Tax Evasion: Presumption of Guilt versus Presumption of Innocence

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Abstract

Fighting tax evasion is costly for the tax authorities as individual actions are hidden. Without monitoring, selfish agents will underreport their true income. Thus, when auditing is costly partial, random audits are implemented to deter evaders from cheating. In this paper we investigate two alternative mechanisms based on: random auditing: presumption of innocence or presumption of guilt schemes. Theses symmetric schemes are based: on aggregate disclosure of tax evasion existence, collective fines and random audits. We experimentally test their efficiency to lessens tax evasion and conclude the presumption of guilt scheme shows even better results than the presumption of guilt scheme.

Keywords: Tax evasion, audit, enforcement, guilt.

JEL Codes: C91, H26, H31, K44.

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1 Introduction

Fighting tax evasion is costly for the tax authority. According to the equity principle each agent should pay taxes as a function of his income. Without monitoring selfish agents will under-report their true income. To achieve equity each agent should be monitored, but such a system might be very inefficient. If monitoring is costly, efficiency requires equalizing the marginal benefit of monitoring to it's marginal cost, which implies partial - or random - auditing. While less equitable, random auditing is cost-effective.

In this paper we investigate two alternative mechanisms based on random auditing. It is assumed that the tax authority cannot observe individual incomes, but knows the aggregate income. Given the tax rule, the authority knows ex post whether there is misreporting. The two mechanisms considered are based on a random auditing scheme which is implemented whenever the agregate reported income is lower than the total income. The two mechanisms are equivalent from an efficiency point of view, but with opposite implications with respect to equity. One of the mechanisms is based on the presumption of innocence. A randomly selected subset of taxpayers will be audited if the agregate reported income is lower than the total income. The audit is implemented according to the following rule : if the audited individual misreported his true income the taxpayer will be liable for a collective fine calculated on the total amount evaded by his group. The other mechanism is based on the presumption of guilt : if the declared income is lower than the realized income, each member of the group will be liable for the collective fine. Nevertheless randomly selected subset of taxpayers is audited, according to the following rule : if the audited individual reported truthfully her income, she would not be liable to pay the fine.

Under suitable parametric restrictions, both mechanisms lead to truthfull income re-

ports. Therefore, at equilibrium, no audit is implemented under either mechanism. Therefore, for given income streams, individual utility, and group welfare will be the same under both mechansims.

2 Predictions

Let y_{it}be player i's income in period t, where $i = 1, \ldots, n$ and $t = 1, \ldots, T$. In each period players have to make an income declaration $x_{it} \leq y_{it}$. We note y_t the aggregate income of all players for period t, and x_t the total amount declared by all players in period t. We note $x_{-it}$the total amount declared by all players except player i in period t. Similarly, y_{-it} is the total income of all players except player i for period t. Declared income is taxed at a constant marginal rate τ. In the absence of any monitoring policy and public income distribution, player i's utility for period t (assuming risk-nentrality) is given by

$$u_{it}(y_{it}, x_{it}) = y_{it} - \tau x_{it}$$

For simplicity we assume that there is no discounting, and that the intertemporal utility of player i is equal to :

$U_i = \sum_{t=1}^{T} u_{it}$

It is straightforward that in the absence of regulation and redistribution, each individual declares $x_{it} = 0$ whatever her income, achieving utility level $u_{it}(y_{it}, 0) = y_{it}$ in period t, and total utility :

$U_i = \sum_{t=1}^{T} y_{it}$

Regulation is constrained by the observability of individual actions. We consider the case where the regulating authority cannot observe x_{it} without incurring monitoring costs. However we assume that y_t and x_t are observable at zero cost, allowing the tax authority

to know the total amount of tax evasion $y_t - x_t$. If the authority does not want to incur monitoring costs, policy instruments are restricted to penalty functions based on total tax evasion, without taking into account individual differences in misreporting. In order to adjust the penalty to individual data, the regulator must incur auditing costs to discover whether an individual misreported his income or reported honestly. We assume that there is an exogenously fixed budget available for auditing agents. Furthermore, we assume that this budget is constant over time, so that only a fixed number of agents can be audited in each period. From the agent's perpective, we assume for simplicity that the audit probability is taken as exogenous and independent.

