

# Specious Confidence after Tax Audits: A Contribution to the Dynamics of Compliance\*

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## Abstract

Dynamics of compliance, depending on audit probability, sanctions, and the time lag between audits, are investigated in a tax experiment. Compliance varied significantly over time: it decreased immediately after an audit and increased afterwards, especially if audits were frequent and sanctions high.

*Keywords:* Tax evasion, Misconception of chance, Audits, Sanctions, Experimental economics

*JEL-classification:* C91, D44

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## 1 Introduction

Previous experimental studies on tax behavior have been particularly concerned with determining the absolute effect of detection rate and punishment on tax filing; the dynamic process of compliance, however, remained largely unexplored. This paper contributes to the literature by investigating the dynamics of compliance in the context of audits, sanctions, and the time lag between past audits in a tax experiment.

A large number of experimental studies on tax behavior was inspired by, or related to, the seminal theoretical paper by Allingham and Sandmo (1972), drawing upon the standard economic framework. According to this paradigm, taxpayers weigh the expected utility of the benefits from successful tax evasion with the uncertain prospect of detection and punishment. An increase in audit probability as well as an increase in tax penalty is assumed to enhance tax compliance.

The standard economic framework solely stresses exogenous variables. Experimental evidence, however, on the impact of audit probability and tax penalty on compliance are ambiguous. Spicer and Lundstedt (1976), for instance, confirmed the influence of audit probability, but not the impact of sanctions. Also, Baldry (1987) showed that the threat of detection increases compliance rates, punishment, on the other hand, did not influence tax behavior. To the contrary, Friedland et al. (1978) demonstrated that large fines are more effective deterrents than small ones, even when audit probability is reduced proportionally. Alm et al. (1995) showed that compliance is positively related to audit rate, at least for large fines, and Alm et al. (1992) emphasize that the rate of compliance rises in a non-linear way as the probability of detection increases.

One of the sources of ambiguity might be the sole focus on the absolute effect of audit probabilities and fines. The dynamics of tax compliance between two audits has not been explicitly investigated. We conjecture that the effect of audits crucially depends on the time lag between past audits, and the naive generation of taxpayers' expectations as when the next audit is likely to occur. It might well be that naive reasoning predicts that the probability of consecutive, yet independent, audits is low; a violation of independence according to probability theory.<sup>1</sup> If subjects are prone to this misconception of chance, it is expected that the more time has passed without audits the higher the perceived probability of an audit might be. In case of high fines, taxpayers' endeavor to accurately predict audits should increase; if fines are low, learning from the past might be perceived as less necessary.

We predict that tax compliance depends on audit probability, sanctions, and the time lag between past audits. More precisely, a three-way interaction effect is predicted: in case of frequent audits, compliance is expected to be low immediately after an audit and is assumed to increase rapidly in the course of subsequent tax filings; in case of less frequent audits, compliance should be low after an audit and is expected to increase slowly. This pattern is assumed to be particularly pronounced under high sanction conditions.

This hypothesis was tested on subjects' tax behavior, who earned their income endogenously

in a market. Contrary to most previous experimental studies, compliance therefore is not investigated based on “windfall” money, distributed to subjects by experimenters. Instead, subjects in our study earn their income themselves in an asset market experiment. More precisely, subjects are asked to declare their earnings, separately for sales revenues, resulting from selling assets, and for dividends received after each of the trading periods. A 2 x 2 experimental between-subjects design is implemented, varying audit probabilities and fines.

## 2 Experiment

### 2.1 Participants

Overall, 72 students from the University of Vienna or the Vienna University of Economics and Business Administration participated in six sessions of an experimental asset market with 12 subjects each. On average, subjects earned Euro 14.39 ( $SD = 17.37$ ). Twenty-six females and 46 males, aged 19 to 30 ( $M = 22.17$ ,  $SD = 2.65$ ), participated in the study. An experimental session took about 2 hours and 15 minutes.

### 2.2 Experimental procedure

After instructing subjects about the market and trading procedures they participated in a computerized experiment, conducted using the software z-Tree (Fischbacher 1999); for a detailed description of the experimental procedure in a similar setting see Kirchler and Maciejovsky (2002). Subjects were informed that overall 16 to 20 trading periods would be performed (with a random termination mechanism in the last five periods with equal probability); that after each trading period they would be asked to declare their income (subject to a 50% tax rate), separately for sales revenues and dividends; and that audit probability would be 15% and 30%, respectively, whereas penalties would either be 50% or 100% of the evaded income. Taxable sales revenues were defined as the positive difference between the selling price of assets and its purchase price.

