Subjective versus objective probability: results from seven experiments on fiscal evasion*

Luigi Mittone[1]

* The experiments described here are the result of team work involving many members of the Experimental and Computational Economics Laboratory of the University of Trento. I am grateful to all them and I wish to give a special thanks to my friend Paolo Patelli, who is the author of the software used in the dynamic experiments, to Alessandra Gaburri, and to Sergio Cagol, who gave a substantial help respectively in the organisational and computational steps of the experiments. As usual all responsibility for mistakes or omissions is exclusively mine.

[1] Department of Economics, University of Trento, via Inama 1, 38100 Trento, Italy

Introduction

The starting point for this work are the results obtained from a group of experiments begun at the Laboratory of Experimental Economics of the University of Trento in 1994, and which have been designed to analyse the influences that psychological factors can play in the tax evasion decision. To explore this topic we have carried out both static, one-shot tests (Bosco and Mittone, 1994), and dynamic, repeated experiments, using two different experimental devices: the publicising of the results from the fiscal audits and the redistribution of the tax yield. The assumption for the first device is that people dislike being known to everybody as "guilty" of evasion; the second device is based on the hypothesis that the experimental subjects feel as a moral cost the awareness that they are stealing from the other participants their contribution to the tax yield.

The results reported here are from two one-shot experiments respectively performed in Trento (experiment ST1) and in Milan at the Catholic University (experiment ST2) and from five repeated choices experiments carried out in Trento from 1995 till 1997 (experiments DY1, DY2, DY3, DY4 and DY5).

Even if these experiments were not specifically aimed to study the role played by the probability of being audited one key ingredient embodied in all them was the risk component, *idem est* the probability of being detected as guilty of evasion, and consequently paying a fine. Expected utility theory, applied to tax evasion (Allingham and Sandmo, 1972), relates the decision to evade basically to the tax payer's attitude towards risk, given a certain inquiry-punishment scheme (amount of the fine and probability of paying). Accepting this theoretical frame, and assuming constant the tax payer's risk attitude, the government should be able to drive the tax payer's decisions by modifying the punishment scheme. For example if we have a risk-neutral tax payer, whose utility depends only on money, we can expect every punishment system designed as an unfair lottery should work in a very effective way because the tax payer will always choose to pay, unless the expected value of the uncertain choice (that is, to evade) becomes higher than the sure choice (i.e. the net income after taxation).

To look at the influences played by the psychological costs it is therefore necessary to carefully analyse the role played by the uncertainty component embodied in the decision to evade. More precisely one must consider the fact that while the first psychological constraint included in the experiments discussed here has no relationship with computation of the evasion's expected monetary value, the second one can directly influence it. The redistribution of the tax yield in fact enters in the calculation of the tax evasion expected value, together with the usual factors, i.e. the probability of being detected and the amount of the fine to pay. Supposing therefore that the tax payer's utility depends only on money we can write the usual tax evasion expected value EV^e formula:

$$EV^e = (1-\pi)\left[1-t(1-\lambda)\right]Y + \pi\left[1-t-\lambda P(\lambda)t\right]Y \qquad [1.1]$$

where:

Y is income before taxation

λ is the percentage of tax evaded ($\lambda = 0$ if taxpayer is perfectly honest, $\lambda = 1$ if taxpayer is perfectly dishonest)

π is the probability that evasion will be discovered;
t is the tax rate;
$P(\lambda)$ is the punishment scheme which links the surcharge to the level of evasion[2].

I have pointed out that the tax payer's problem, given [1.1], is simply a matter of making a comparison between the value of EV^e and the net income after taxation. When $EV^e = (1-t)Y$ the choice of the tax payer is conventionally assumed by the expected utility theory to be discriminatory between risk aversion and risk attraction.

How does [1.1] change if we include the tax yield redistribution? Recalling the assumption that the tax payer's utility depends only on her/his net income, and following the traditional approach to tax evasion theory, we can hypothesise that *R*, that is, the amount of money redistributed after taxation, is a function of the tax payers' attitude towards risk, of total income and of t. More precisely if we hypothesise:

[H1] - t is a fixed rate,
[H2] - the govern redistributes the tax yield simply by dividing the total amount of money collected from taxes (without including the fines paid by the evaders detected by the fiscal audits) in equal parts among the tax payers;
[H3] - the punishment system is the same for every taxpayer,

then we can say that R will depend only on the total income and on the average prevailing attitude towards risk. Equation [1.1] therefore becomes:

$$EV^{eR} = (1-\pi)\left[1-t(1-\lambda)\right]Y + \pi\left[1-t-\lambda P(\lambda)t\right]Y + R \qquad [1.2]$$

where:

$$R = K\,\frac{\sum_{i=1}^{n} tY_i - \lambda_i tY_i}{n}$$

and (i=1,..,n) is the total number of tax payers.

Looking at equations [1.1] and [1.2] one notes that the nature of the tax payer's decisional problem is basically the same with or without redistribution. More precisely, and always supposing a risk neutral tax payer, we expect to observe some different decision, moving from the without-redistribution context to that with redistribution, only when the ratio between the value of the sure choice (pay taxes) and the value of the uncertain one (to evade) becomes greater than one as a consequence of the amount of money redistributed. The amount of "sure" income in fact rises as a consequence of redistribution and therefore the original ratio $(1-t)Y/EV^e$ of the without-redistribution lottery changes, becoming $\left[(1-t)Y+R\right]/EV^{eR}$. It is worth noting that the value of R can only be foreseen by the individual tax payer, as it is highly unrealistic to assume that s/he could have “sure” information on the behaviours of the other tax payers. Hence it follows that the only way to compute the value of the sure choice is to assume that

[2] I assume that the penalty rate is imposed on evaded tax, an institutional feature commonly used in many developed countries.

none of the other tax payers will pay. The value of the sure income for tax payer j therefore becomes $[(1-t)Y_j + tY_j / n]$ and in a similar way it also changes EV^{eR}.

This is from the microeconomic theory point of view but as it was easily predictable[3] many behaviours observed in the experiments reported here are difficult to explain either from this standpoint and from that of other theories, even when they are based on experimental data. Among the most interesting of such theories I shall only cite the well known *prospect theory* of Kahneman and Tversky (1979).

The central argument of prospect theory is that the attitude towards risky choices is influenced by the nature of the decisional context. This means that the same agent can modify her/his decision (e.g. leave the sure choice to choose the risky one or vice-versa), given the same lottery structure, simply by effect of a different framing of the decisional problem. More precisely the essential framing effect, to which the theory refers, can be defined as a gain-loss effect, that is, the ownership position of the decision maker in respect to the lottery prize. The ownership position of the decision maker is defined by Kahneman and Tversky as a point belonging to a *reference structure* which is built through a mental accounting process that starts by fixing a *reference* state of the world, which is assumed as a point neutral in respect to the decision taker welfare level. All the states of the world are then ordered according to the reference point, and related to each of them is a structure of preferences that could be imagined as a family of traditional microeconomic preference maps. When the decisional context is designed so that the agent must decide between the sure *loss* of part of a prize that s/he has *already received* and the possibility of keeping the entire reward but running the risk of a greater loss, then the prevailing attitude is to choose the risky choice instead of the sure one. Conversely, when the alternative choices regard the possibility of earning a prize that *has not yet been given* to the player, but running the risk of loosing a large part of it, against the opportunity to have a smaller but sure prize, then the more frequent decision is to take the sure option.

Following prospect theory the tax payer decisional context should therefore stimulate risky behaviours because the tax payer is exactly in the position to perceive taxes as a loss of an income already earned. An experiment that analyses the validity of prospect theory in the tax payer context is reported by Chang, Nichols and Schultz (1987) who reach the conclusion that prospect theory fits the tax payers' behaviours better than expected utility theory does. The dynamic experiments reported here can be also used to check the validity of prospect theory. I shall briefly return to this topic in the section devoted to comment the results from the dynamic experiments.

[3] As well known there is a large experimental literature about the failures of the expected utility theory. Among these works the most interesting are in my opinion those realised by Kahneman and Tversky (Tversky and Kahneman, 1974, 1981, 1983, 1986; Kahneman, Slovic and Tversky, 1982; Tversky, Slovic and Kahneman, 1990). Furthermore an almost equally large literature considers fiscal evasion from an experimental perspective, for a review and for a sort of text-book on this topic see Webley, Robben, Elffers and Hessing (1991).

The main aim of this work is to investigate the role played by uncertainty in the tax evasion decisional context either in a static environment and in a dynamic one. More precisely I shall investigate two phenomena: the first is the role played by subjective versus objective audit probability in a static context, the second is the influence in a repeated game context of previous tax audit experiences on the tax payers' behaviours.

2. The one-shot experiments

The design[4] of both the two one-shot experiments was identical except for two aspects, both related to the tax audit probability.

The design of the one-shot experiments - For each experiment[5] we used 64 experimental subjects[6] equally divided into two income groups: the "high income ones" and the "low income ones"; those belonging to the first group received 60,000 Italian liras while those belonging to the second group received 30,000 Italian liras. The decision to have at least a couple of income levels was due to the necessity to check for income effects. The participants in each experiment were also divided into two psychological constraints sets, that have been introduced in the experiments using the following definitions:

D_1) subjective (Kantian) moral constraint: participants dislike the idea that someone could suffer because of their behaviour (tax evasion reduces the total yield and therefore leaves less money for the final redistribution);
D_2) collective (social) moral constraint: participants believe that the other agents involved in the experiment (researchers, fellow participants) resolutely condemn tax evasion.

Summarising we had four groups (each divided into two sub-groups: rich ones and poor ones) of subjects per each experiment:

- group A, total anonymity, absence of any redistribution of tax yield;
- group B, public audit, absence of any redistribution of tax yield;
- group C, total anonymity, partial redistribution of tax yield;
- group D, public audit, partial redistribution of tax yield.

The redistribution regarded the 80% of the tax yield, and all the participants had to answer to a questionnaire (see the appendix). Also the structure of the lottery for both the experiments was been kept identical, with the same audit probability and the same penalty rate structure. The audit probability was 18.75% and the fines to pay were:

---

[4] For a more detailed description of the experimental design see Bosco and Mittone (1994).

[5] The one-shot experiments were run without using a computer.

[6] Unfortunately the participants in ST1 were only 61 because three of those selected did not come to the meeting time.

a) tax evasion lower than the 30% of the amount due: fine equal to 60% of the value of the tax evaded;
b) tax evasion from 31% up to 60% of the amount due: fine equal to 80% of the value of the tax evaded;
c) tax evasion over 61% of the amount due: fine equal to 100% of the value of the tax evaded.

The only two differences between the designs of ST1 and ST2 were:

1) in ST1 experiment the subjects did not know the audit probability, while in experiment ST2 the subjects knew that three of them for each group of 16 participants would be audited;
2) in the ST1 experiment the subjects did not know that the tax rate was the same for every participant, while in ST2 the subjects knew that they were treated equally, i.e. that everybody would be taxed using the same tax rate.