We consider regulatory instrument based on the total amount frauded in the group of players, combined with a mitigation mechanism. Since the regulator cannot observe individual fraud without cost, the core of the policy instrument is to inflict blindly the same penalty to each member of the population of players. This penalty is a function of total fraud $y_t - x_t$. We assume that each player is liable for a penalty $\theta(y_t - x_t)$, $\theta > \tau$ whenever $x_t < y_t$, that is each player has to bear the total amount of tax evasion, whatever his private income and declaration. While such a policy instrument might seem very unfair, since honestly reporting players are fined like cheaters, at equilibrium fairness is not an issue, since as shown below, all players have an incentive to report truthfully their income.

The central feature of the above collective fine, is a mitigating mechanism, whereby honest taxpayers have a positive probability to avoid the collective penalty. The general principle is that random auditing detects (perfectly) whether agent i reported honestly or not her income, with some positive probability. If the audit concludes that agent i reported truthfully, he will be exempted from the collective fine.

There are two alternative ways to set up the mitigating mechanism. In the first case, whenever $x_t < y_t$ all members of the group are liable for the collective fine ex ante. Ex post, audited agents who reported truthfully are exempted from the collective fine. In the second case, whenever $x_t < y_t$ no-one is liable for the collective fine ex ante. Ex post, audited agents who under-reported their income are liable for the collective fine. We identify the first case as "presumption of guilt" and the second as "presumption of innocence". Under presumption of guilt no cheater can escape the sanctioning system, but some honest taxpayers might be fined unfairly. Under "presumption of innocence", no honest taxpayer is fined, but some cheaters can escape the penalization system. Both systems are unfair : under presumption of guilt, the system treats honest taxpayers unfairly, while under presumption of innocence, the system treats cheaters unfairly. However, theoretical results show that either system is perfectly revealing, that is at equilibrium no player is cheating. Therefore, there is no effective unfairness, only perceived unfairness.

Since the game has a finite number of periods, we apply subgame perfection. Past outcomes and penalties as well as future expected choices are independent from current choice. Therefore we solve the stage game by dropping the time index t.

2.1 Presumption of guilt

Under presumption of guilt each player's best reply to the other players' income declaration is to report truthfully. Since any undeclared Euro has a negative net gain $\tau - \theta$ player i has always an incentive to report truthfully, whatever the other players declaration, i.e. either if they report truthfully ($x_{-i} = y_{-i}$) or if they underreport ($x_{-i} < y_{-i}$). Therefore under presumption of guilt, since $\tau < \theta$, risk-neutral players will always report truthfully, achieving individual utility :

$U_i=(1-\tau)\sum_{t=1}^{T} y_{it}$
and total group utility

$U=\sum_{i=1}^{N} U_i=(1-\tau)\sum_{i=1}^{N}\sum_{t=1}^{T} y_{it}$

2.2 Presumption of innocence

Assume that $x_i < y_i$. Player i's expected utility is given by :

$u_i(y_i, x_i) = y_i - \tau x_i - p\theta(y - x) = y_i - \tau x_i - p\theta(y_i - x_i) - p\theta(y_{-i} - x_{-i})$

If $p\theta > \tau$, $u_i(y_i, x_i)$ is increasing with x_i and is maximized for $x_i = y_i$.

Note that the condition for honnest reporting under presumption of innocence is weaker than under presumption of guilt. Under presumption of innocence the expected penalty has to be larger than the tax rate, while under presumption of guilt the sure penalty must be larger than the tax rate.

3 Risk-averse agents

3.1 Presumption of guilt

Since the net income $y_i - \tau x_i - \theta(y_i - x_i) - \theta(y_{-i} - x_{-i})$ is increasing in x_i , because $\theta > \tau$, the same argument applies than for risk-neutral agents, since it is true for any increasing utility function. Therefore under presumption of guilt any expected utility maximizer reports truthfully.