Since the main focus of this paper was to investigate the dynamics of compliance, it was our aim to aggravate the gambling aspect of tax decisions. A convenient way to attain this goal is simply to redistribute tax yields to the experimenter; implying that taxes are lost money to subjects. The expected payoff of subject  $i$  in period  $t$  after tax filing therefore is:

$$E(d_i^t) = p[(1 - r)y_i^t + re_i^t - (1 + f)e_i^t] + (1 - p)[(1 - r)y_i^t + re_i^t], \quad (1)$$

whereby the tax rate is denoted by  $r$ , the audit probability by  $p$ , the penalty by  $f$ , the evaded income by  $e$ , and the investment income, earned in the asset market, by  $y$  ( $e \leq y, 0 \leq p \leq 1$ ).

A double-auction market with 18 periods, each lasting for 120 seconds, was implemented. The number of periods was determined according to the above described termination mechanism and

was applied to all six sessions. In each period, subjects were endowed with 300 ECU (Experimental Currency Units)<sup>2</sup> and five risky assets. Dividends for the assets were determined randomly in each period according to a pre-specified distribution, which was known to subjects.

To ensure comparability between the six sessions, audits were randomly selected prior to the experiment. In the low-audit condition, declarations were audited after periods 3 and 12, whereas in the high-audit condition the respective audit periods were 3, 5, 8, 12, and 16.

### 3 Results and discussion

The prediction of the three way interaction effect was tested by a mixed 2 x 2 x 5 x 2 analysis of variance with compliance rates as dependent variable. The factors are audit probability and sanctions (both between subjects factors), trading periods after an audit (1 to 4) plus the baseline prior to audits (first three periods), and as control factor, type of income, sales revenues versus dividends (both within subjects factors).

The analysis yielded insignificant main and interaction effects for income type. Also the predicted three-way interaction did not reach significance ( $F(4, 80) = 0.64; p = .63$ ). The two-way interaction between audit probability and period was significant ( $F(4, 80) = 5.36; p < .01; \eta^2 = .21$ ). The two-way interaction effect between fine and period approached significance ( $F(4, 80) = 2.30; p = .07$ ). And finally, the main effects of period ( $F(4, 80) = 3.97; p < .05; \eta^2 = .17$ ) and audit ( $F(1, 20) = 17.71; p < .001; \eta^2 = .47$ ) were highly significant. Results of the significant two way interactions are presented in Figures 1 and 2, whereby baseline denotes initial compliance rates in the first three periods prior to audits.

[Insert Figure 1 about here]

[Insert Figure 2 about here]

Our results confirm that in the high-audit condition tax compliance was generally higher than in the low-audit condition. Moreover, compliance decreased sharply after an audit and slowly increased in the next three trading periods. This dynamic is especially pronounced in the high-audit condition where tax behavior seems to be quite strategic from a subjective perspective. High and low fines had no moderating effect in the present study.

Our results suggest that participants employed a strategy which emanates from a misconception of chance: subjects showed less compliance immediately after an audit, possibly assuming that audits are interspersed uniformly across time; being audited twice in a row was perceived as rather unlikely.<sup>3</sup> As expected, the adjustment process of returning to baseline compliance was expedited in the high-audit condition (see Figure 1).

A less clear picture emerged in the sanctions condition, which, as described above, did not reach statistical significance. However, it seems that participants show a tendency to be more responsive to fines in the high sanction condition than in the low one (see Figure 2).

The sharp decrease of compliance after an audit could also be due to loss repair and increased risk taking. Support for this conjecture is evident from the dynamics following the purchase of assets. A net increase in asset holdings led to a lower compliance in the subsequent filing. A t-test of participants' average compliance after a decrease of cash holdings due to asset investments as compared to compliance after no such decrease approached significance ( $t(67) = 1.55, p = .06$ ). When interpreting this finding in the light of prospect theory (Kahneman and Tversky 1979), an increase in asset holdings and decrease in disposable income, might be perceived as subjective loss, which in turn, amplifies risk seeking behavior. Tax evasion might be used as a means to "repair" such perceived losses.