For both experiments the tax rate was 40% for all the participants. Therefore the sure option for the subjects belonging to the high income groups was to pay 24,000 liras and consequently to earn respectively 36,000 liras for those that belong to the group without tax yield redistribution, or 37,200 liras for those belonging to the group with redistribution. Computing these values for those belonging to the low income groups we obtain respectively 12,000 liras to pay and 18,000 or 18,600 liras to earn. By putting the data in [1.1] and in [1.2] we then obtain the lottery structure for the two one-shot experiments, which gives a EV^e value of 51,000 for a rich total evader, and obviously half this value for a low income total evader. Looking at the lotteries, it follows that a neutral risk player will always evade the entire amount of the tax due, because the sure choice has a lower value than the expected value of the uncertain one. The differences between the structures of the lotteries of the with or without redistribution groups were very small, so we can reasonably assume that the experimental subjects were very weakly influenced by the presence or absence of redistribution.

Obviously all these considerations are true only when the subjects are informed about the probability of being detected, while everything can change in the situation designed for ST1 where the subjects had to forecast the tax audit probability. Admitting that the subjects followed a traditional way to represent probability and supposing that we know their individual estimations it is possible to compute each participant's lottery.

The results from the one-shot experiments - Fig. 1 shows the results obtained by using the tax evaders' declared expected probability[7] to be audited. The interesting phenomenon shown by fig. 1 is that all the evaders decided to evade even if their expected probability of being audited - obviously combined with the penalty - gave an expected value from evasion that is always lower than that offered by the sure choice,

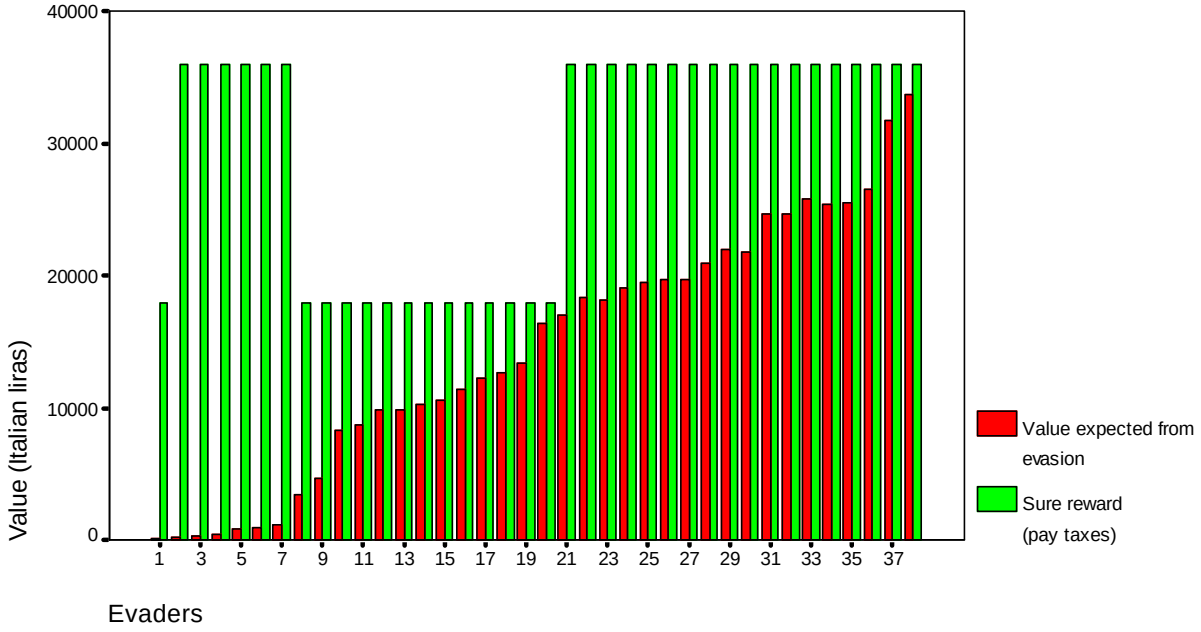
[7] Before running the experiment we asked the subjects to write their expected probability of being audited. The questionnaire used is reported in the appendix.

idem est the net reward after taxation. We can imagine three main explanations for this phenomenon:

a) the subjects completely ignored any criteria to compute the expected value,
b) all of these subjects were risk takers, i.e. they found some pleasure in making the risky choice,
c) some "psychological" factor and/or the mental process followed to compute the expected audit probability induced the ST1's subjects to take an apparently bad choice.

Obviously these three explanations can combine, as they are not necessarily antagonistic.

Fig. 1 Value expected from evasion (only evaders ST1)



Unfortunately the experiment gives only little insight into the predominance of one explanation over the other ones; but from the applied psychology literature we have a great deal of evidences that the behaviours observed are not uncommon.

Explanation a) seems quite weak because all the subjects were second-third year students from the Faculty of Economics and therefore had already attended courses in statistics and in microeconomics. Explanation b) cannot be tested because we had no information about the individual generic attitude of the subjects towards risky choices. Finally explanation c) is the most interesting because it gives an opportunity to discuss a large range of considerations that will be also analysed in the following sections using the data obtained from the dynamic experiments. To study the psychological effects on the decision to evade in spite of any apparent rational convenience we must consider two aspects of this phenomenon: the first regards the cognitive process that the subjects

follow to build their subjective perception of risk; the second one regards the cultural environment simulated by the experiment. A possible way to analyse these topics is to compare the results from ST1 and ST2.

In experiment ST1 38 subjects (63.3%) decided to evade while in ST2 the evaders were only 28.2% of the total sample; furthermore *"moral"* constraints produced quite different results. The redistribution of the tax yield in the ST2 experiment did not influence at all the behaviours of the subjects, while in the ST1 experiment the redistribution of the tax yield produced a strong reduction in tax evasion (in ST1 only 14 subjects belonging to the groups with tax yield redistribution decided to evade, while the evaders belonging to the groups without redistribution were 24). Conversely the other psychological factor, i.e. anonymity, did not have any strong consequences on the behaviour of the subjects of ST1, while in ST2 it seemes to have had some even small influence, because the number of evaders has been a bit higher in the anonymous groups (11 subjects) than in the non-anonymous ones (7 subjects).

Admitting that the two samples of subjects were extracted from the same population these differences should be in some way due to the changes introduced in ST2. As anticipated at the beginning of this section the only difference between the two experiments regarded the fact that in ST2 the subjects were informed either on the real value assigned to the audit probability and on the criteria used to apply the tax rate (while in ST1 the subjects did not know that the tax rate was the same for everybody). I cannot state with absolute certainty that the samples were statistically homogenous but I tried to keep constant all the socio-economic characteristic that we thought could be important (for both the experiments all the subjects were university students from the faculty of Commerce and Economics, all them lived in Northern Italy, 50% were female, all them were volunteers).

From a micro-economic point of view the nature of probability (subjective versus objective[8]) in an expected utility maximisation process should not influence the results of the choice because the decision taker should treat her/his forecast as if it has been obtained from the "true" probability distribution. One way to interpret the results from ST1 and ST2 is to hypothesise that this theoretical assumption has failed. As uncertainty in these experiments related to a fiscal context it seems reasonable to suppose that the cognitive process followed by the subjects to forecast the audit probability should in some way be influenced by their knowledge of the functioning of the real fiscal system[9]. It follows that we can check if some beliefs about the fiscal system show a significant difference between the two samples. Looking at the results from the questionnaires distributed to the subjects it is possible to produce two graphs that show the frequency of fiscal audits in Italy as perceived by the subjects (fig. 2 and fig.3).

Fig. 2 and fig.3 show that the beliefs about the frequency of fiscal audits in Italy were almost identical in the two samples. This conclusion can be reached in an even clearer way by looking at tab.1, which shows how the values of the valid percent

[8] Her I use the terms "objective" and "subjective" probability in a broad sense. A more correct definition should be "generally accepted probability distribution" and "individually defined probability distribution".

[9] It is worth underline that in ST1 the instructions given to the subjects made clear reference to the procedures used by the Italian tax system. The statement was as follows: "The procedure used to carry on the fiscal enquiry is identical to that of the Italian revenue office".

column were almost identical. The greatest difference regards the number of subjects who believe that fiscal audits are carried out by investigating a percentage of tax payers between 10% and 30%. In ST1 the subjects belonging to this group were 21.6% of those who answered to the questionnaire, while in ST2 they are only 18.8%.

Fig. 2 Expected fiscal audit in Italy (ST1)

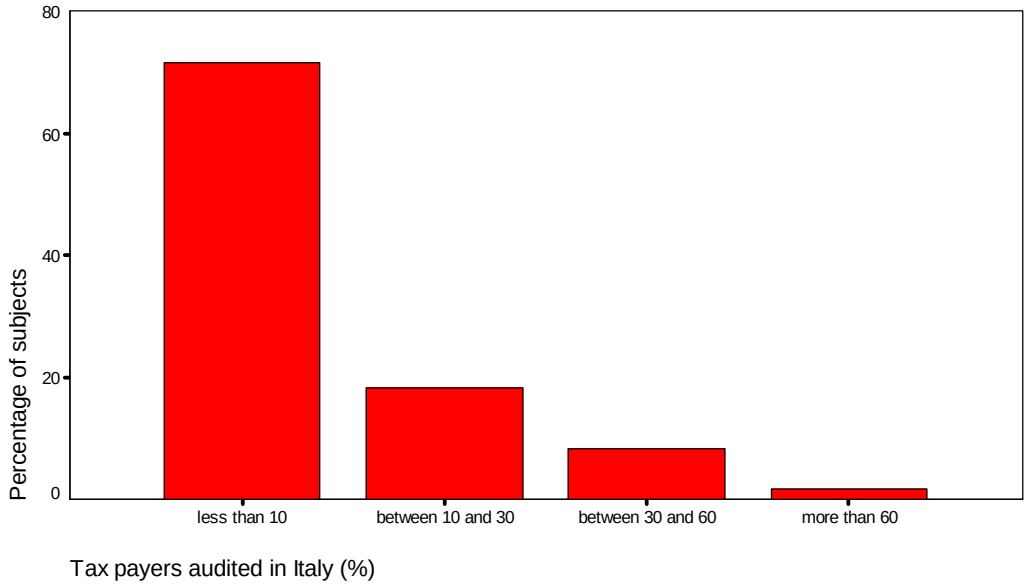
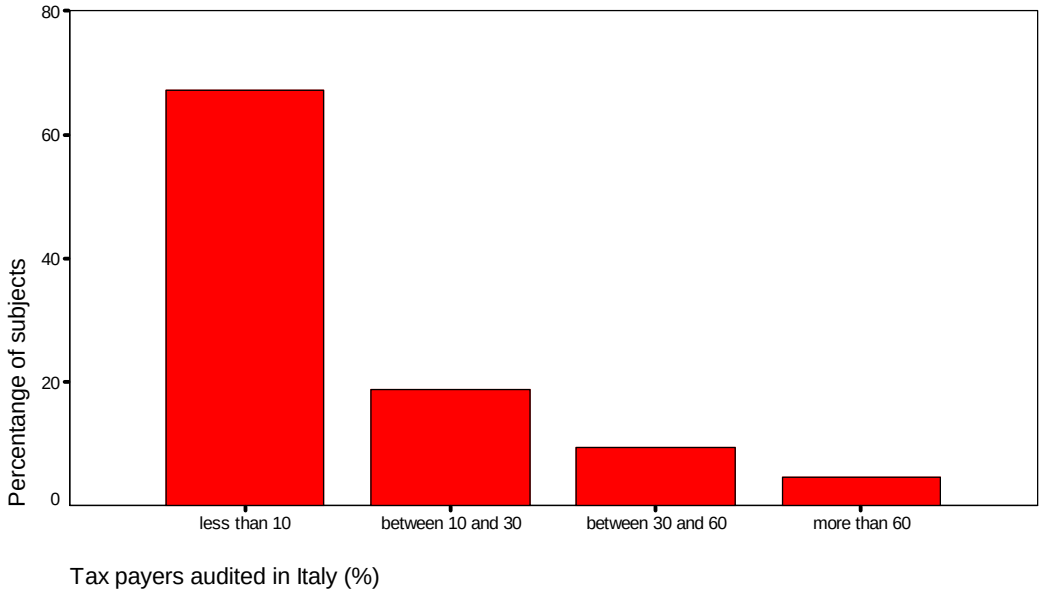