3.2 Presumption of innocence

If player i reports truthfully his expected utility is equal to $u_i(y_i(1 - \tau))$, while if he undereports he achieves expected utility $(1 - p)u_i(y_i - \tau x_i) + pu_i(y_i - \tau x_i - \theta(y_i - x_i) -$

$\theta(y_{-i} - x_{-i})$). As for the linear utility case assume that $p\theta > \tau$. The latter inequality implies that his expected net income $y_i - \tau x_i - p\theta(y_i - x_i) - p\theta(y_{-i} - x_{-i})$ is lower than his sure income under truthfull report $y_i(1-\tau)$, which is equivalent to $u_i(y_i(1-\tau)) > u_i(y_i - \tau x_i - p\theta(y_i - x_i) - p\theta(y_{-i} - x_{-i}))$. Assuming $u''(.) < 0$, Jensen's inequality implies $u_i(y_i - \tau x_i - p\theta(y_i - x_i) - p\theta(y_{-i} - x_{-i})) > (1-p)u_i(y_i - \tau x_i) + pu_i(y_i - \tau x_i - \theta(y_i - x_i) - \theta(y_{-i} - x_{-i})$. Therefore, a risk-averse taxpayer always reports truthfully under presumption of innocence, whenever $p\theta > \tau$, i.e. the expected fine is larger than the tax rate.

4 Experimental design

The experiment was designed to compare the performance of the two auditing schemes to fight tax evasion as discussed in section 2. : presumtion of innocence (I) or presumption of guilt (G). This comparison was carried with different audit probability levels, respectively: low audit porbability (L) and high audit probabililty level (H). We also ran two benchmark sessions without any audit at all in order to observe the "natural" level of declaration of our sample. All things considered a total of 200 subjects participated in our experiment . We conducted 10 sessions, involving 20 subjects each. In each sessions, subjects were randomly assigned to fixed groups of 5 subjects interacting together until the end of the 30 periods of the experiment. For each treatment with audits (IL; IH; GL; GH) we ran 2 sessions, plus one test session for each scheme (I;G) without audit. The whole experiment was computerized : subjects had simply to declare their income on a computer in the LEEM[1]. Subjects were recruited thanks to the LEEM data base. This data base is composed of more than 3000 students from all universities of Montpellier, that is: law, letters, business, economics. Each experimental session took about one hour and a half.

[1]The LEEM is the experimental laboratory of Montpellier.

The declaration game is repeated over 30 periods, each of them being divided into two stages. At the beginning of stage one, subjects received an income, randomly and independently drawn from the set of possible incomes $\{10, 11, 12...99, 100\}$. New incomes are randomly and independantly drawn at the beginning of each period. So as to control for the effect of income and audit history of subjects we have initially drawn a sequence of incomes and audits for each groups over the 30 periods and we have used these sequances it in each session. Also all subjects were endowed with an initial capital of 100 ecus to avoid losses during the experiment. Losses could result for the implementation of the collective fine if many people in the group evade. At the end of the 30 periods, the computer drawn randomly 5 periods among the 30 periods of the experiment for each subject. Subjects total earning is estimated as the average of the earnings over these 5 periods, added to the initial endowment of 100 ecus (or what is left of it) and increased of the usual participation fee. The total amount is converted into euros following the conversion rate of 10 ecus equals 1 euro and paid in cash to subjects at the end of the experimental session.

The declaration game functions as follows. Each subject's task was to decide upon the amount of his income to declare. Subjects could freely choose their declaration level, i.e. any amount between total income allocated at the beginning of the period (full compliance) and zero (total evasion). At the end of stage one, the computer compared total income declared by the group and total income allocated to the group at the beginning of the period. If, for that group, total declared income was lower than total allocated income, the computer calculated a collective penalty equal to 60% of the observed difference. In stage 2 a 10% tax is deducted from each subject's declared income and if the group shows some underreported income, p randomly selected subjects were audited in each group. When the level of probability was low one individual in the group was audited whereas

when the audit probability was high three taxpayers were randomnly audited in the group.

While total declared income of the groupe differs from total allocated income the collective penalty is implemented. Nevertheless The implmenetation is symetric in these two deterrent schemes :

- In the presumption of guilt treatment (G) each member of the group under study is liable to the collective penalty, irrespectively of his personnal income declaration. Then the audit determined who, among members of the group, was eventually released from the collective penalty. Only audited subjects who declared honestly their income were exempted from the collective fine.

