47	16.33	17.2	18.07	18.93	19.8
13	9.56	10.59	11.61	12.63	13.66	14.68	15.7	16.73	17.75	18.78	19.8
14	8.14	9.31	10.47	11.64	12.81	13.97	15.14	16.3	17.47	18.63	19.8
15	6.81	8.11	9.41	10.7	12	13.3	14.6	15.9	17.2	18.5	19.8
16	5.53	6.95	8.38	9.81	11.24	12.66	14.09	15.52	16.95	18.37	19.8
17	4.31	5.86	7.41	8.96	10.51	12.06	13.61	15.15	16.7	18.25	19.8
18	3.1	4.77	6.44	8.11	9.78	11.45	13.12	14.79	16.46	18.13	19.8
19	1.51	3.34	5.17	7	8.83	10.66	12.49	14.31	16.14	17.97	19.8
20	0.11	2.07	4.04	6.01	7.98	9.95	11.92	13.89	15.86	17.83	19.8

Table 3. Sequence of the Experimental Session

<ul style="list-style-type: none"> • Part I - Instructions • Part I - Comprehension test • Part I - Decision stage • Part II - Instructions • Part II - Comprehension test • Part II - Pre-decision stage (forecast) • Part II - Decision stage • Quiz • Tetris training • Tetris game • Experimental condition draw (#1 or #2) 	<p>if Part II is selected:</p> <ul style="list-style-type: none"> - Provisional earning summary - Tax revision (Part III) • Method determination (Random, WF, Quiz, Tetris) • Decisive individual drawing • Risk aversion test • Background questions • Final earnings summary
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Table 4. Experimental Sessions and Subjects by Tax Cost and Dead Weight Loss

		Tax Cost				
		\$0	\$0.25	\$0.50	\$1	Total
Dead Weight Loss	0%	2 (42)	2 (42)	2 (42)	2 (42)	8 (168)
	1.25%	1 (21)	1 (21)	1 (20)	1 (21)	4 (83)
	2.50%	1 (21)	1 (21)	1 (21)	1 (21)	4 (84)
	Total	4(84)	4(84)	4(83)	4(84)	16 (336)

Table 5. Part I Tax Choices by Tax Cost

All (16 sessions, 335 subjects, 1340 observations)		
Tax Rate	# Choices	%
t = 0	316	23.6%
t ≥ 10%	1024	76.4%
t ≥ 50%	592	44.2%
t = 100%	187	14.0%
Mean Tax = 42.4% (s.d. = 35.0%)		
Tax Cost > \$0 (12 sessions, 251 subjects, 1004 observations)		
Tax Rate	# Choices	%
t = 0	247	24.6%
t ≥ 10%	757	75.4%
t ≥ 50%	426	42.4%
t = 100%	134	13.3%
Mean Tax = 41.4% (s.d. = 35.0%)		
Tax Cost = \$1 (4 sessions, 84 subjects, 336 observations)		
Tax Rate	# Choices	%
t = 0	101	30.1%
t ≥ 10%	2	69.9%
t ≥ 50%	117	34.8%
t = 100%	26	7.7%
Mean Tax = 33.7% (s.d. = 31.9%)		

Figure 1. Part I Average Tax Rate by Tax Cost

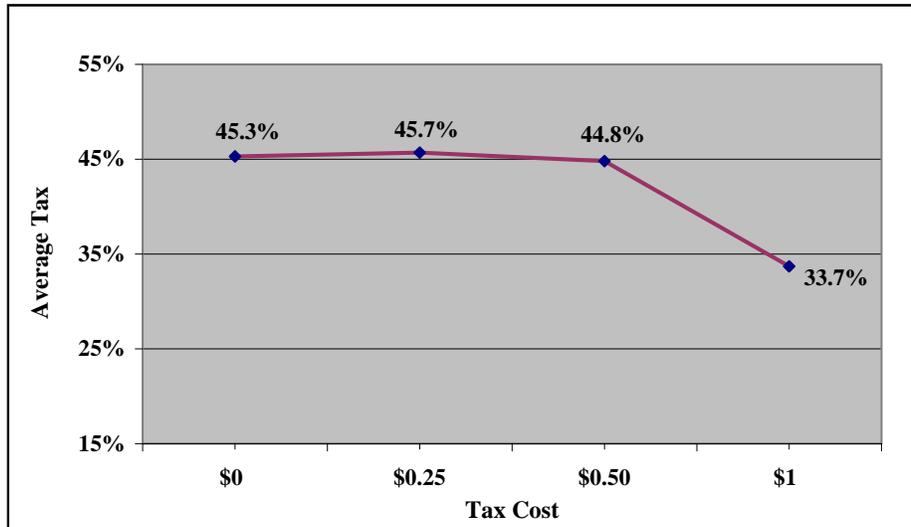


Table 6. Part I Average Tax Rate by Tax Cost and Efficiency Loss

		Tax Cost	
		< \$1	= \$1
Dead Weight Loss	0.0%	47.0%	38.0%
	12.5%	44.6%	40.7%
	25.0%	42.5%	18.0%

Figure 2. Part I Average Tax Rate by Efficiency Loss

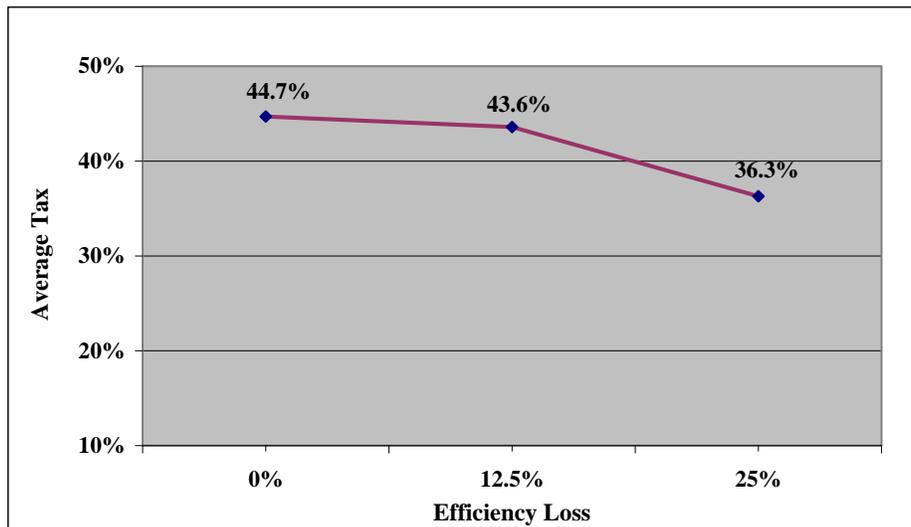


Table 7. Distribution of Tax Choices by Method

	$t = 0$	$t \geq 10\%$	$t \geq 50\%$	$t = 100\%$
Random	20.0%	80.0%	54.9%	19.1%
Where From	24.5%	75.5%	47.5%	19.1%
Tetris	25.7%	74.3%	37.6%	8.4%
Quiz	24.2%	75.8%	36.7%	9.3%