Fig. 3 Expected fiscal audit in Italy (ST2)



Tab. 1 Expected fiscal audits in Italy

exp. ST1

				Valid	Cum
		Frequency	Percent	Percent	Percent
less than 10%		34	56.7	66.7	66.7
between 10 and 30%		11	18.3	21.6	88.2
between 30 and 60%		5	8.3	9.8	98.0
more than 60%		1	1.7	2.0	100.0
missing		9	15.0		
Total	60				
Valid cases	51	Missing cases	9		

exp. ST2

				Valid	Cum
		Frequency	Percent	Percent	Percent
less than 10%		43	67.2	67.2	67.2
between 10 and 30%		12	18.8	18.8	85.9
between 30 and 60%		6	9.4	9.4	95.3
more than 60%		3	4.7	4.7	100.0
missing		0			
Total	64				
Valid cases	64	Missing cases	0		

The results seems to demonstrate that the subjects' perception of the risk run by a tax evader in Italy are very similar in both the samples, and therefore it is reasonable to suppose that the ST2 subjects produced forecasts not very different from those produced by the ST1 subjects. It follows that the precise knowledge of the risk dimension probably had some influence on the subjects' behaviours.

To investigate the second explanation of the lower number of evaders in ST2, i.e. the psychological or moral one, there is no specific way in which it was modelled it in the experiments, i.e. by introducing anonymity and the redistribution of the tax yield, because both these characteristics of the experimental designs were kept identical. To analyse the psychological issue we need to consider the effects produced by the second difference introduced in ST2, i.e. the knowledge of the rules used by the researchers to fix the individual tax rate level. Every individual subject in ST1 may think that s/he alone was heavily and therefore unfairly taxed - recall the very high tax rate adopted in the experiment (40%) - meanwhile the others involved in the experiment were subjected to lighter fiscal pressure. This belief can work as a powerful incentive for fiscal evasion because the tax payers can react to the unfairness of the fiscal system by deciding to evade.

A similar effect can be produced by the so called "central value system" brought by the subjects to the experiment, and inherited from the cultural and moral values that they have learned during their lives. These values can work as a deterrent or, conversely, as an incentive for fiscal evasion. To measure the subjective feeling of

rejection or approval of evasion two questions were used in ST1 as well as in ST2: "how many other participants do you think will evade taxes?" and "how much do you resent the fact that some of the other participants have decided to evade their taxes?". The assumption involved in these questions is that if a participant believes that only very few people will evade and if s/he feels strong resentment, discovering that many of her/his fellows have decided to evade, s/he also should strongly blame tax evasion. Figures 4 and 5 respectively report the ST1's and ST2's distributions of Ψ (degree of resentment), expressed using a 1 (low) to 10 (high) range , and of $\hat{\mu}$ (expected rate of evaders). Looking at both these figures it appears immediately clear that the degree of disagreement with tax evasion is definitely stronger in ST2 than in ST1.

A further confirmation of a stronger moral attitude in ST2 comes from the frequency distribution of both variables $\hat{\mu}$ and Y, from which we discover that 61% of the subjects in ST2 declared a value for Y equal to or higher than 5 (the admitted range for this variable was 1 to 7). In ST1 the percentage of people that declared resentment equal to or greater than 5 was only 27%, while 36.7% of them declared that they felt only low resentment (in ST1 the percentage of subjects that felt "low resentment" against those that decided to evade was only 12.5%). In a similar way, looking at the expected rate of evasion, we note that in ST2 there was a lower expected rate of evaders than in ST1, for example in ST2 the cumulative percentage of subjects, expecting that more than the 30% of people will evade, was 43% while in ST1 this percentage was 53%. Unfortunately we cannot be sure that in ST2 the forecast of the expected rate of evaders was influenced by a moral judgement of the prevailing attitude against fiscal evasion, or by an evaluation of the lottery. Nevertheless the results are coherent with our assumptions and therefore it seems reasonable to suppose that in ST2 the moral constraints against tax evasion inherited from the subjects' *central value system* were in some measure more powerful than in ST1.

Accepting this interpretation we can justify either the lower rate of evaders in ST2, and the weak effect produced in ST2 by the artificial moral constraint, represented by the redistribution of the tax yield, and finally the stronger effect produced by anonymity. It is in fact clear that in the presence of a strong moral *endogenous* attitude against tax evasion the *artificial* enforcement introduced by the experiment should play a marginal role. At the same time anonymity can be seen as a sort of emergency exit for those that, knowing themselves in some way to be among virtuous puritans (remember that the ST2 experiment was run at the Catholic University of Milan), nevertheless decided to evade.

Fig. 4 Degree of resentment ST2 versus ST1

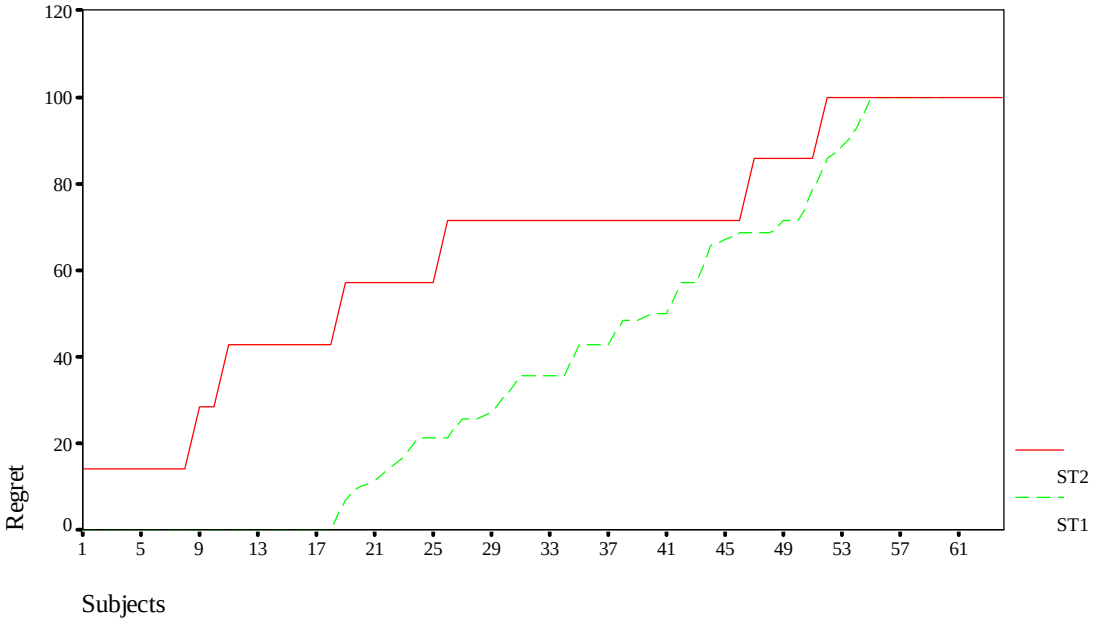
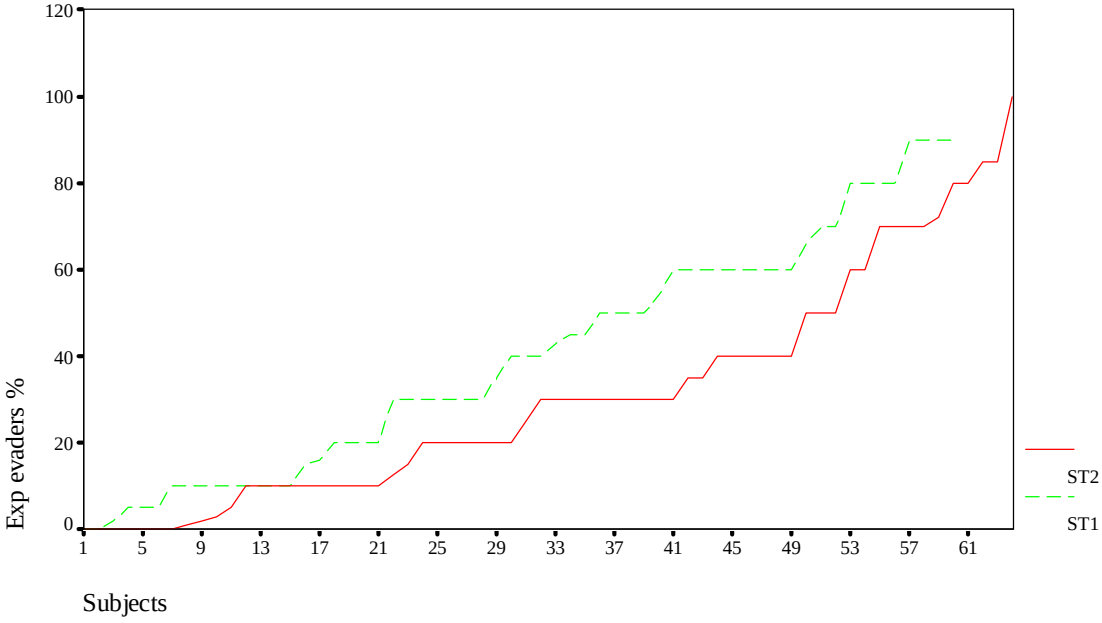


Fig. 5 Expected evasion ST2 versus ST1



3. The dynamic experiments

The main issues that have emerged from the one-shot experiments are the following:
1. the subjects' perception of risk and their attitude towards it, as shown in fig. 1, can be explained by looking at the nature (subjective versus objective) of audit probability;
2. the psychological frame can deeply influence tax payer behaviour.