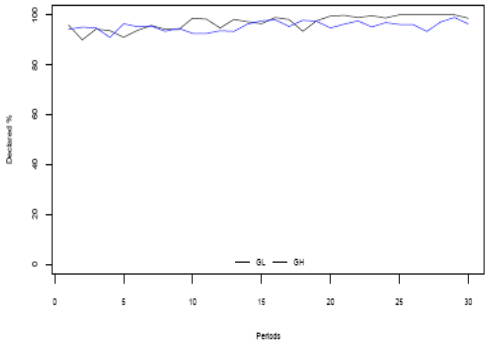
- In the presumption of innocence treatment (I), the audit determined which subjects were eventually liable to the collective penalty. Among audited subjects, only those who misreported had to pay the collective penalty.

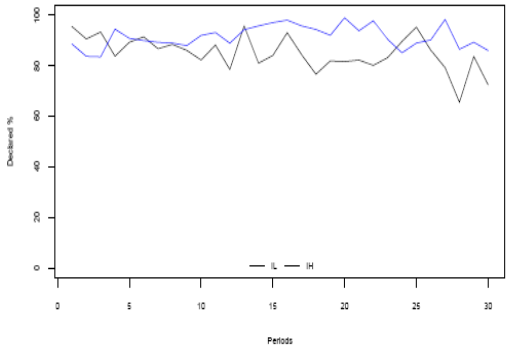
At the end of each period, the computer screen displayed the following information for each subjects and period : period number, allocated income , declared income, tax paid, amount of collective fine, individual audit (yes/no), penalties paid and total earning. Earning of the period correspond to : allocated income, minus tax, éventually minus collective penalty when it has to be paid. This history table is displayed on the upper right corner of the screen. Subject can freely consult this table by a simple clic.

5 Results

A preliminary data analysis consists of non parametric statistical analysis on our datas per groups and provides four main results on the relative efficiency of the presumption of innocence (I) versus presumption of guilt (G) schemes.

Result 1: There is a higher compliance level under G than under I for any positive level of the audit probability (either Low or High).



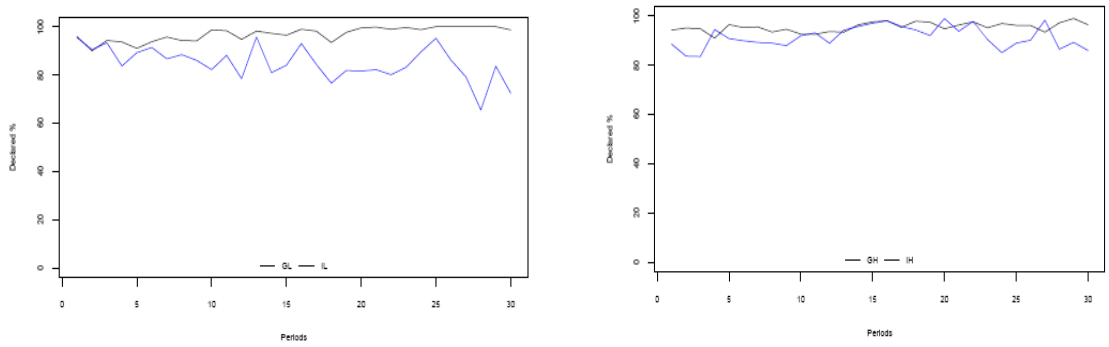


Proof: The analysis per groups displays the relative efficiency gain obtained from the implementation of the presumption of guilt scheme. We have calculated and compared the average declaration of the 5 members composing a group, for our 8 groups and for each treatment. The main observation resulting from this estimate is that **average declaration** and show in Fig 1**,** is increased under the presumption of guilt scheme compared to the presumption of innocence scheme. This calculation is respectively done for Low (GL 84.94%; IL 96.98%) and High (GH 95.44% ; IH 91.40%) audit probabilities. In order to support these findings we have run a Mann Whitney one sided U-test and rejected the null hypothesis that declared were the same under both schemes at the 5% level. This result holds whatever audit probability level is considered with a p-values of 0.0005 for the lower audit probability; whereas we obtain a p-value of 0.025when the audit probability is higher.