Figure 3. Part I Average Tax Rate by Method

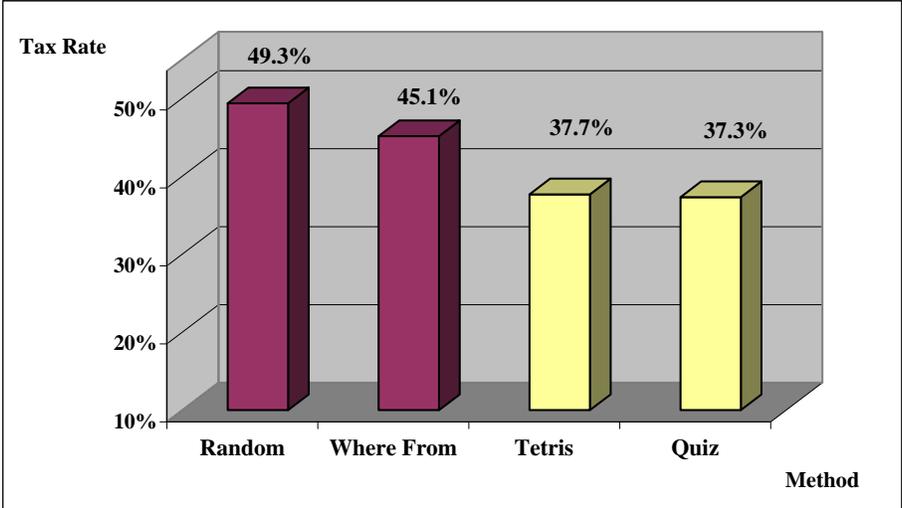


Figure 4. Part I Average Tax Rate by Method and Taxcost

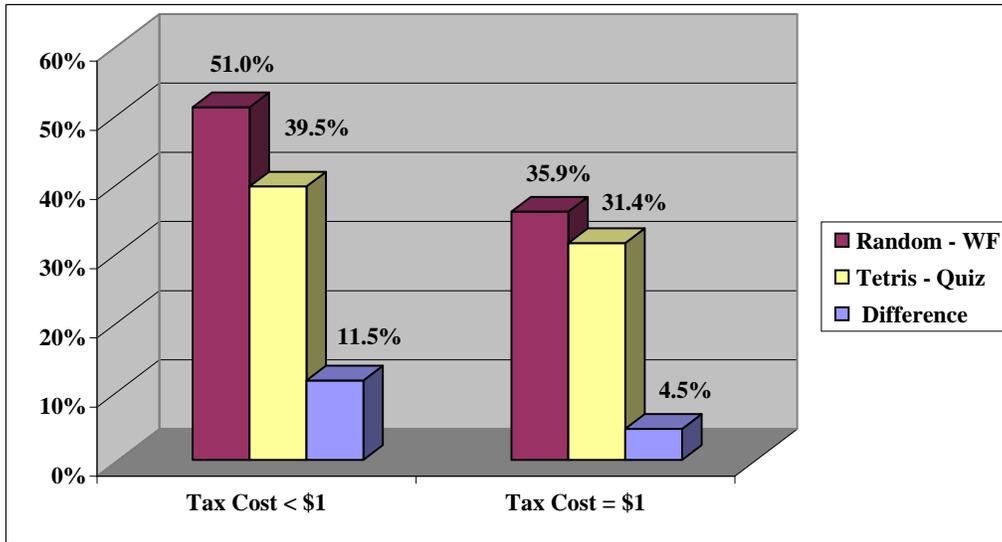


Figure 5. Part I Average Tax Rate by Method and Efficiency Loss

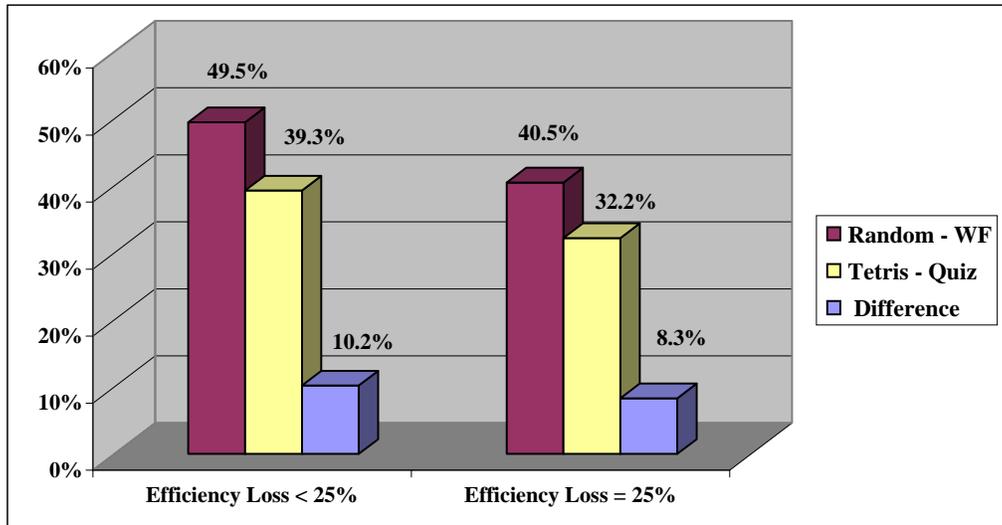


Table 8. Distribution of the participants by personal characteristics

	Subjects	% Subjects
<u>Gender</u>		
Female	151	45.1%
Male	184	54.9%
<u>Ethnic background</u>		
White	213	63.6%
African-American	25	7.5%
Asian	58	17.3%
Hispanic	21	6.3%
<u>Home Area Income</u>		
< \$ 20,000	65	19.4%
\$ 20,000 - \$ 40,000	176	52.5%
\$ 40,000 - \$ 60,000	67	20.0%
> \$ 60,000	27	8.1%
<u>Socioeconomic Status</u>		
Middle-low	43	12.8%
Middle	119	35.5%
Middle-high	173	51.6%
<u>Political Inclination</u>		
Liberal	247	73.7%
Moderate	50	14.9%
Conservative	38	11.3%
<u>Economics Courses</u>		
2 or less	283	84.5%
More than 2	52	15.5%

Table 9. Part I Average Tax Rate by Personal Characteristics

	Mean Tax	St. dev.
<u>Gender</u>		
Female	49.3%	0.334
Male	36.7%	0.350
<u>Ethnic background</u>		
White	42.1%	0.350
African-American	40.0%	0.363
Asian	42.4%	0.345
Hispanic	43.8%	0.342
<u>Home Arean Income</u>		
< \$ 20,000	47.8%	0.372
\$ 20,000 - \$ 40,000	41.8%	0.339
\$ 40,000 - \$ 60,000	39.5%	0.346
> \$ 60,000	39.8%	0.367
<u>Political Inclination</u>		
Liberal	45.2%	0.355
Moderate	36.2%	0.329
Conservative	31.8%	0.310