From these topics we extracted some questions to explore in a repeated choices frame:

Q1) does the possibility of playing more than once change the attitude of the subjects towards risk and consequently towards fiscal evasion?
Q2) does the more effective of the two moral constraints introduced in the one-shot experiments (i.e. tax yield redistribution) play any role in a repeated choices frame?
Q3) can one identify some form of learning process that teaches to the subjects how to cope with risk?
Q4) does the context (the simulation of a fiscal environment) has any effect on the subjects behaviours?

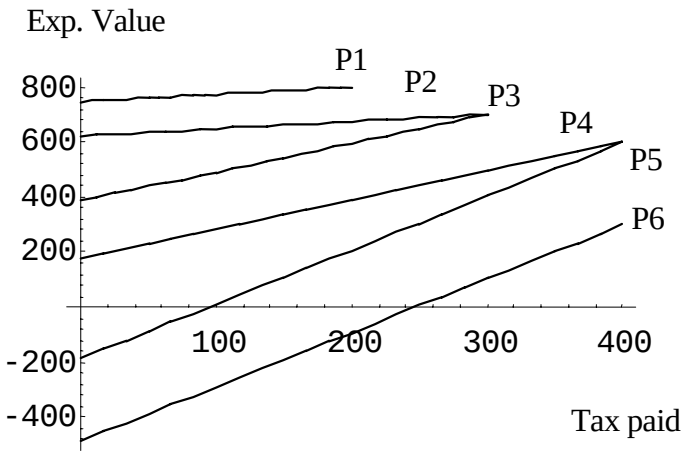
To try to answer to these questions we have run five dynamic experiments that we shall discuss here, starting from the description of the parts of the experimental design which are common to all the experiments.

The design of the dynamic experiments - The dynamic experiments were run using a computer aided game to which 30 subjects participated per each experiment (15 men and 15 women, students from the Faculty of Economics of the University of Trento). All the experiments had the same length (60 rounds, duration that was communicated to the subjects) and that were run by taking as constant the variables that enter the lottery structure. The values for the lottery are the following:

a) income - 1000 Italian liras from round 1 until round 48, then 700 Italian liras;
b) tax rate - 20% from round 1 until round 10, then 30% from round 11 until round 30, and finally 40% from round 31 until the end;
c) tax audit probability - 6% from round 1 until round 21, then 10% from round 22 until round 40, and finally 15% from round 41 until the end (the individual probability to be audited is independent of the other subjects' audit probability of being audited and the players are informed of this characteristic);
d) fees - the amount of the tax evaded plus a fee equal to the tax evaded multiplied by 4.5, the tax audit had effect over the current round and the previous three rounds.

Because the tax audit had effect over a period of four rounds, and as the lottery structure changes during the experiment, the computation of the expected value from evasion is rather more complex than for the one-shot experiments. To calculate the expected values for the different lotteries I wrote the simple program with *Mathematica*© reported in the appendix. The graphic result from the simulation is shown in fig. 6 where we can see a plot in which the horizontal axis represents the tax paid, while the vertical axis represents the expected value from evasion. Looking at fig. 6 we can easily notice that the lottery structure for the dynamic experiments is always unfair. As the one-shot lottery was a more than fair lottery, we expected the percentage of evaders in the dynamic experiments to be smaller than that of the one-shot ones. Obviously this consideration is valid only for the first round of the game.

Fig. 6 Expected values for the dynamic experiments



P1: income=1000; tax=20%; audit prob.=6%
P2: income=1000; tax=30%; audit prob.=10%
P3: income=1000; tax=40%; audit prob.=10%
P4: income=1000; tax=40%; audit prob.=15%
P5: income=1000/700; tax=40%; audit prob.=15%
P6: income=700; tax=40%; audit prob.=15%

During the experiment the players could not communicate and they received information only through the computer screen, on which were reported the following pieces of information:

a) the total net income earned by the player from the beginning of the game,
b) the gross income of the active round,
c) the amount of taxes to pay in the active round,
d) the number of the active round,
e) the number of subjects investigated in the former round (as a percentage),
f) the number of players that decided to evade in the previous round (a percentage also in this case),

Information e) and f) are not the data really produced during the given experiment because we provided it to the subjects using a pre-built data base that has been kept identical for all the experiments. This device was introduced in order to test the players' reactions in a controlled and constant environment and to allow comparisons between different experiments. For the same reason we also divided the subjects into two groups (obviously without informing them) and we audited them in correspondence to the same

rounds (precisely rounds 13, 31, 34, 48, 54, 58 for the first group and rounds 3, 24, 27, 40, 46, 50 for the second group). We have decided to include information e) and f) with the aim to enforce the context of the experiments.

A further information device of the experiment is represented by a snap interruption: the computer screen changes and a message appears, informing the subjects that the audit probability will change after three rounds (this piece of information keeps the subjects constantly informed about the relevant parameters of the lottery). When each subject has read the information on the screen and has taken her/his decision s/he must wrote, by using the computer keyboard, the amount of money that s/he has decided to pay and then wait to see if has been extracted for a fiscal investigation.

As anticipated above the dynamic experiments were designed to test some specific hypothesis; this task was performed by introducing some differences to the original design:

DY1) it is the standard experiment;
DY2) the same as DY1 but we introduced the tax yield redistribution (which was one of the "moral" factors investigated in the one-shot experiments);
DY3) is the same as DY2 but we have used the tax yield to finance the provision of a public good (the creation of a fund for scholarships);
DY4) is exactly identical to the standard experiment but we designed it as a generic gamble and we eliminated every reference to the fiscal environment;
DY5) is the only one with a different structure of the lottery and with a different timing for the fiscal audits.

I shall return in more detail to the structure of the experiments in the following section, during discussion of the results.

Some results from the dynamic experiments - I shall discuss here only some of the aggregate results obtained from the repeated choices experiments because the individual data are still under analysis. More precisely I shall limit our discussion to comment on the graphs obtained from the subjects' aggregate behaviours, during the entire length of each experiments.

Before starting the analysis of the graphs it is useful to take a look at the number of evaders computed for the first round of each experiment and at the total tax yield:

Tab.2 Evaders and tax yield from the dynamic experiments

Experiment	number of evaders (first round)	% of evaders (first round)	total tax yield (Italian liras)
DY1	14	46.0%	393,519
DY2	12	40.0%	495,345
DY3	16	53.0%	467,021
DY4	19	63.3%	397,524
DY5	15	50.0%	-

The first consideration that appears from tab.2 is that the percentages of evaders in the first round for all the repeated choices experiments is much higher than that reported in the one-shot experiment with objective audit probability (in experiment ST2 the evaders were only 28.2% of the total sample). As the starting lottery of all the dynamic experiments was unfair, while the lottery in ST2 was more than fair, this result is once more quite difficult to explain starting from the expected utility theory, unless we hypothesise that the subjects in ST2 had strong risk aversion while in all the dynamic experiments they were no risk adverse.

The second consideration regards the total tax yield collected at the end of the experiments; the differences confirm the importance of the moral constraint that had been already tested in the one-shot experiments. Both the experiment with tax yield redistribution (DY2) and the experiment with a public good financed with the tax yield (DY3) produced a higher tax yield than that collected in the standard experiment (DY1) and in the de-contextualised experiment (DY4). These data therefore seem to confirm the anti-evasion effect played by some psychological factor implied by the redistribution of the tax yield either in the form of money or as a public good.

The graphs from experiment DY1 are reported in fig. 7 and 8, which show the restless dynamic of the subjects choices which requires a careful interpretation, to be understood using the traditional expected utility theory and that seem apparently unaffected by the modifications to the lottery structure. To try to interpret the dynamic observed using the Von Neumann Morgenstern usual approach to choices under uncertainty we need to suppose that there is an high rate of subjects who are risk neutral (given the different lotteries) and therefore that are choosing the amount of money to pay each round by using a random device. The second consideration can be better evaluated by looking at two periods of the DY1 experiment, i.e. from round 11 to round 30 and from round 31 to round 48. During these periods all the influential variables of the lottery were kept constant except for the audit probability which changed at rounds 21 and 40 (these changes are plotted with a dotted line on the graphs). Dividing these two periods into four sub-periods: rounds (11-21); (22-30); (31-40); (41-48) and computing for each sub-period the average tax-yield per round yielded the following values:

(sub-group A - rounds 11-21 - tax audit = 6%) - average tax yield per round 5610.3
(sub-group B - rounds 22-30 - tax audit = 10%) - average tax yield per round 6032.2
(sub-group C - rounds 31-40 - tax audit = 10%) - average tax yield per round 7608.5
(sub-group D - rounds 41-48 - tax audit = 15%) - average tax yield per round 8458.9

The increase in the average tax yield from A to B is 7.5% against an increase of 66% in the audit probability. The tax yield increase from C to D is 11.1% while the increase in the audit probability is 50%. It follows that the effects produced on tax evasion by the increase in the tax audit probability are very small and one can argue that is quite ineffective.

It is worth to underline that we cannot use any other theory of behaviour under conditions of uncertainty, like the just mentioned prospect theory, to forecast in a robust way the dynamics described in the figures here reported. Unless we admit that most subjects are simply choosing randomly, it seemed that some form of adaptive dynamic

behaviour is driving the choices of our subjects. Going back to fig. 7 and 8 and introducing the graphs obtained from experiments DY2, DY3 and DY4 (fig. 9, 10, 11, 12, 13 and 14) we notice another important aspect of the results obtained from the experiments that can in some way support this late consideration. Even if the trends are very unstable and apparently follow a sort of random walk we can notice a constancy in the rounds immediately after a fiscal audit, which registers a systematic increase in tax evasion. This increase generally has its lowest peak in correspondence with the round immediately after the fiscal audit and it lasts at least two or three rounds. We call it "bomb crater effect", the subjects choose to evade immediately after a fiscal audit because they think that it cannot happen twice in the same place. This effect has a sort of echo and therefore many subjects still evade for two or three rounds after the audit. It is important to stress that the echo effect is probably reduced (compressed in time) because of the particular system of fiscal audits introduced in the experiment, which had effect over the last three rounds before the active round (the round when the audit effectively took place).