Discussion on Result 1: Thus we can conclude from these tests that there is a significative effect of the presumption of guilt scheme on tax compliance. The level of tax compliance is higher under the guilt scheme due to the collective penalty

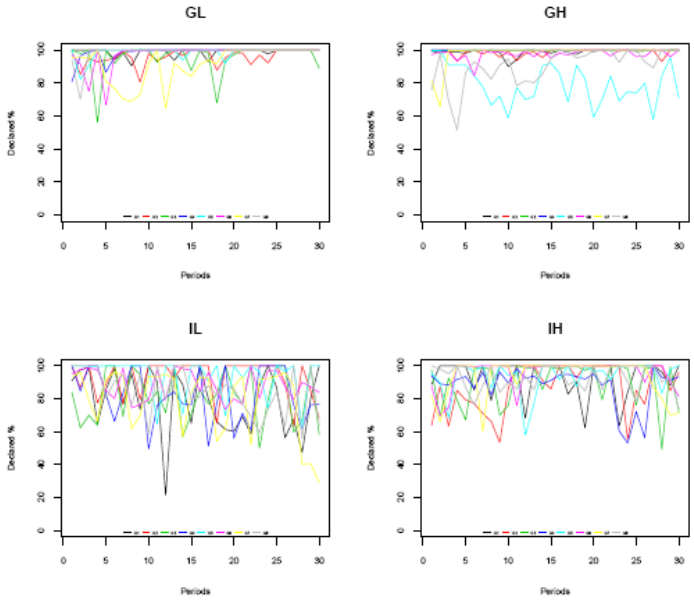
implemented any time one member of the group deviates from total compliance. Nevertheless due to the inequity problem attached to both scheme this result has to be completed by an analysis of the role of the audit probability level. From these very preliminary results it seems that the probability of audit only has a significant effect under the presumtion of innocence scheme, while showing no effect under the presumtion of guilt scheme.

Result 2: Increasing the audit probability increases compliance under the presumption of innocence scheme, while it has no effect under the presumption of guilt scheme.



Proof: Average declared income increases from 84.94% in the innocence treatment with a low level of audit probability to 91.4% in the innocence treatment with a high level of audit probability. The same comparison of average declared figures over the total sample for the presumption of guilt treatement, respectively low and high audit probabilities, results in the following percentages: 96.98% and 95.44%. The Mann Whitney one sided test supports these conclusions at the 5% level in the presumption of innocence case (p-value=0.025) while there is no rejection of Ho in the presumption of guilt scheme (p-value = 0.3225).

Discussion of result 2: Despite the fact that the audit is the only mitigation mecha-



nism in thess schemes we found no real effect of increased audit probability in the presomption of guilt treatment while any audited honest taxpayer is exempted of the collective fine. We found here an incentive to test the scheme without any audit. In these sessions we reach a "natural" level of compliance of respectively: 44% on average in the presomption of innocence treatment and of 92% on average in the presumption of guilt treatment. In such cases the audit, that allows for a correction of unfairness effects of the presumption of guilt scheme, shows a very low level of efficiency because the scheme by itself is efficient. Collective penalties due to social interaction are efficient in providing high levels of compliance at low administrative costs.

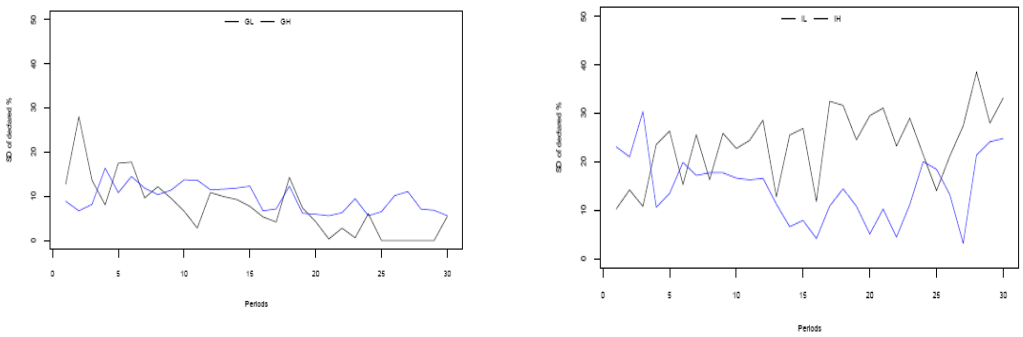
Result 3: Variability of declared income is larger under the presumption of innocence treatment than under the presumption of guilt treatment.