Figure 6. Part I Average Tax Rate by Gender and Taxcost

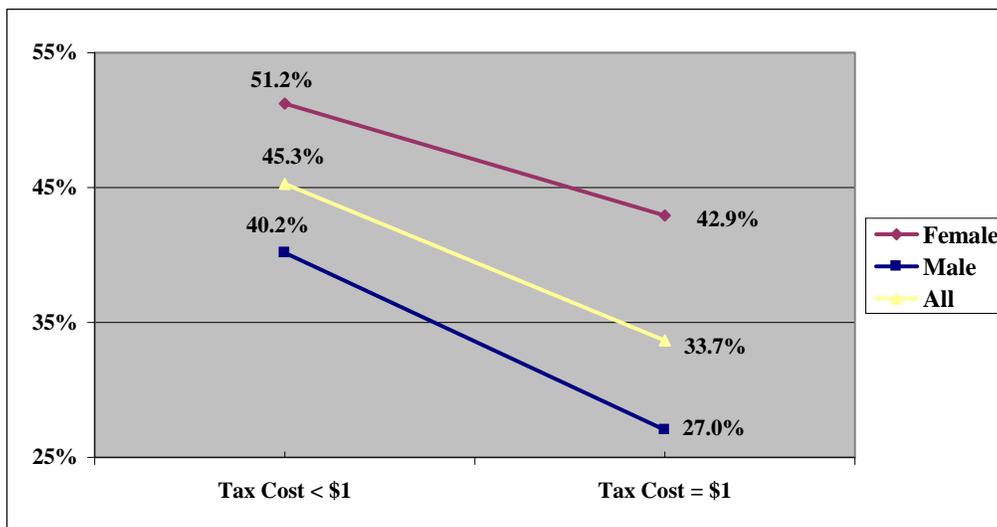


Figure 7. Part I Average Tax Rate by Gender and Efficiency Loss

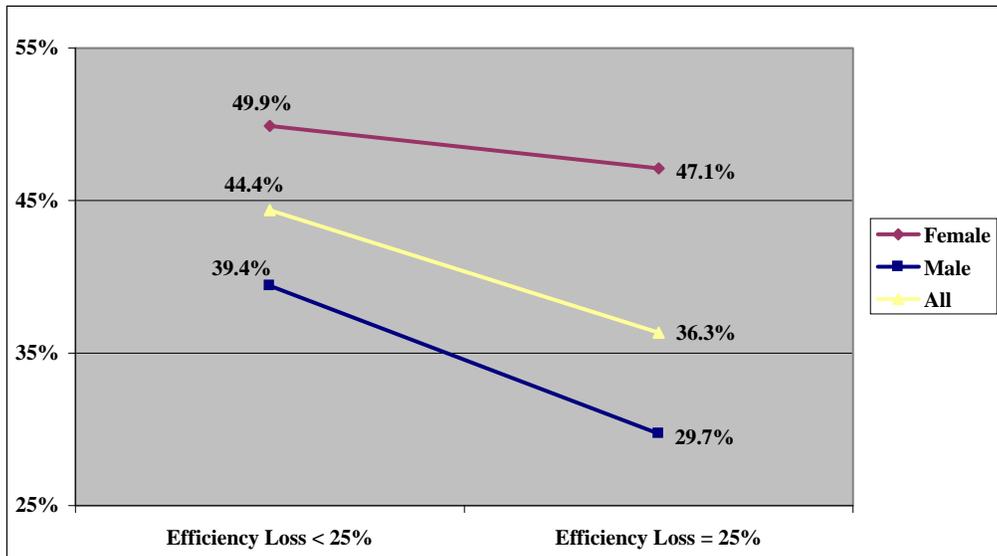


Figure 8. Part I Average Tax Rate by Methods (Males)

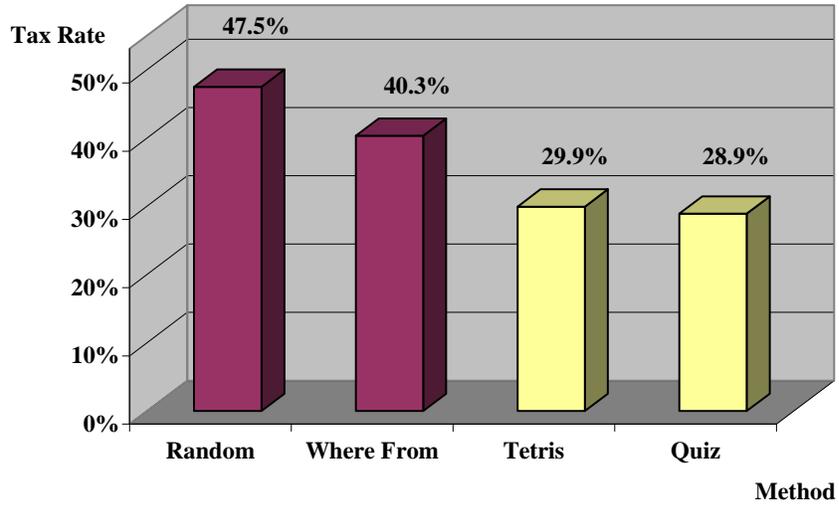


Figure 9. Part I Average Tax Rate by Methods (Females)

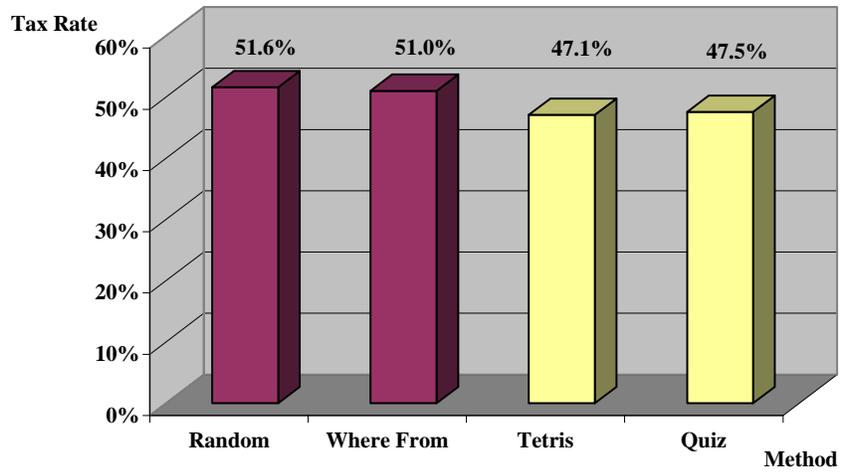


Table 10

Dependent variable: Part I Tax Rate

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Tax Cost	-0.116 [0.022]***	-0.114 [0.022]***	-0.110 [0.021]***	-0.108 [0.022]***	-0.109 [0.022]***	-0.105 [0.022]***	-0.105 [0.022]***
Efficiency Loss	-0.081 [0.022]***	-0.086 [0.022]***	-0.074 [0.022]***	-0.075 [0.022]***	-0.068 [0.022]***	-0.058 [0.022]***	-0.063 [0.022]***
Risk Aversion		0.010 [0.002]***	0.006 [0.002]***	0.007 [0.002]***	0.007 [0.002]***	0.007 [0.002]***	0.007 [0.002]***
Female			0.104 [0.019]***	0.104 [0.019]***	0.097 [0.020]***	0.090 [0.019]***	0.087 [0.019]***
Asian				0.003 [0.025]	-0.013 [0.026]	-0.002 [0.025]	0.001 [0.025]
African American				-0.024 [0.037]	-0.055 [0.038]	-0.062 [0.038]	-0.068 [0.038]*
Hispanic				0.027 [0.039]	-0.001 [0.040]	-0.012 [0.040]	-0.012 [0.040]
Income					-0.023 [0.016]	-0.026 [0.016]*	-0.029 [0.016]*
SES					-0.027 [0.012]**	-0.028 [0.012]**	-0.024 [0.012]**
Political Philosophy						0.037 [0.007]***	0.035 [0.007]***
Economics Courses							-0.008 [0.004]*
Constant	0.473 [0.012]***	0.426 [0.016]***	0.391 [0.018]***	0.389 [0.019]***	0.729 [0.168]***	0.568 [0.169]***	0.610 [0.171]***
Observations	1340	1340	1340	1340	1340	1340	1340
R-squared	0.03	0.04	0.06	0.06	0.07	0.09	0.09

Absolute value of t statistics in brackets

* significant at 10%; ** significant at 5%; *** significant at 1%

Table 11

Dependent variable: Part I Tax Rate

	(1)	(2)
Tax Cost	-0.105 [0.022]***	-0.109 [0.021]***
Efficiency Loss	-0.063 [0.022]***	-0.066 [0.022]***
Risk Aversion	0.007 [0.002]***	0.008 [0.002]***
Female	0.087 [0.019]***	0.067 [0.020]***
Asian	0.001 [0.025]	0.000 [0.025]
African American	-0.068 [0.038]*	-0.188 [0.052]***
Female*Afr. American		0.233 [0.070]***
Hispanic	-0.012 [0.040]	-0.013 [0.039]
Income	-0.029 [0.016]*	-0.030 [0.016]*
SES	-0.024 [0.012]**	-0.023 [0.012]*
Political Philosophy	0.035 [0.007]***	0.036 [0.007]***
Economics Courses	-0.008 [0.004]*	-0.008 [0.004]*
Constant	0.610 [0.170]***	0.620 [0.171]***
Observations	1340	1340
R-squared	0.09	0.1