## Notes

<sup>1</sup>For a discussion of biases of chance see, for instance, Hastie and Dawes (2001).

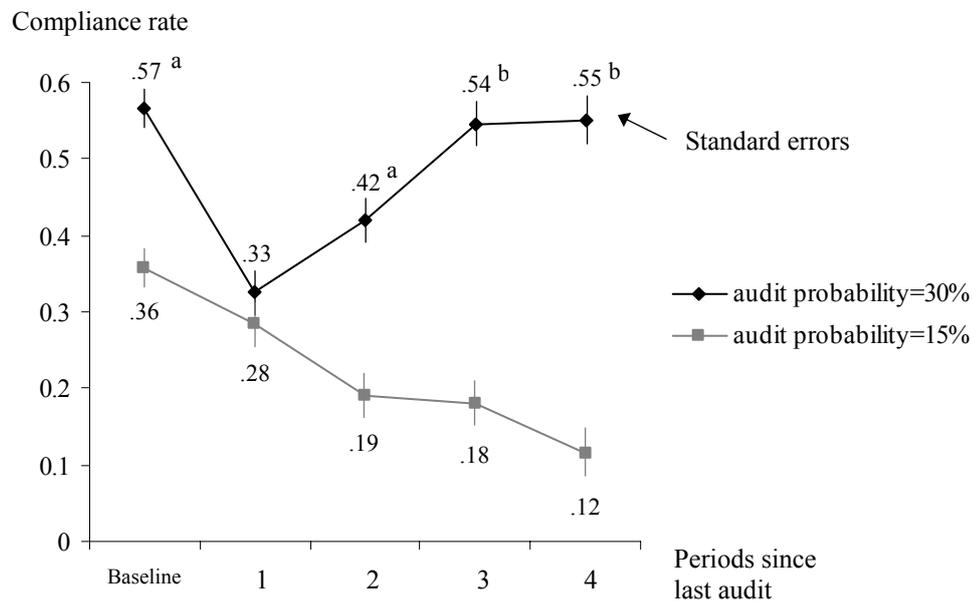
<sup>2</sup>The exchange rate was 10 ECU equal 7 Euro Cents.

<sup>3</sup>Similar results are reported by Mittone (1999).

## References

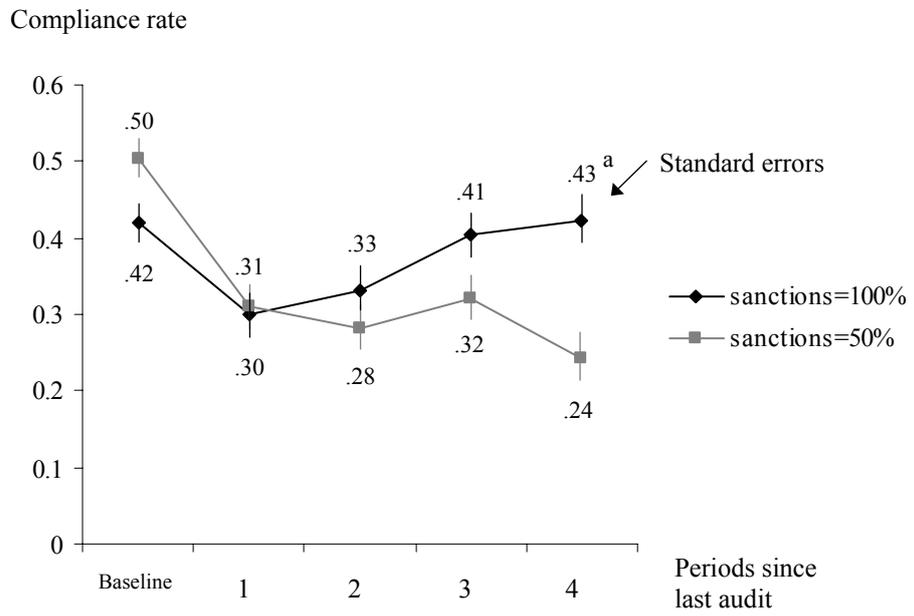
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Figure 1: Compliance rate by audit probability and periods since last audit



Note: <sup>a</sup> denotes significance at the 5% level, and <sup>b</sup> denotes significance at the 1% level.

Figure 2: Compliance rate by sanctions and periods since last audit



Note: <sup>a</sup> denotes significance at the 5% level.