Fig. 7 Exp. DY1

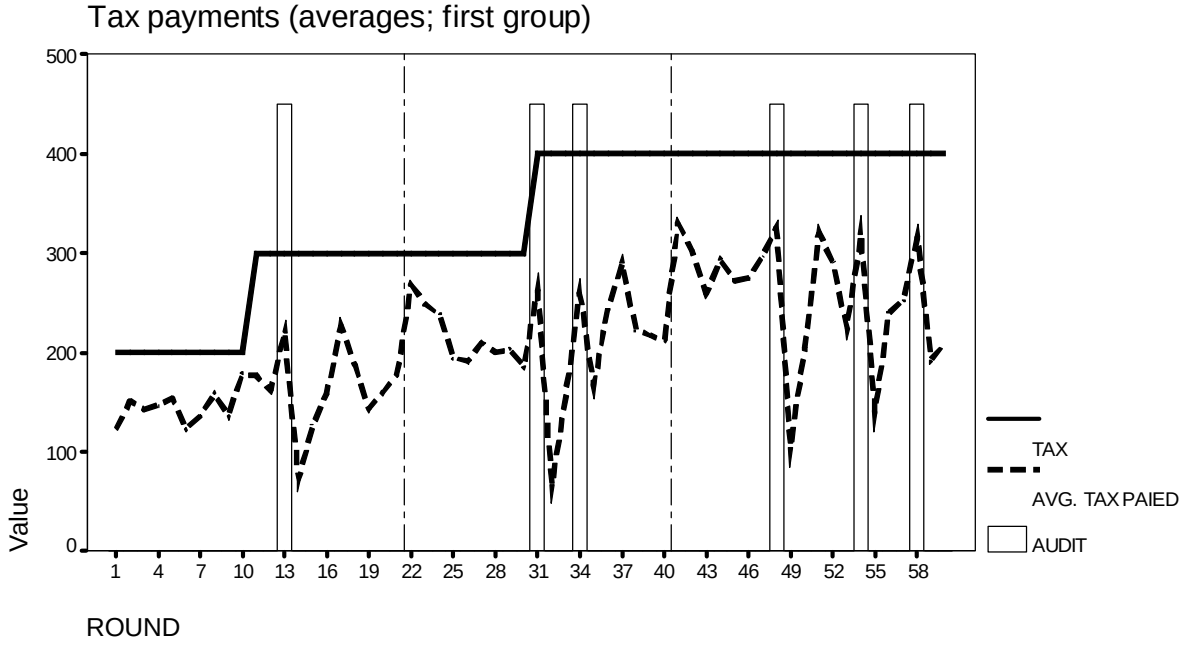
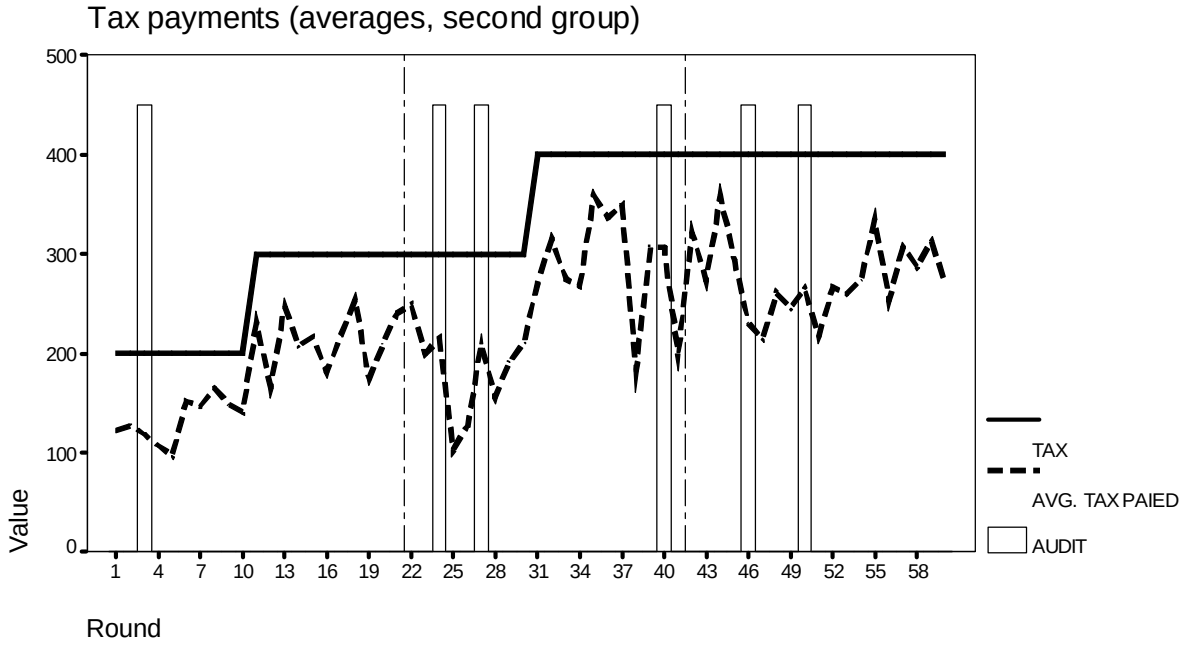


Fig. 8 Exp. DY1



The “bomb crater effect” is not influenced by the tax yield redistribution nor by the context. So it can be assumed to be a sort of mental representation of probability that the subjects automatically activate each time they have to cope with a choice under risk. To test if this mental representation of probability can be modified by experience we then introduced the experiment DY5. Looking at fig. 15 and 16 we can easily see that the audits were concentrated in the second half of the experiment for the subjects belonging to the first group and in the first half for the subjects belonging to the second group. The structure of the lottery in DY5 was kept constant for all the experiments to allow isolation of the effects produced by the audit timing. The result is quite clear. The subjects who “learnt” in the first half of their experimental lives that fiscal audits are a very uncommon event, also learnt to be risk takers and therefore had an highly favourable attitude towards tax evasion, even when they moved into the second half of their experimental lives, when the probability of being audited increased in a dramatic way. By contrast the subjects of the second group who learnt that fiscal audits are very frequent learnt to be risk adverse and to maintain this virtuous behaviour for the whole experiment.

Fig. 9 Exp. DY2

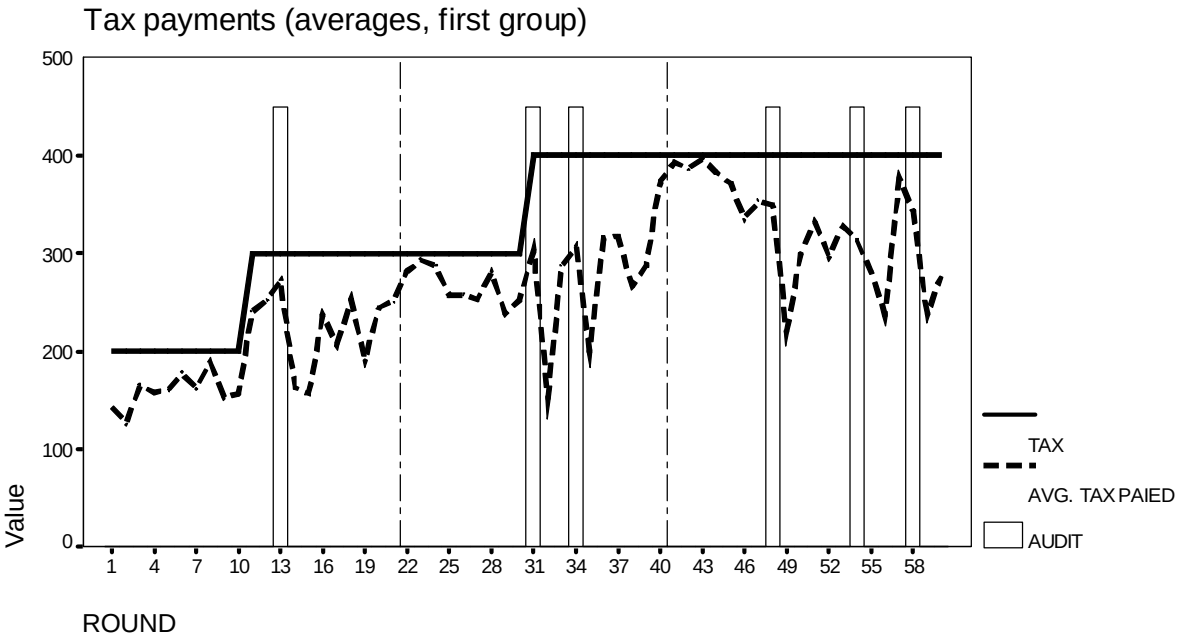


Fig. 10 Exp. DY2

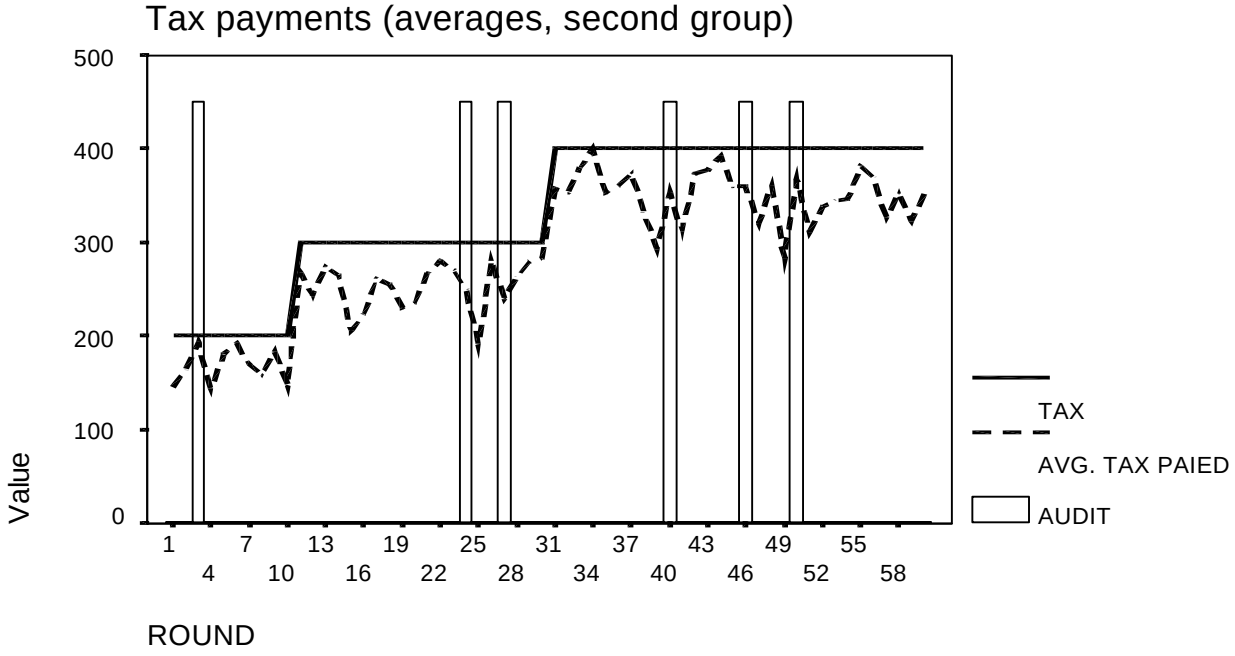


Fig. 11 Exp. DY3

Tax payments (averages, first group)