Absolute value of t statistics in brackets

* significant at 10%; ** significant at 5%; *** significant at 1%

Table 12

Dependent variable: Part I Tax Rate by Method

	Random	Where From	Tetris	Quiz
Tax Cost	-0.159 [0.044]***	-0.112 [0.046]**	-0.079 [0.040]**	-0.071 [0.039]*
Efficiency Loss	-0.088 [0.044]**	-0.069 [0.046]	-0.047 [0.040]	-0.045 [0.039]
Risk Aversion	0.009 [0.005]**	0.007 [0.005]	0.008 [0.004]*	0.004 [0.004]
Female	-0.004 [0.040]	0.049 [0.041]	0.146 [0.036]***	0.154 [0.035]***
Asian	0.091 [0.052]*	-0.062 [0.054]	0.02 [0.047]	-0.046 [0.046]
African American	-0.136 [0.077]*	-0.159 [0.080]**	-0.041 [0.070]	0.065 [0.068]
Hispanic	0.019 [0.080]	0.037 [0.084]	-0.041 [0.073]	-0.064 [0.071]
Income	0.030 [0.032]	-0.146 [0.034]***	0.009 [0.030]	-0.010 [0.029]
SES	-0.007 [0.025]	-0.059 [0.026]**	0.02 [0.023]	-0.051 [0.022]**
Political Philosophy	0.049 [0.015]***	0.036 [0.016]**	0.029 [0.014]**	0.025 [0.013]*
Economics Courses	-0.019 [0.009]**	-0.015 [0.009]	-0.001 [0.008]	0.004 [0.008]
Constant	-0.015 [0.347]	2.001 [0.362]***	-0.01 [0.318]	0.464 [0.307]
Observations	335	335	335	335
R-squared	0.13	0.16	0.11	0.14

Standard errors in brackets

* significant at 10%; ** significant at 5%; *** significant at 1%

Table 13
Dependent variable: Part I Tax Rate

	(1)	(2)	(3)	(4)	(5)	(6)
Tax Cost	-0.105 [0.022]***	-0.105 [0.021]***	-0.105 [0.021]***	-0.105 [0.021]***	-0.127 [0.028]***	-0.164 [0.000]
Efficiency Loss	-0.063 [0.022]***	-0.063 [0.022]***	-0.063 [0.022]***	-0.063 [0.021]***	-0.096 [0.028]***	-0.111 [0.035]***
Female	0.087 [0.019]***	0.087 [0.019]***	0.087 [0.019]***	0.034 [0.026]	0.000 [0.030]	-0.002 [0.030]
Tetris		-0.096 [0.022]***				
Quiz		-0.099 [0.022]***				
Tetris-Quiz			-0.097 [0.018]***	-0.145 [0.024]***	-0.145 [0.024]***	-0.173 [0.029]***
Tetris-Quiz*Female				0.105 [0.036]***	0.105 [0.036]***	0.110 [0.036]***
Female*Tax Cost					0.053 [0.043]	0.053 [0.043]
Female*Efficiency Loss					0.084 [0.043]*	0.084 [0.043]*
Tetris-Quiz*Tax Cost						0.074 [0.042]*
Tetris-Quiz*Efficiency Loss						0.030 [0.042]
Constant	-0.341 [0.169]***	0.659 [0.169]***	0.659 [0.169]***	0.683 [0.169]***	0.692 [0.170]***	0.706 [0.170]***
Observations	1340	1340	1340	1340	1340	1340
R-squared	0.09	0.11	0.11	0.12	0.12	0.12

Standard errors in brackets

* significant at 10%; ** significant at 5%; *** significant at 1%

The following controls are included: risk aversion, ethnic dummies, income, SES, political philosophy, economics courses

Table 14

Dependent variable: Part I Tax Rate - By Methods

	Random-Where From	Tetris-Quiz
Tax Cost	-0.136 [0.032]***	-0.075 [0.028]***
Efficiency Loss	-0.079 [0.032]**	-0.046 [0.028]*
Risk Aversion	0.008 [0.003]**	0.006 [0.003]**
Female	0.023 [0.029]	0.150 [0.025]***
Asian	0.014 [0.038]	-0.013 [0.033]
African American	-0.147 [0.056]***	0.012 [0.049]
Hispanic	0.028 [0.059]	-0.052 [0.051]
Income	-0.058 [0.024]**	-0.001 [0.021]
SES	-0.033 [0.018]*	-0.016 [0.016]
Political Philosophy	0.042 [0.011]***	0.027 [0.010]***
Economics Courses	-0.017 [0.007]**	0.002 [0.006]
Constant	0.993 [0.253]***	0.227 [0.221]
Observations	670	670
R-squared	0.11	0.11

Standard errors in brackets

* significant at 10%; ** significant at 5%; *** significant at 1%

Table 15

Dependent variable: Part I 1 Tax Rate - By Gender

	Males	Females
Tax Cost	-0.122 [0.028]***	-0.096 [0.033]***
Efficiency Loss	-0.096 [0.028]***	-0.006 [0.034]
Risk Aversion	0.006 [0.004]*	0.008 [0.003]**
Asian	0.027 [0.034]	-0.029 [0.040]
African American	-0.161 [0.055]***	0.013 [0.052]
Hispanic	-0.012 [0.050]	-0.015 [0.063]
Income	-0.020 [0.023]	-0.038 [0.022]*
Socio-economic Status	-0.009 [0.016]	-0.038 [0.019]**
Political Philosophy	0.035 [0.009]***	0.037 [0.012]***
Economics Courses	-0.002 [0.006]	-0.017 [0.007]**
Random_WF	0.145 [0.024]***	0.040 [0.027]
Constant	0.396 [0.246]	0.785 [0.236]***
Observations	736	604
R-squared	0.12	0.08

Standard errors in brackets

* significant at 10%; ** significant at 5%; *** significant at 1%

Table 16 : Random Tax Choice in Part I and Part II

	Part 1	Part 2	Difference
All	49.3%	54.6%	5.3%
<u>Gender</u>			
Female	51.6%	57.2%	5.6%
Male	47.5%	52.4%	4.9%
<u>Ethnic background</u>			
White	49.3%	54.6%	5.3%
African-American	36.0%	46.4%	10.4%
Asian	55.2%	61.4%	6.2%
Hispanic	51.0%	52.9%	1.9%
<u>Home Area Income</u>			
< \$ 20,000	48.5%	49.4%	0.9%
\$ 20,000 - \$ 40,000	48.0%	55.3%	7.3%
\$ 40,000 - \$ 60,000	50.6%	56.3%	5.7%
> \$ 60,000	57.4%	58.5%	1.1%
<u>Socioeconomic Status</u>			
Middle-low	49.3%	0.528	3.5%
Middle-high	49.4%	0.563	6.9%
<u>Political Inclination</u>			
Liberal	53.6%	57.5%	3.9%
Moderate	40.2%	47.2%	7.0%
Conservative	33.7%	45.5%	11.8%
<u>Economics Courses</u>			
2 or less	50.7%	55.7%	5.0%
More than 2	41.9%	48.7%	6.7%
<hr style="border-top: 1px dashed black;"/>			
<u>Tax Cost</u>			
< \$1	53.7%	58.2%	4.5%
= \$1	36.2%	43.7%	7.5%
<u>Efficiency Loss</u>			
< 25%	51.5%	57.3%	5.8%
= 25%	42.9%	46.5%	3.7%