Proof: Average standard deviations of declared income, in %, are higher in the presumption of innocence treatment than in the presumption of guilt treatment, with respec-

tively: 23.54% and 7.57 % for the low level of audit probabilities. Similarly results obtained with the higher level of audit probability show the same characteristics: respectively 14.77% and 9.54% for presumption of innocence and presumption of guilt schemes respectively. The gap between the two schemes is particularly significant in terms of variability for the low audit probability as the Mann Whitney two sided test confims at the 1% level (p-value =0.001 low audit probability ; p-value=0.083 high audit probability).

Discussion of Result 3: Taxpayers in the innocence treatment often show a fragmented strategy, that is shift from evasion to honesty from periods to periods. This can be explained by the change in allocated revenu levels but also by audit history. Usually it has been shown in the litterture thta the higher the revenu was the higher the tax evasion level was. So any decrease in revenu from one period to the other may explain a decrease in evasion. Moreover in the innocence treatment any audited taxpayer at period t will expect not being audited again during the next period and as a consequence may underdeclare his income. Individual data analysis should provide additionnal explanations for such behaviors.

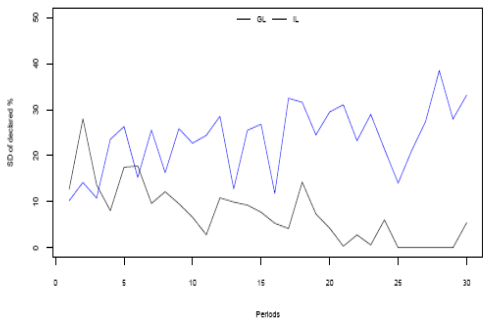
Result 4: Varibility over the 30 periods shows a decreasing trends in standard deviation of declared under the guilt scheme, but not under the innocence scheme.

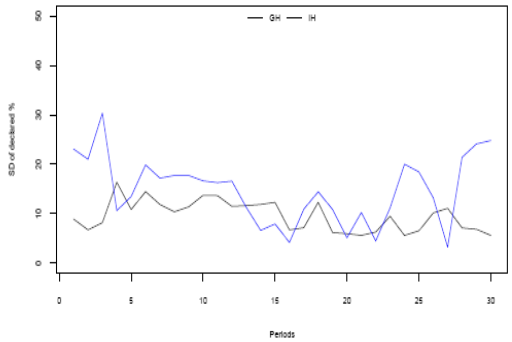


Proof: Observations of standard deviations of declared from total honesty shows a de-

creasing trend in time under the guilt scheme whatever audit probability is implemented. This result does not hold in the presumtion of innocence scheme with a potentially increasing trend (see right hand side of figure 3).

Discussion of Result 4: Deterrent policies are usually presented as short term policies, especially when audit is not retroactive, which is the case here. Nevertheless there is a learning effect in time under the presumption of guilt scheme and we can observe a long term adjustment towards more honesty. The result doesn't seem to hold in the presumption of innocence treatment because there is not the same level of interdependence in actions of the members of a group. Any evasion, detected at the group level, will trigger the audit but only dishonest taxpayers will have to pay the fine. There is no incentive to punish the other members for having paid a fine while being honest as it can appear in the presumption of guilt scheme. From figure 4 we can add that the innocence treatment can offer similar results to the guilt treatement in terms of variability by increasing the audit probability. This costly procedure ensures increases in the efficiency of the scheme and in the administrative costs of tax evasion deterrence.





6 Conclusion

This research is derived from the fact that, in the tax evasion problem, regulatory possibilities are constrained by the observability of individual actions. This is also the case in many environnemental problems and this idea has been inspired by environnemental policies. Since the regulator cannot observe individual evasion without cost, the core of the policy instrument is to inflict blindly the same penalty to each member of the population of players. This penalty is a function of total evasion, where each player has to bear this collective penalty, whatever his private income and declaration. While such a policy instrument might seem very unfair, since honest players are fined like cheaters, in equilibrium fairness is not an issue since all players have an incentive to report truthfully their income. Moreover, unfairness has always been pointed as a justification for tax evasion decisions: perception of unfairness increasing tax evasion. Hopefully our preliminary result show that the very high efficiency of the presumption of guilt scheme in reducing tax evasion mitigating, as a direct consequence, any inequity problem.

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