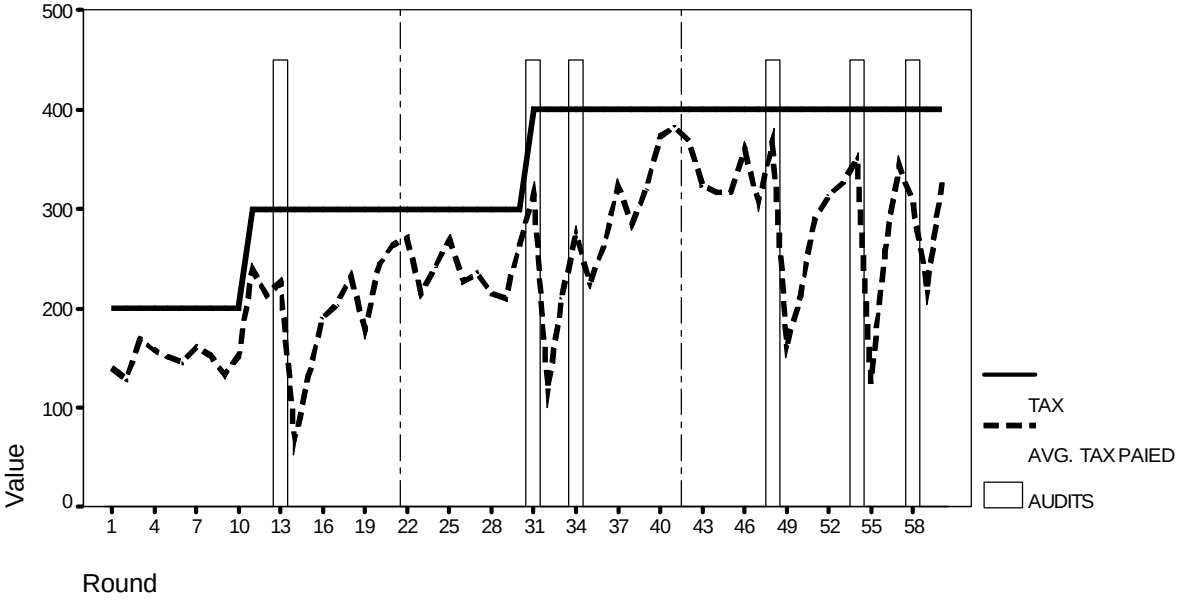


Fig. 12 Exp. DY3

Tax payments (averages, second group)

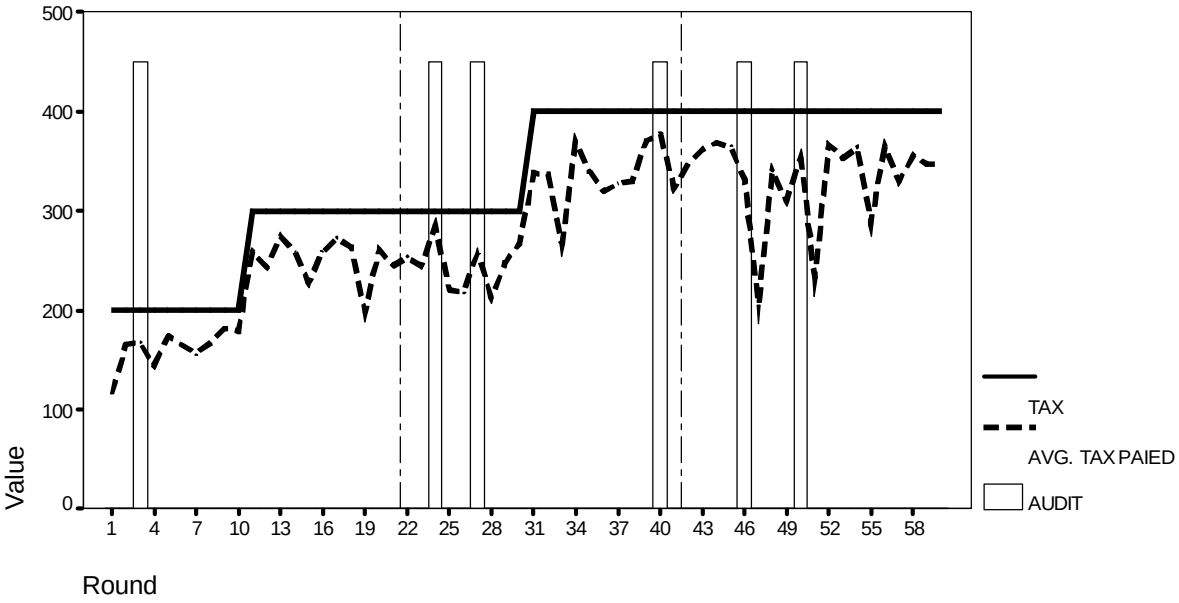


Fig. 13 Exp. DY4

Tax payments (averages; first group)

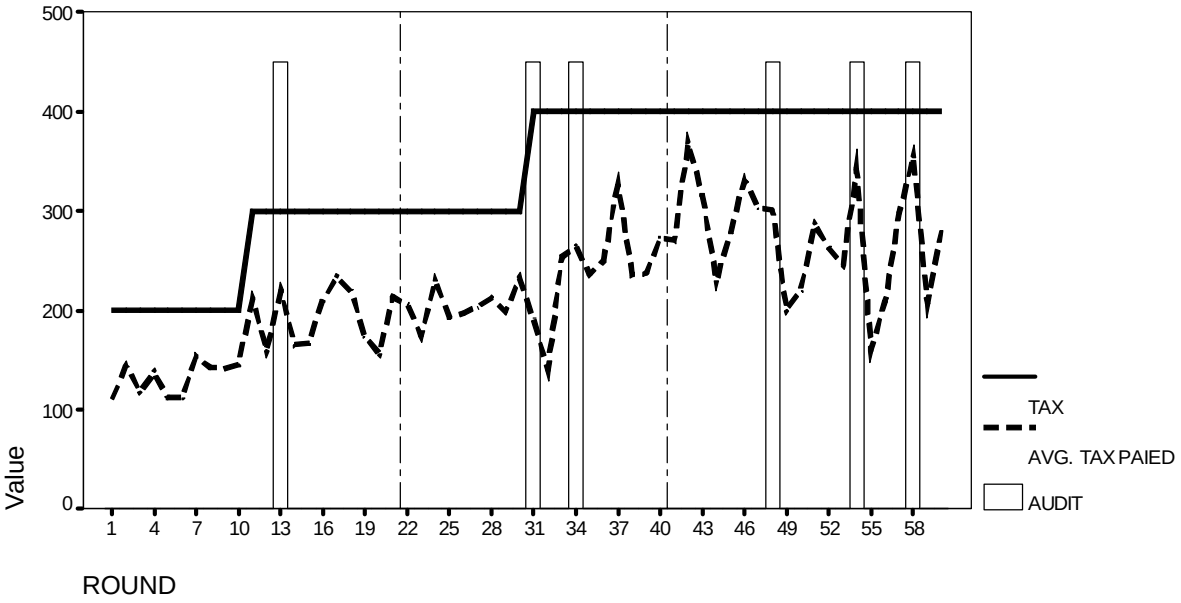


Fig. 14 Exp. DY4

Tax paied (averages, second group)

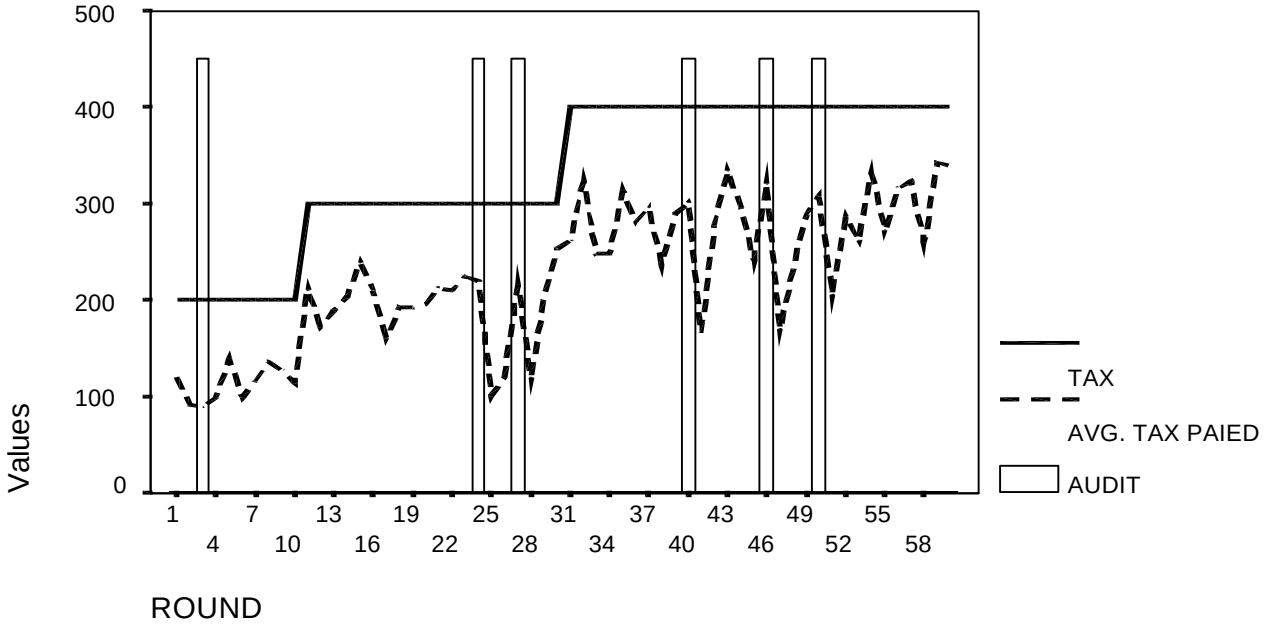


Fig. 15 Exp. DY5

Tax payments (averages; first group)