Table 17

Dependent variable: Random Tax Rate

	(1)	(2)
Tax Cost	-0.146 [0.030]***	-0.146 [0.030]***
Efficiency Loss	-0.102 [0.030]***	-0.102 [0.030]***
Risk Aversion	0.007 [0.003]**	0.009 [0.004]**
Female	0.009 [0.027]	0.009 [0.027]
Asian	0.106 [0.036]***	0.106 [0.036]***
African American	-0.085 [0.053]	-0.085 [0.053]
Hispanic	0.024 [0.055]	0.024 [0.055]
Income	0.045 [0.022]**	0.045 [0.022]**
SES	0.010 [0.017]	0.010 [0.017]
Political Philosophy	0.044 [0.010]***	0.044 [0.010]***
Economics Courses	-0.018 [0.006]***	-0.018 [0.006]***
Involvement (Part 2)	0.053 [0.026]**	0.068 [0.040]*
Involvement*Risk Aversion		-0.003 [0.006]
Constant	-0.201 [0.239]	-0.209 [0.240]
Observations	670	670
R-squared	0.13	0.13

Standard errors in brackets

* significant at 10%; ** significant at 5%; *** significant at 1%

Table 18. Where From, Tetris, and Quiz Methods - Average Tax Rates Part I and Part II

Method	Part I	Part II	Difference
Where From	45.1%	45.1%	0.0%
Tetris	37.7%	36.8%	0.9%
Quiz	37.3%	39.9%	-2.6%
Where From + Tetris + Quiz	40.0%	40.5%	-0.5%

Table 19 : Where From, Tetris, and Quiz Methods - Part I vs. Part II Tax Rates

Where From		Tetris	
difference = 0	56.4%	difference = 0	57.0%
difference ≤ 0.2	79.7%	difference ≤ 0.2	84.5%
difference ≤ 0.5	90.5%	difference ≤ 0.5	94.0%
difference ≤ 0.7	93.8%	difference ≤ 0.7	97.0%
Part I > Part II	23.0%	Part I > Part II	23.9%
Part I = Part II	56.4%	Part I = Part II	57.0%
Part II > Part I	20.6%	Part II > Part I	19.1%
Quiz		Where From + Tetris + Quiz	
difference = 0	56.7%	difference = 0	56.7%
difference ≤ 0.2	85.7%	difference ≤ 0.2	83.3%
difference ≤ 0.5	96.2%	difference ≤ 0.5	93.6%
difference ≤ 0.7	97.4%	difference ≤ 0.7	96.1%
Part I > Part II	18.2%	Part I > Part II	21.7%
Part I = Part II	56.7%	Part I = Part II	56.7%
Part II > Part I	25.1%	Part II > Part I	21.6%

Figure 10. Part II Average Tax Rate by Method (Males)

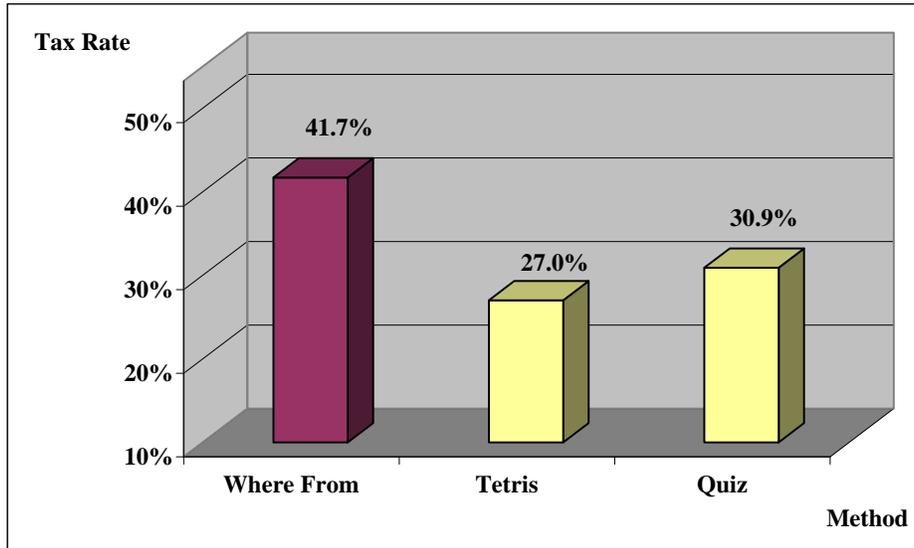


Figure 11. Part II Average Tax Rate by Method (Females)

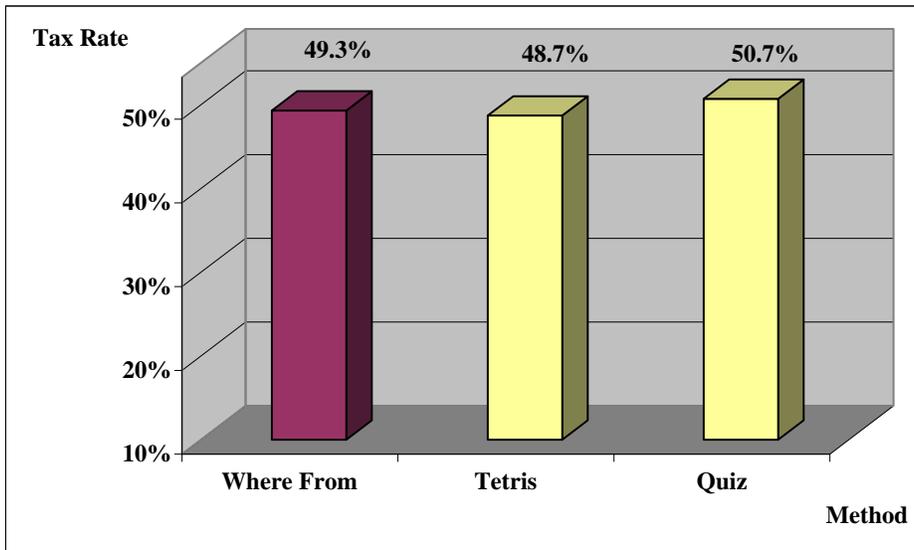


Table 20

Dependent variable: Part II Tax Rate

	(1)	(2)	(3)
Tax Cost	-0.077 [0.024]**	-0.074 [0.021]**	-0.075 [0.021]**
Efficiency Loss	-0.062 [0.024]**	-0.065 [0.021]**	-0.067 [0.021]**
Risk Aversion	0.007 [0.003]**	0.005 [0.002]*	0.004 [0.002]
Female	0.122 [0.021]**	0.073 [0.019]**	0.075 [0.019]**
Asian	-0.021 [0.028]	-0.002 [0.025]	0.007 [0.024]
African American	0.046 [0.042]	0.021 [0.037]	0.035 [0.036]
Hispanic	0.024 [0.044]	0.040 [0.039]	0.054 [0.038]
Income	-0.088 [0.018]**	-0.020 [0.016]	
SES	-0.025 [0.014]	-0.009 [0.012]	
Political Philosophy	0.026 [0.008]**	0.019 [0.007]**	0.019 [0.007]**
Economics Courses	-0.003 [0.005]	-0.002 [0.004]	-0.002 [0.004]
Expected Rank		0.035 [0.002]**	0.036 [0.002]**
Constant	1.213 [0.188]**	0.204 [0.179]	-0.042 [0.046]
Observations	1005	1005	1005
R-squared	0.13	0.31	0.31

