



# Can strategic uncertainty help deter tax evasion? An experiment on auditing rules



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## ABSTRACT

This paper adds to the economic-psychological research on tax compliance by experimentally testing a simple auditing rule that induces strategic uncertainty among taxpayers. Under this rule, termed the *bounded* rule, taxpayers are informed of the maximum number of audits by a tax authority, so that the audit probability depends on the joint decisions among the taxpayers. We compare the bounded rule to the widely studied *flat-rate* rule, where taxpayers are informed that they will be audited with a constant probability. The experimental evidence shows that, as theoretically predicted, the bounded rule induces the same level of compliance as the flat-rate rule when strategic uncertainty is low, and a higher level of compliance when strategic uncertainty is high. The bounded rule also induces distinctive tax evasion dynamics compared to the flat-rate rule. The results suggest that increasing the level of strategic uncertainty among taxpayers could be an effective device to deter tax evasion.

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## 1. Introduction

Auditing is a common strategy used in fighting against the pervasive evasion problem in all tax systems. In most prior research modeling tax evasion, auditing is analyzed in terms of the one-to-one interaction between the tax authority and a taxpayer. Specifically, the taxpayer chooses between honestly stating his income or cheating on his taxes, which results in either extra money if not detected or financial losses otherwise. Audits are carried out in a simple randomized fashion: The taxpayer is audited with a certain probability, either pre-committed by the tax authority (see, e.g., Allingham & Sandmo, 1972) or not (see, e.g., Graetz, Reinganum, & Wilde, 1986). In this study, we refer to this auditing rule as the *flat-rate* rule.<sup>2</sup>

While simple and intuitive, the existing tax evasion framework neglects the potential impact of social interactions among taxpayers. Recent studies argue from an economic psychology perspective that compliance decisions are affected by

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<sup>2</sup> See the literature review in the next section.

personal, social and societal norms (Kirchler, 2007).<sup>3</sup> In other words, the compliance decisions of taxpayers do not merely depend on their isolated assessments of economic variables such as income, audit probability and penalty, but also on *their beliefs about what they should do and what others would do*. Given the limited audit resources of a tax authority for a fixed period of time, a taxpayer's belief regarding the compliance decisions of others may affect his own compliance decision and, consequently, the ex-post probability of being audited. This could lead to distinctive tax evasion dynamics and equilibria across societies.

Given that evasion decisions might be depended on the beliefs that taxpayers have concerning each other, could tax authorities construct better auditing strategies that induce higher compliance? In this paper, we experimentally model and examine an innovative auditing rule that induces strategic uncertainty among taxpayers. According to Brandenburger (1996), strategic uncertainty arises when “there is uncertainty concerning the purposeful behavior of players in an interactive decision situation”, as opposed to a game against nature. We create strategic uncertainty by informing the taxpayers of the maximum number of audits to be carried out, instead of telling them directly what the audit probability is. We refer to this as the *bounded rule* because the number of audits is bounded by the limited resources of the tax authority.<sup>4,5</sup>

Studying the bounded rule is interesting for two reasons. Firstly, the bounded rule, relative to the flat-rate rule, describes the actual auditing practice more realistically. Most organizations, public and private alike, plan their activities, such as auditing, according to the committed budget of a period. Once the budget is allocated for a certain purpose, it becomes difficult to reshuffle during the course of a fiscal year. Given the fixed audit capacity of a tax authority in a certain period, it is difficult to commit to a pre-specified audit probability. Secondly, the bounded rule naturally incorporates the analysis of beliefs via game theory. Since the tax authority only conducts a fixed number of audits, the actual audit probability faced by a taxpayer is endogenously determined by the evasion decisions of other taxpayers. Consequently, a taxpayer has to infer the audit probability by forming expectations of the decisions of others.

Apart from strategic uncertainty, the bounded rule also brings in uncertainty regarding the occurrence of an audit compared to the flat rate, in that it is much more difficult for taxpayers to calculate the exact audit probability. We attempt to identify these effects in our experiment. In particular, we ask two research questions. First, how does the complex structure of the bounded rule (i.e., the ambiguous audit probability) affect the level of compliance compared to that of the flat-rate rule widely studied in the literature? Second, how does the level of strategic uncertainty (i.e., beliefs about the others' behavior) affect compliance decisions?

We take an experimental approach to examine these questions. Compared to empirical data from the field, the laboratory offers tight controls on the tax-reporting mechanisms such as audit probability, tax rate, and income level. By carefully selecting the relevant parameters, we can directly compare the actual compliance behavior under the two auditing rules which are equally deterrent in theory. Moreover, we can measure tax evasion behavior repeatedly and inexpensively in the laboratory without the errors that may otherwise occur in field data (for more discussions on the methodology of experimental methods on tax evasion, see, e.g., Alm & McKee, 1998; Torgler, 2002).

Our laboratory setting follows the key features of a classical tax compliance game first developed by Graetz et al. (1986). Every taxpayer has a certain probability of receiving high or low income.<sup>6</sup> Knowing a certain auditing rule (flat-rate or bounded), they have to decide simultaneously and independently whether or not they will report their income truthfully to the tax authority. Then the tax authority implements the auditing rule, depending on the treatments. In the flat-rate rule treatment, every low-income report is audited with a constant probability. In contrast, the bounded rule audits a randomly selected sample of low-income reports whenever the number of these reports exceeds the maximum number of audits allowed by the budget. Otherwise, it audits all of the low-income reports.

To examine our first research question, we select parameters for the bounded rule such that (1) the theoretically predicted deterrence effect of the bounded rule is statistically equivalent to that of the flat-rate rule and; (2) the optimal decision of the profit-maximizing taxpayers does not depend on their beliefs about the others' behavior. That is, they have a dominant strategy to cheat on taxes since the level of strategic uncertainty is low. By comparing the actual levels in these two treatments, we are able to examine whether the complex structure of the bounded rule affects compliance.<sup>7</sup>

To study the second question, we increase the level of strategic uncertainty faced by taxpayers under the bounded rule by manipulating the number of players receiving high income. As a result, the equilibria depend on the independent beliefs of

<sup>3</sup> A personal norm, which is defined as “a moral imperative that one should deliberately comply”, is associated with factors such as moral reasoning, religious beliefs and political party preference. A social norm, according to Wenzel (2005), is “prevalence or acceptance of tax evasion among a reference group” (e.g., friends, colleagues or acquaintances). A societal (or culture) norm, which reflects the general attitude towards tax evasion in a large population, is often addressed as tax morale or civic duty.

<sup>4</sup> The bounded rule was inspired in a theory paper by Yim (2009). However, this experiment is not a strict test of Yim (2009) as we modified a key feature of Yim's model.

<sup>5</sup> We thank an anonymous referee who points out that the bounded rule could be interpreted as a simplification of the cut-off rule. A real world example of the cut-off rule is the *Studi di Settore* system used by the Italian Tax Administration in dealing with small size firms and independent workers. The system calculates the estimated gross income based on the observed characteristics of taxpayers such as firm size and location, and audits those who negatively deviate from the estimates with larger probability. For the analysis of this system see Marchese and Privileggi (2009).

<sup>6</sup> Such a binary-income setting, or similar discrete-type extensions, are used in many studies (e.g., Alm & McKee, 2004; Mills & Sansing, 2000, and some others cited in footnote 4 of Yim, 2009).

<sup>7</sup> A limitation of the design is that it does not completely rule out the strategic interaction channel. Even though the optimal strategy is independent of beliefs, players have to think of the others' actions strategically. It is important that future experiments further identify these effects. See Section 6 for discussion.

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