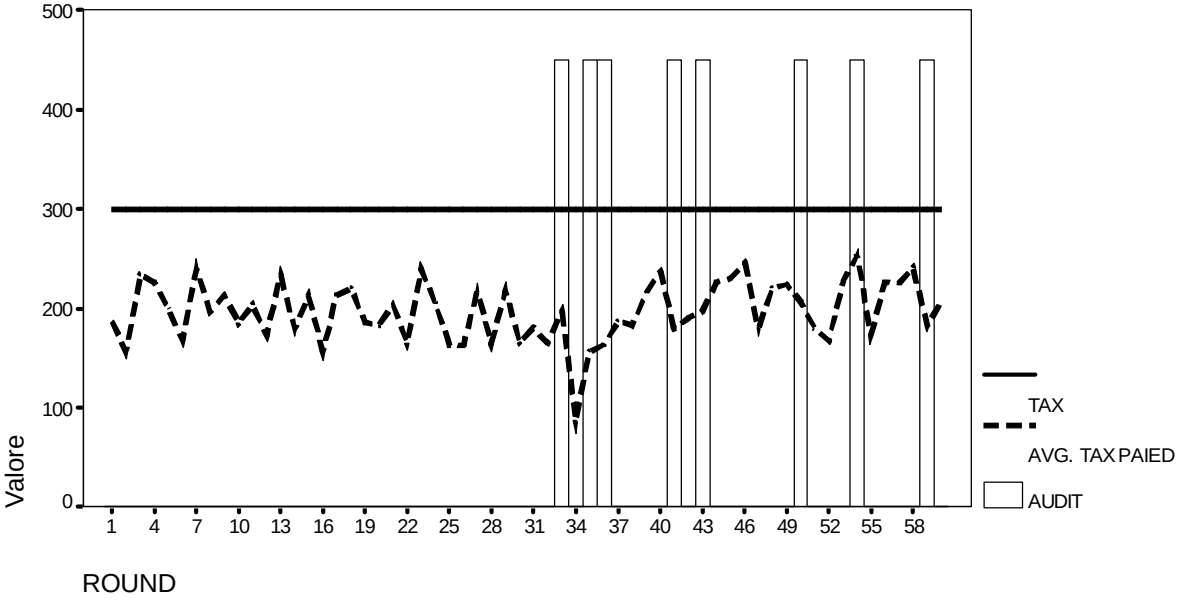
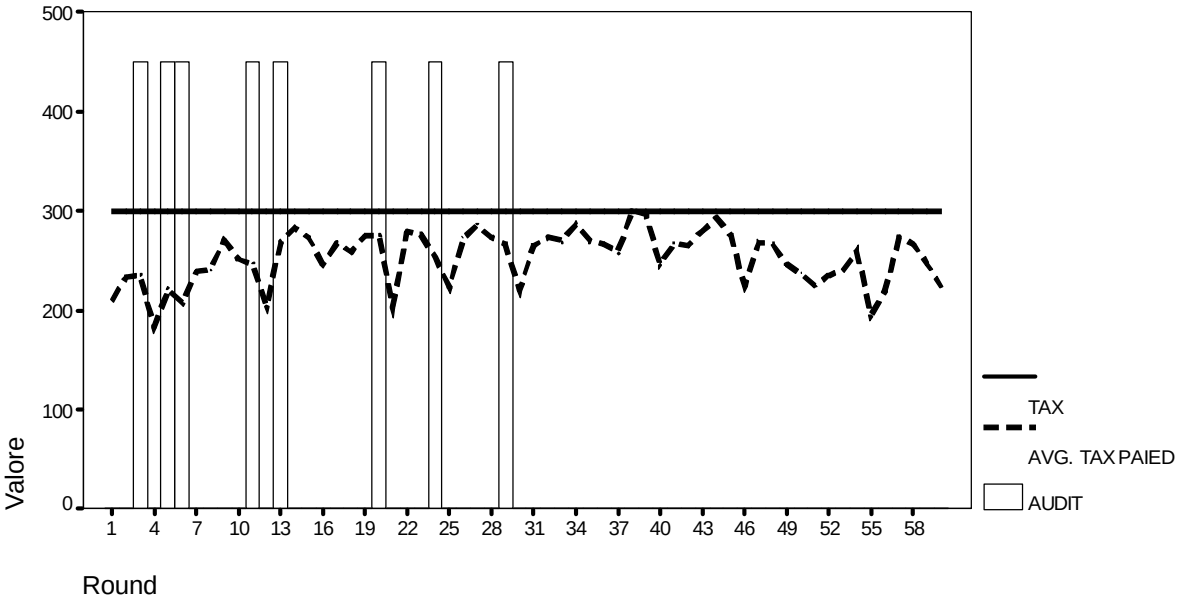


Fig. 16 Exp. DY5

Tax payments (averages; second group)



4 Conclusions

This work does not complete the analysis of the results obtained with the dynamic experiments and in particular does not explore the individual behaviours. Nevertheless some conclusions can be suggested even from this first overview. In table 3 I have summarised the main results emerged from the analysis of the experiments here presented.

Experiment	Risk attitude	Psychological effects
ST1 subjective probability; more than fair lottery	1) evaders' expected value from evasion always lower than the vaue of the sure choice 2) high percentage of evaders	1) tax yield redistribution reduces evasion 2) weak effect played by anonymity
ST2 objective probability; more than fair lottery	1) low percentage of evaders	1) weak effect played by tax yield redistribution 2) comparatively stronger effect played by anonymity
DY1 objective probability; unfair lottery	1) higher number of evaders if compared with ST2 2) complex dynamic of choices 3) "bomb crater effect"	
DY2 objective probability; unfair lottery; tax yield redistribution	1) complex dynamic of choices 2) "bomb crater effect"	1) tax yield redistribution reduces evasion
DY5 objective probability; unfair lottery; artificial audits	1) complex dynamic of choices 2) "bomb crater effect" 3) learning to be risk adverse	

Looking at table 3 one can notice that the more robust results regard the effect played by tax yield redistribution and by audits (what I have called "bomb crater effect"). Both these effects can be seen from a normative perspective as tools to reduce evasion. Obviously this conclusion required more analysis, that must be carry out mainly on the individual data.

Appendix

A1. ST1 experiment questionnaire

a) what do you believe is the probability of your being audited? Use the following scale to indicate your expected probability:

1----------7
min. probability max probability

b) how many other participants do you believe will evade taxes? Write it as a percentage.
c) How resentful are you that some of the other participants have decided to evade their taxes? Use the following scale:

1----------7
low resentment high resentment

d) Do you know the Ministery of Finance's audit procedure?
e) How many Italians in your opinion are audited each year by the board of the Ministry of Finance? Write it as a percentage.
f) Describe the audit procedure that you believe is actually used by the Ministry of Finance.

A2. ST2 experiment questionnaire

The questionnaire distributed to the participants to the ST2 experiment included questions b), c) and e) of the ST1 questionnaire plus the following new questions:

g) How many Italians do you believe usually evade taxes? Write it as a percentage.
h) Do you believe that the tax rate used in the experiment is fair? Use the following scale:

1----------7
unfair fair
i) Which in your opinion is the average rate for income tax in Italy?
l) Suppose that the number of fiscal audits in Italy is doubled, what change with this in your opinion?

A3. Instructions for the experimental subjects: ST1 experiment

- *group A: total anonymity, absence of any redistribution of tax yield)*

"First of all we want to thank you for having answered to the questionnaires we gave you. The reward for your work is in the envelope that you have just received.

Inside the envelope, besides the money, you will find two tickets with a number, which will keep you anonymous while you cash the reward.

The reward, as you know, is proportionate to the time spent and to the amount of work that you have done to answer to the questionnaires. In fact some of you have been given a greater number of questionnaires ("more work" state) compared to another group ("less work" state). To the members of the first group we have assigned a reward of 60,000 liras, while to the others we have given a 30,000 liras reward. These rewards, like any form of earned income, are subject to a tax.

Your tax rate is written in the "tax envelope" together with the amount of the tax burden (rounded to the lower 1,000 liras), that you should pay.

Before to pay the tax please answer to the questions that we gave you together with these instructions.

The operations that you must perform to pay your tax are the following (you cannot take more than 3 minutes to do everything):

1) enter the booth;
2) put the money for the tax in the "tax envelope" together with your answers to the questions;
3) put the remaining money in the "personal reward envelope" and one of the two identification tickets in the "ticket envelope";
4) seal all the envelopes;
5) join all the envelopes with the clip;
6) keep the second ticket, don't show it to anyone, will use it at the end to cash your money;
7) put the envelopes in the box of your group (i.e. "more work" box or "less work" box), then go back to your seat and wait until all the other participants have finished their tax payment.

It is important that you know that if you put the whole reward into your pocket without using the "personal reward envelope" you will lose the right to anonymity and the right to receive the personal reward.

If you decide to evade tax you take the risk of being detected by the fiscal enquiry, in that case (only in the case that you are detected by the fiscal enquiry) you must pay your debt plus the following fines:

I) tax evasion lower that 30% of the amount due: fine equal to 50% of the value of the tax evaded;
II) tax evasion from 31% up to 60% of the amount due: fine equal to 80% of the value of the tax evaded;
III) tax evasion over 61% of the amount due: fine equal to 140% of the value of the tax evaded;

The procedure used to carry out the fiscal enquiry is identical to that of the revenue office. The procedure that will ensure your anonymity has the following characteristics: after having decided the envelopes that will be inspected (more precisely the sets of three envelopes kept together with the pin),

a) the "personal reward envelopes" and the "tax envelopes" will be opened;
b) the fine will be applied, if there is tax evasion, putting back the remaining money in the "personal reward envelope";
c) the "ticket envelope" will not be opened (unless both the "personal reward envelope" and the "tax envelope" are empty). In this way, therefore, we will protect also tax evaders' anonymity.

All the remaining envelopes will be opened, except the "ticket envelopes", contained in boxes with the aim to check the amount of tax evasion. No fine will be applied on those envelopes. At the end of this last step we will keep the "tax envelopes", while the "personal reward envelopes" (that will be closed) and the "ticket envelopes" (obviously still glued to the "personal reward envelopes") will be put in a box, shuffled, and distributed to the participants using the reference ticket.

The instructions for the second group (group B, public audit, absence of any redistribution of tax yield) are identical to those just exposed with the only difference that no form of anonymity is assured to the participants chosen for the fiscal audit.

Also the instructions for the third group (group C, total anonymity, partial redistribution of tax yield) are basically identical to those of group A with the addition of a further piece of information:

"It is important that you know that a part of the total yield will be redistributed among all the participants. More precisely 70% of the total yield will be redistributed in identical individual parts. For example if the total yield (that is the sum of the individual payments of all the members of both the "less work" and "more work" groups) is 200,000 liras then each participant will receive 12,500 liras."

Obviously members of the fourth group (group public audit, partial redistribution of tax yield), received the group C instructions without any assurance of anonymity for those audited.

A4. Instructions for the experimental subjects: ST2 experiment

The instructions given to the subjects in ST2 are the same as those given in ST1, with the exception of two statements:

a1) "Your tax rate is written in the "tax envelope" together with the amount of the tax burden (rounded to the lower 1,000 liras), that you should pay."
b1) "The procedure used to carry on the fiscal enquiry is identical to that of the revenue office."

Which were respectively changed to:

a2) "The tax rate is the 40% of your reward and it is the same for all the participants. The amount of the tax burden (made round to the lower 1,000 liras) that you should pay is written in the "tax envelope"."
b2)"Three people will be randomly chosen for a fiscal inspection."