Standard errors in brackets

* significant at 10%; ** significant at 5%; *** significant at 1%

Table 21

Dependent variable: Part I Tax Rate

	(1)	(2)	(3)
Tax Cost	-0.087 [0.024]**	-0.085 [0.023]**	-0.083 [0.023]**
Efficiency Loss	-0.054 [0.025]*	-0.056 [0.024]*	-0.061 [0.023]**
Risk Aversion	0.006 [0.003]*	0.005 [0.003]	0.005 [0.003]
Female	0.117 [0.022]**	0.084 [0.021]**	0.087 [0.021]**
Asian	-0.029 [0.029]	-0.017 [0.028]	-0.009 [0.027]
African American	-0.045 [0.043]	-0.062 [0.041]	-0.047 [0.040]
Hispanic	-0.023 [0.045]	-0.012 [0.043]	0.002 [0.041]
Income	-0.049 [0.018]**	-0.004 [0.018]	
SES	-0.030 [0.014]*	-0.019 [0.013]	
Political Philosophy	0.030 [0.008]**	0.026 [0.008]**	0.025 [0.008]**
Economics Courses	-0.004 [0.005]	-0.003 [0.005]	-0.004 [0.005]
Expected Rank		0.023 [0.002]**	0.023 [0.002]**
Constant	0.819 [0.193]**	0.151 [0.197]	0.040 [0.050]
Observations	1005	1005	1005
R-squared	0.10	0.18	0.18

Standard errors in brackets

* significant at 10%; ** significant at 5%; *** significant at 1%

Table 22

Dependent variable: Part I and Part II Tax Rate (Where From, Tetris, and Quiz)

	(1)	(2)	(3)
Tax Cost	-0.080 [0.016]***	-0.078 [0.016]***	-0.079 [0.016]***
Efficiency Loss	-0.060 [0.016]***	-0.061 [0.017]***	-0.058 [0.016]***
Risk Aversion	0.005 [0.002]***	0.003 [0.002]*	0.005 [0.002]***
Female	0.079 [0.014]***	0.049 [0.017]***	0.084 [0.014]***
Asian	-0.010 [0.019]	0.002 [0.020]	-0.008 [0.019]
African American	-0.020 [0.028]	-0.036 [0.029]	-0.016 [0.028]
Hispanic	0.014 [0.029]	0.023 [0.030]	0.015 [0.029]
Income	-0.013 [0.012]	0.030 [0.018]*	-0.008 [0.012]
SES	-0.014 [0.009]	-0.004 [0.010]	-0.014 [0.009]
Political Philosophy	0.023 [0.005]***	0.019 [0.006]***	0.023 [0.005]***
Economics Courses	-0.003 [0.003]	-0.002 [0.003]	-0.003 [0.003]
Where From	0.057 [0.014]***	0.045 [0.015]***	0.054 [0.044]
Involvement	-0.107 [0.030]***	-0.243 [0.081]***	-0.054 [0.040]
Expected Rank	0.022 [0.002]***	0.036 [0.008]***	0.022 [0.003]***
Involvement*Expected Rank	0.012 [0.003]***	0.027 [0.009]***	0.007 [0.004]*
Involvement*Where From			-0.120 [0.062]*
Where From*Expected Rank			0.001 [0.004]
WF*Involvement*Expected Rank			0.011 [0.006]*
Constant	0.281 [0.134]**	-0.289 [0.235]	0.165 [0.135]
Observations	2010	2010	2010
R-squared	0.25	0.17	0.25