A5. Instructions for the experimental subjects: Dynamic experiments

This game is about the behaviour of tax payers. The game is computer aided, the software that you will use is pre-built and no direct intervention will be made by the researchers during the experiment. The results of your choices will be collected only after the end of the experiment and they will remain anonymous.

The game simulates a real world environment: there are several rounds that represent different time periods (for example years). In each period you will receive a round income (which at the end will correspond to your reward for the work you have done), in each period you will also be required to pay a tax but you can decide to evade part of the tax of even the whole amount of it. Independently of your choices you could be investigated in any moment of the game and if you have evaded in one or more of the last five rounds you must pay the taxes evaded plus a fee. The inspection may never take place and is decided and performed only by the machine, without any direct or indirect intervention by the researchers.

All relevant pieces of information will be provided directly through the computer screen and you are required not to communicate with anyone during the whole experiment.

This is the sequence that you must follow in each round of the game:

1) get informed about your round income and tax to pay;
2) decide the amount of tax to pay (from zero to the total amount required);
5) press the enter key.

If you do not perform the entire routine the machine will not allow you to pass to a new round and you must repeat everything.

A5. Computation of the dynamic experiments expected values with Mathematica

```
p1=p
p2= (1 - p1) p
p3= (1 - p2) p
p4= (1 - p3) p
prob = p1 + p2 + p3 + p4
uno= prob /. p -> .06 (* Probability to be audited on 4 round with p=6%  *)
due= prob /. p -> .1  (* Probability to be audited on 4 round with p=10% *)
tre= prob /. p -> .15 (* Probability to be audited on 4 round with p=15% *)
(* The following plots show the expected values for the lotteries *)
(* Audit = 6% Income = 1000 tax = 200 *)
p1=Plot[(uno (1000-tax-5.5*(200-tax))+ (1-uno) (1000-tax)), {tax,0,200}]
```

```
(* Audit = 6% Income = 1000 tax = 300 *)
p2=Plot[(uno (1000-tax-5.5*(300-tax))+ (1-uno) (1000-tax)), {tax,0,300}]
(* Audit = 10% Income = 1000 tax = 300 *)
p3=Plot[(due (1000-tax-5.5*(300-tax))+ (1-due) (1000-tax)), {tax,0,300}]
(* Audit = 10% Income = 1000 tax = 400 *)
p4=Plot[(due (1000-tax-5.5*(400-tax))+ (1-due) (1000-tax)), {tax,0,400}]
(* Audit = 15% Income = 1000 tax = 400 *)
p5=Plot[(tre (1000-tax-5.5*(400-tax))+ (1-tre) (1000-tax)), {tax,0,400}]
(* Audit = 15% Income = 800 tax = 400 *)
p6=Plot[(tre (800-tax-5.5*(400-tax))+ (1-tre) (800-tax)), {tax,0,400}]
Show[p1,p2,p3,p4,p5,p6]
```

References

Allingham, M. G. and Sandmo, A., 1972, *"Income Tax Evasion: A Theoretical Analysis"* in Journal of Public Economics, 1, 323-338.

Alm, J. Mc.Clelland, G. H. and Schulze, W. D., 1992, *"Why Do People Pay Taxes?"* in Journal of Public Economics, 48, 21-38.

Alm, J., Jackson, B. R. and Mckee, M., 1992, *"Estimating the Determinants of Taxpayer Compliance with Experimental Data"* in National Tax Journal, 1, 107-114.

Baldry, J. C., 1987, *"Income Tax Evasion and the Tax Schedule: some Experimental Results"* in Public Finance, 3, 357-383.

Becker, G., 1968, *"Crimine and Punishment: An Economic Approach"* in Journal of Political Economy, 76, 169-217.

Becker, W. H. and Buchner, H. J. and Sleeking, S., 1987, *"The impact of public transfer expenditures on tax evasion: an experimental approach"* in Journal of Public Economics, 34, 243-252.

Bernardi, L., 1989, *"Per un'introduzione ad dibattito sul sistema tributario italiano e alle proposte di riforma"* in Pedone (a cura di), 25-89.

Bernardi, L., Buratti, C., 1986, *"Irpef e Iva: un'analisi modellistica"* in Gerelli (a cura di), 241-274.

Bernasconi, M., 1995, *"Evasione fiscale in Italia ed evoluzioni recenti degli strumenti di contrasto"* in La Finanza Pubblica Italiana, 111-135.

Bernasconi, M., 1995, *"Evasione, pressione fiscale e progressività delle imposte"* in Rivista di diritto finanziario e scienza delle finanze, 3, 538-553.

Bonini, N., Mistri, M. e Rumiati, R., 1995, *"La Teoria del Prospetto: decisioni economiche e psicologia cognitiva"* Università di Padova.

Bordignon, M., 1992, *"Evasione fiscale: Aspetti teorici e suggerimenti pratici"* in Rivista Internazionale di Scienze Sociali, 1, 3-28.

Bulckaen F. 1984, *"Equità dei sistemi di controllo della evasione delle imposte personali sul reddito"* in Rivista di diritto finanziario e scienza delle finanze, 1, 399-426

Cassone, A. e Cogno, R., 1987, *"Il comportamento dell'evasione fiscale: una rassegna critica della letteratura"* in Rivista di diritto finanziario e scienza delle finanze,

2, 241-273.

Cerea, G., 1992, *"Una stima "prudenziale" dell'evasione dell'IVA nel settore del commercio"* in Rivista di diritto finanziario e scienza delle finanze, 51, 157-184.

Cerea, G., 1995, *"I confini dell'evasione"* Università di Trento (mimeo).

Chang, O. H., Nichols, D. R. and Schultz, J. J., 1987, *"Taxpayer Attitudes Toward Tax Audit Risk"* in Journal of Economic Psychology, 8, 299-309.

Chung, P., 1976, *"On Complaints about "High" Taxes: An Analytical Note"* in Public Finance, 31, 36-47.

De Garda, E. e Mannetti, L., 1992, *"L'attribuzione causale: teorie classiche e sviluppi recenti"* Il Mulino.

Di Cagno, D., 1990, *"I nuovi sviluppi della teoria delle scelte in condizioni di incertezza: i risultati di un esperimento"* in Economia, Società e Istituzioni, 2, 521-540.

Fishburn, G., 1979, *"On How to Keep Tax Payers Honest"* in Economic Record, 55, 267-270.

Friedland, N. 1982, *"A Note on Tax Evasion as a Function of the Quality of Information about the Magnitude and Credibility of Threatened Fines: Some Preliminary Research"* in Journal of Applied Social Psychology, 12, 1, 54-59.

Friedland, N., Maital, S., and Rutenberg, A. 1978, *"A Simulation Study of Income Tax Evasion"* in Journal of Public Economics, 10, 107-116.

Hewstone, M., 1991, *"Attribuzione causale: processi cognitivi alle credenze collettive"* Giuffrè Editore, Milano.

Hite, P. A., 1987, *"An Application of Attribution Theory in Taxpayer Noncompliance Research"* in Public Finance, 1, 105-118.

Hite, P. A., 1990, *"An experimental Investigation of the Effect of Tax Shelters on Taxpayer Noncompliance"* in Public Finance, 1, 90-108.

Kaplan, S. E. and Reckers, P. M. J., 1985, *"A Study of Tax Evasion"* in National Tax Journal, 1, 97-102.

Kaplan, S. E., Reckers, P. M. J. and Reynolds, K. D., *"An Application of Attribution and Equity Theory to Tax Evasion Behaviour"* in Journal of Economic Psychology, 7, 461-476.

Kaplan, S. E., Reckers, P. M. J. and Roark, S. J., 1988, *"An Attribution Theory Analysis of Tax Evasion Related Judgments"* in Accounting Organizations and Society, 4, 371-379.

Miceli, M., 1988, *"Teorie attribuzionali: cognitivismo senza scopi"* in Teorie e Modelli, 2, 31-59.

Pultini, F., 1979, *"Una esposizione diagrammatica della evasione fiscale come problema di scelta in condizioni di incertezza"* in Rivista di diritto finanziario e scienza delle finanze, 1, 24-40.

Robben, H. S. J., Webley, P. Weigel, R. H., Warneryd, K. E., Kinsey, K. A., Hessing, D. J., Alvira Martin, F., Elffers, H., Wahlund, R., Van Langenhove, L., Long, S. B. and Scholz, J. T., 1990, *"Decision Frame and Opportunity as Determinants of Tax Cheating: An International Experimental Study"* in Journal of Economic Psychology, 11, 341-364.

Rumiati, R., 1990, *"Giudizio e decisione: teorie e applicazioni della psicologia delle decisioni"*, Bologna, Il Mulino.

Shafir, E., Tversky, A., *"Decision Making"* in Invitation to Cognitive Science, MIT Press.

Spicer, M. W. and Hero, R. E., 1985 *"Tax Evasion and Heuristics; A Research Note"* in Journal of Public Economics, 26, 263-267.

Spicer, M. W. and Lee Becker, L. A. 1980 *"Fiscal inequity and tax evasion: an experimental approach"* in National Tax Journal, 2, 171-175.

Spicer, M. W. and Thomas, J. E., 1982, *"Audit probabilities and tax evasion decision: an experimental approach"* in Journal of Economic Psychology, 2, 241-245.

Srivansan, T. N., 1973, *"Tax Evasion: A Model"* in Journal of Public Economics, 2, 339-346.

Strumpel, 1968, *"Contribution of Survey Research"* in Quantitative Methods in Public Finance, 29-42.

Tagliacozzo, A., 1984, *"Per una sociologia dell'evasione fiscale"*, Roma, Carucci.

Thurman, Q., 1988, *"Taxpayer Noncompliance and Attribution Theory: An Experimental Vignette Approach"* in Public Finance, 1, 147-156.

Tutino, S., 1992, *"L'evasione contributiva"* in Studi ed informazioni, 4,27-52.

Tversky, A., Kahnman, D., 1979, *"Prospect Theory: An Analysis of Decision Under*

Risk" in Econometrica, 47, 263-291.

Tversky, A., Kahnman, D., 1992, *"Advances in Prospect Theory: Cumulative Representation of Uncertainty"* in Journal of Risk and Uncertainty, 5, 297-323.

Visco, V., 1983 *"Erosione ed evasione dell'imposta sul reddito delle persone fisiche"* in Rivista milanese di economia, 7, 101-110.

Vitaletti, G., *"La struttura e la dinamica dell'imposizione diretta"* in Gerelli (a cura di), 332-341.

Webley, P., Robben, H., Elffers, H., Hessing, D., 1991, *"Tax Evasion: An Experimental Approach"* Cambridge Univerity Press.

Yaniv, G., 1994, *"Tax Evasion and the Income Tax Rate: A Theoretical Reexamination"* in Public Finance, 49, 107-112.

Yitzhaki, S., 1974, *"A note on Income Tax evasion: A Theoretical Analysis"* in Journal of Public Economics, 3, 201-202.