Standard errors in brackets

* significant at 10%; ** significant at 5%; *** significant at 1%

Figure 12. Part I Tax Choices Distribution by Expected Rank

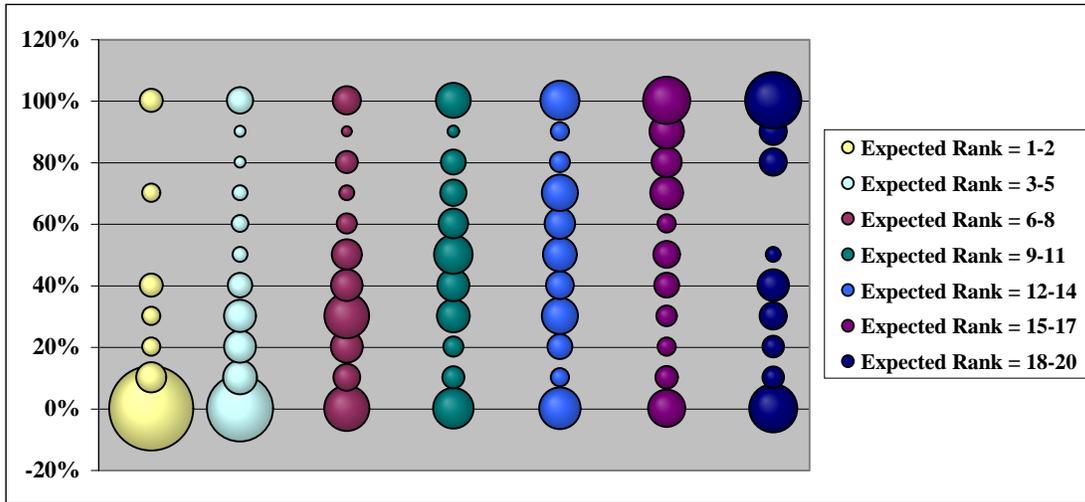


Figure 13. Part II Tax Choices Distribution by Expected Rank

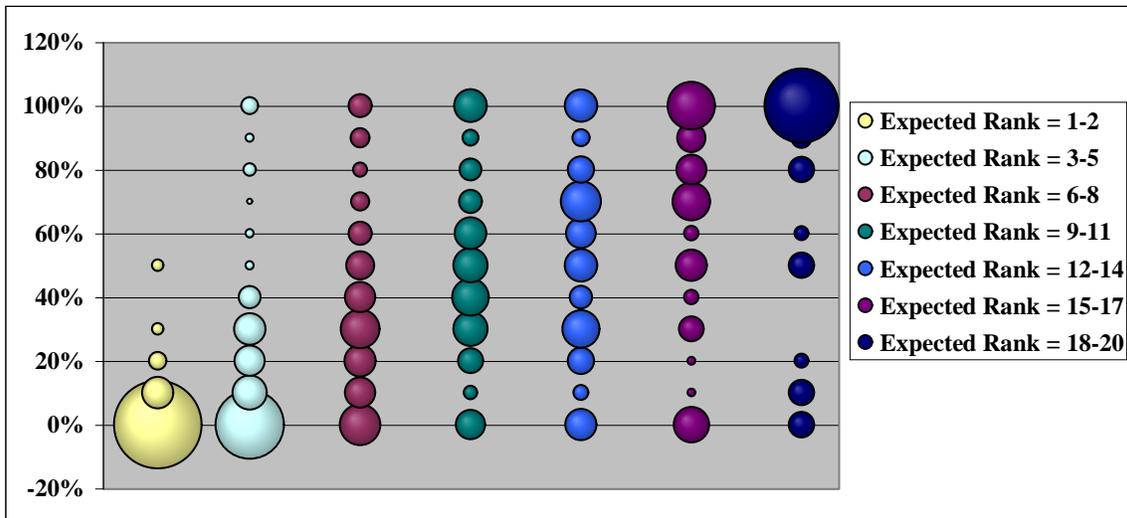


Figure 14. Part I and Part II Tax Choices by Expected Rank

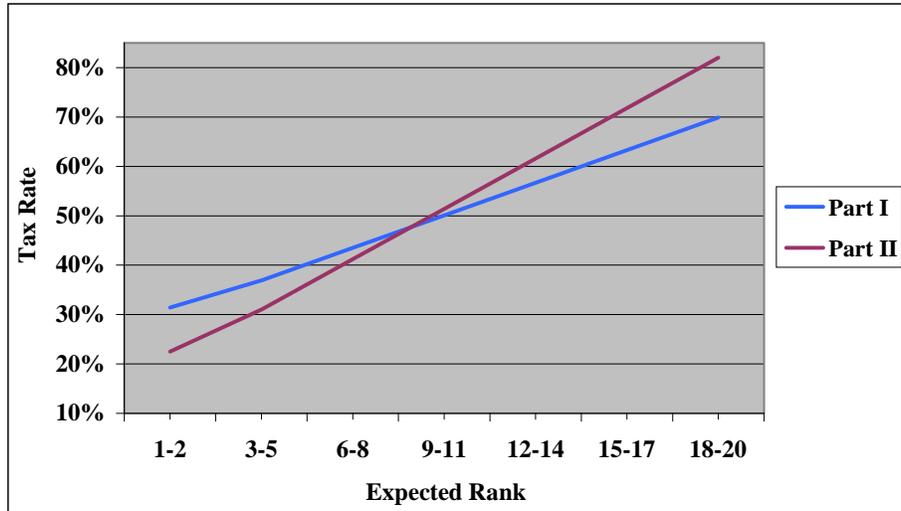


Table 23

Dependent variable: Part II Tax Rate

	Where From	Where From	Tetris	Tetris	Quiz	Quiz
Tax Cost	-0.109 [0.048]*	-0.077 [0.038]*	-0.076 [0.038]*	-0.081 [0.034]*	-0.060 [0.038]	-0.060 [0.036]
Efficiency Loss	-0.097 [0.048]*	-0.052 [0.038]	-0.049 [0.038]	-0.054 [0.035]	-0.063 [0.038]	-0.078 [0.037]*
Risk Aversion	0.008 [0.005]	0.006 [0.004]	0.008 [0.004]	0.003 [0.004]	0.005 [0.004]	0.005 [0.004]
Female	0.038 [0.043]	0.020 [0.034]	0.186 [0.034]**	0.104 [0.033]**	0.181 [0.034]**	0.136 [0.034]**
Asian	0.031 [0.055]	0.013 [0.044]	-0.003 [0.044]	0.002 [0.040]	0.014 [0.044]	0.007 [0.042]
African American	0.123 [0.081]	0.023 [0.065]	0.047 [0.064]	0.037 [0.058]	0.147 [0.064]*	0.077 [0.063]
Hispanic	0.120 [0.085]	0.059 [0.068]	-0.013 [0.067]	0.009 [0.062]	0.130 [0.067]	0.100 [0.065]
Political Philosophy	0.031 [0.016]	0.029 [0.013]*	0.026 [0.013]*	0.013 [0.012]	0.015 [0.013]	0.015 [0.012]
Economics Courses	-0.012 [0.010]	-0.007 [0.008]	-0.004 [0.008]	-0.001 [0.007]	0.008 [0.008]	0.004 [0.007]
Expected Rank		0.042 [0.003]**		0.032 [0.004]**		0.022 [0.004]**
Constant	0.280 [0.099]**	-0.102 [0.083]	0.142 [0.078]	-0.016 [0.074]	0.211 [0.078]**	0.052 [0.081]
Observations	335	335	335	335	335	335
R-squared	0.07	0.41	0.16	0.3	0.15	0.21

Figure 15 : Part III Deviation from 0% Earning-Maximizing Tax Rate by Cost of Deviation

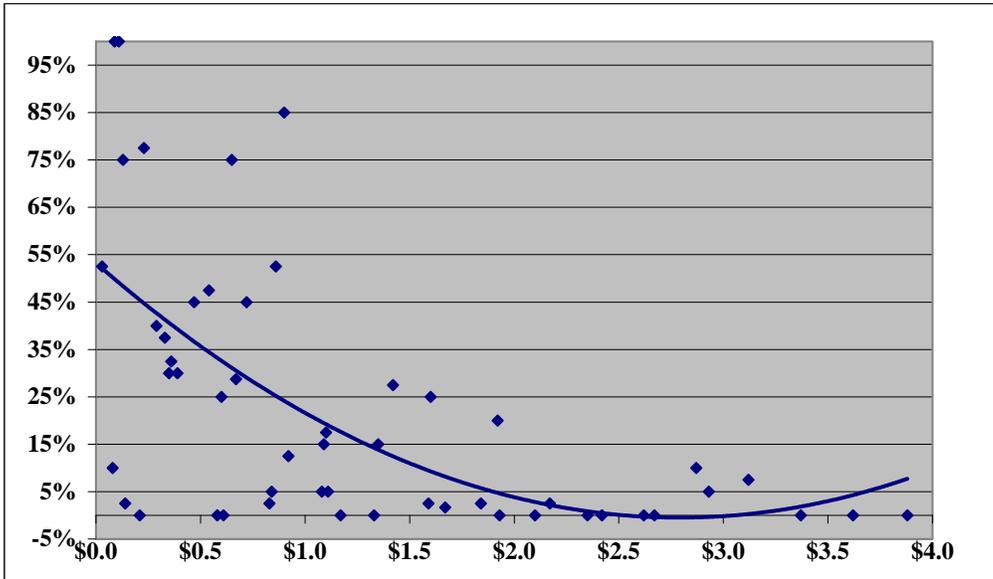


Figure 16: Part III Deviation from 0% Earning-Maximizing Tax by Cost of Deviation and Part I Tax

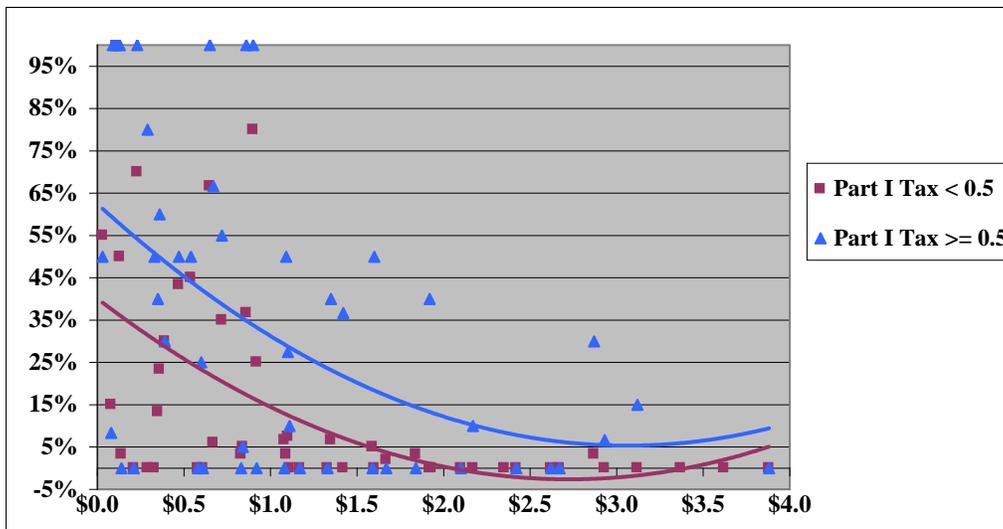


Table 24

Dependent variable: Part III Deviation from 0% Earning-maximizing tax

	(1)	(2)	(3)	(4)
Cost of Deviation (\$ per 10%)	-0.042 [0.008]***	-0.213 [0.029]***	-0.192 [0.029]***	-0.184 [0.030]***
Cost of Deviation Square		0.019 [0.003]***	0.017 [0.003]***	0.017 [0.003]***
Part I Tax			0.242 [0.054]***	0.275 [0.068]***
Cost of Deviation * Part I Tax				-0.017 [0.021]
Constant	0.281 [0.026]***	0.431 [0.035]***	0.319 [0.042]***	0.304 [0.046]***
Observations	272	272	272	272
R-squared	0.09	0.20	0.25	0.26

Standard errors in brackets

* significant at 10%; ** significant at 5%; *** significant at 1%

Table 25

Dependent variable: Part III Deviation from 0% Earning-maximizing tax

	(1)	(2)
Cost of Deviation (\$ per 10%)	-0.213 [0.029]***	-0.217 [0.030]***
Cost of Deviation Square	0.019 [0.003]***	0.020 [0.003]***
Risk Aversion		-0.004 [0.005]
Gender		0.055 [0.040]
Asian		-0.058 [0.052]
African American		-0.012 [0.063]
Hispanic		0.028 [0.077]
Political Philosophy		0.034 [0.016]**
Economics Courses		0.000 [0.010]
Constant	0.431 [0.035]***	0.265 [0.096]***
Observations	272	272
R-squared	0.20	0.24

Standard errors in brackets

* significant at 10%; ** significant at 5%; *** significant at 1%

Figure 17 : Part III Deviation from 100% Earning-Maximizing Tax by Cost of Deviation

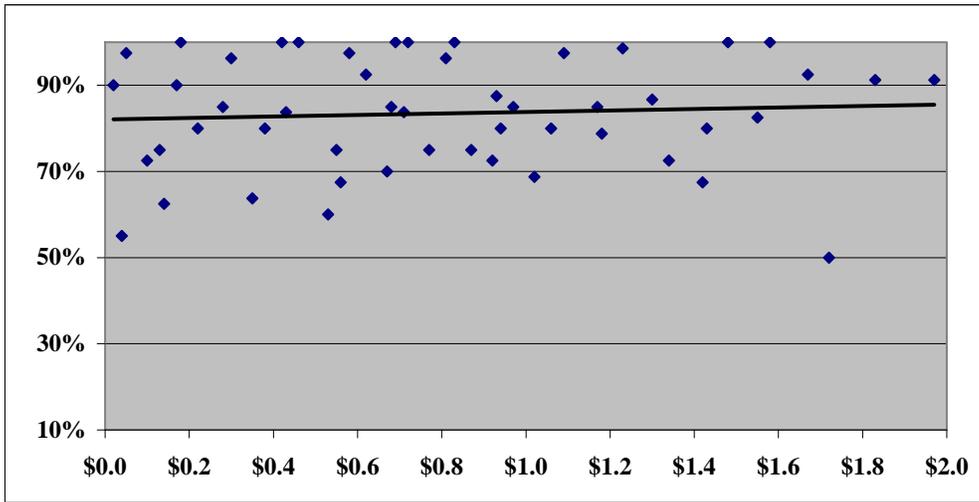


Figure 18: Part III Deviation from 100% Earning-Maximizing Tax by Cost of Deviation and Part I Tax

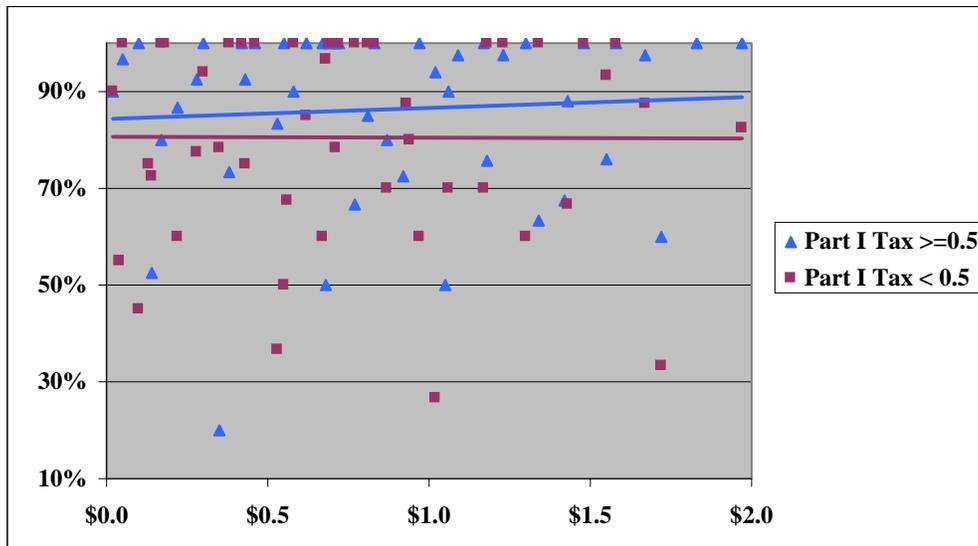


Table 26

Dependent variable: Part III Deviation from 100% Earning-maximizing Tax

	(1)	(2)	(3)
Cost of Deviation (\$ per 10%)	-0.031 [0.032]	-0.022 [0.118]	-0.011 [0.116]
Cost of Deviation Square		0.005 [0.058]	0.001 [0.057]
Part I Tax			0.164 [0.050]***
Constant	0.797 [0.034]***	0.8 [0.051]***	0.739 [0.053]***
Observations	316	316	316
R-squared	0.003	0.003	0.04

Standard errors in brackets

* significant at 10%; ** significant at 5%; *** significant at 1%

Appendix

Questions used to construct the Political Philosophy and the Socioeconomic Status indicators

<u>Political philosophy</u>	
Question:	Which of the following best describes your political inclination (affiliation)?
Possible answers:	Republican ; Democrat ; Independent ; Don't Know ; Other
Question:	Which of the following best describes your political philosophy (ideology)?
Possible answers:	On a scale of 1 to 7 "Very Conservative" to "Very Liberal"
<u>Socioeconomic Status</u>	
Question:	1) When you were in high school, did your family live in:
Possible answers:	An apartment ; A single family house ; A multi-family house ; Other
Question:	2) When your father was growing up, were his parents:
Possible answers:	Working class ; Middle class; Upper middle class; Rich
Question:	3) When your mother was growing up, were her parents:
Possible answers:	Working class ; Middle class; Upper middle class; Rich
Question:	4) When you were growing up, were your parents:
Possible answers:	Working class ; Middle class; Upper middle class; Rich
Question:	5) How would you characterize the principal wage-earner in your family?
Possible answers:	A professional (doctor, lawyer, dentist, accountant, etc.) ; A business person, executive, or manager ; A small business owner ; An ordinary employee ; Other
Question:	6) Considering your family's income, what your family has to live on and the cost of living, how would you say your family is making out today? All things considered would you say your family is :
Possible answers:	All right ; Fairly Well ; Quite Pinched ; Not Making Ends Meet

Test for the assessment of risk aversion

1) Please indicate whether you would like to receive \$1 or would prefer to let the computer randomly select for you either \$0 or \$1.80 (each with a 50% probability).

- Guaranteed \$1
- Random Selection between \$0 and \$1.80

2) Please indicate whether you would like to receive \$1 or would prefer to let the computer randomly select for you either \$0 or \$2 (each with a 50% probability).

- Guaranteed \$1
- Random Selection between \$0 and \$2.00

3) Please indicate whether you would like to receive \$1 or would prefer to let the computer randomly select for you either \$0 or \$2.33 (each with a 50% probability).

- Guaranteed \$1
- Random Selection between \$0 and \$2.33

4) Please indicate whether you would like to receive \$1 or would prefer to let the computer randomly select for you either \$0 or \$2.67 (each with a 50% probability).

- Guaranteed \$1
- Random Selection between \$0 and \$2.67

5) Please indicate whether you would like to receive \$1 or would prefer to let the computer randomly select for you either \$0 or \$3.00 (each with a 50% probability).

- Guaranteed \$1
- Random Selection between \$0 and \$3.00

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