



# Effects of supervision on tax compliance: Evidence from a field experiment in Austria



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## HIGHLIGHTS

- We study the impact of supervision on tax compliance with a field experiment.
- We manipulate supervision through friendly deterrence.
- Results suggest that supervision leads to delayed tax payments.
- It is concluded that supervision causes a crowding out of intrinsic tax compliance.

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## ABSTRACT

We conduct a field experiment on tax compliance, focusing on newly founded firms. As a novelty the effect of tax authorities' supervision on timely tax payments is examined. Interestingly, results show no positive overall effect of close supervision on tax compliance.

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## 1. Introduction

Taxes are important as they finance the provision of public goods. To ensure sufficient tax funds, tax authorities enforce compliance—mainly by inducing fear via audits and fines (Allingham and Sandmo, 1972; Srinivasan, 1973). Meta and overview studies report that there is a tendency for deterrence to reduce tax

evasion (Fischer et al., 1992; Alm, 1999; Blackwell, 2010); however, the effect is small or even negligible (Andreoni et al., 1998; Kirchler, 2007). It has also been suggested that deterrence may crowd out the intrinsic motivation of paying taxes (Feld and Frey, 2002; Torgler, 2002; Kirchler et al., 2008).

Most of the empirical research on tax compliance is based on surveys analyzing individual taxpayer self-reports and laboratory experiments that mainly work with students. Hence, evidence on firm tax compliance is limited (Torgler, 2002; Alm and McClellan, 2012). This gap in the empirical literature is particularly important as firms or self-employed people have more opportunities to engage in tax evasion and are reported to have lower tax morale (Torgler, 2007). Laboratory experiments have been criticized for

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their lack of generalizability. On the other hand, despite the availability of very reliable field data such as that from the Taxpayer Compliance Measurement Program of the IRS, it only permits the exploration of limited questions and does not allow analysis of causal relationships. Thus, controlled field experiments have recently emerged as an important tool in empirical research because they evoke real processes outside the laboratory while avoiding an experimental demand effect, with the aim of generating causal effects (Blumenthal et al., 2001; Slemrod et al., 2001; Torgler, 2004; Kleven et al., 2011).

To the best of our knowledge, there are only five studies that manipulate deterrence in the field (Ariel, 2012; Hasseldine et al., 2007; Kleven et al., 2011; Schwartz and Orleans, 1967; Slemrod et al., 2001). However, these studies mostly have individual taxpayers as subjects and manipulate deterrence through questions, prior audits, or through letters announcing audits in order to emphasize a higher perception of audit probability (threat-of-audit letter). Hasseldine et al. (2007) report a positive impact of deterrence on tax behavior while Kleven et al. (2011) find a modest impact. In contrast, Schwartz and Orleans (1967) and Ariel (2012) find no effect whereas Slemrod et al. (2001) observe a small positive effect for low and middle income groups and a negative impact on high income taxpayers. However, perceived audit probability may differ from the manipulated audit probability (Slemrod et al., 2001; Mittone, 2006). For example, one cannot be sure that the taxpayers actually read the letter. Additionally, the letters themselves could be perceived as unfriendly, invoking reluctance in taxpayers because of the hostile communication and not just due to deterrence itself. Using reported taxable income, net profit, or deductions as measures of compliance can also be problematic as they do not directly measure tax non-compliance (no information on taxpayer return audits). Moreover, earnings generated in the informal sector are not reported in taxable income. Audits also struggle to detect tax evasion through informal activities which leads to measurement biases in tax evasion and therefore lower-bound estimates (Kleven et al., 2011).

The strength of our study is that it uses firm data and a field experiment to provide further evidence on tax compliance. In addition, as a novelty, we explore the influence on the compliance of close supervision by the tax administration. Supervision is defined as a friendly and constant form of deterrence and interaction with the firms. This allows controlling for awareness of the auditing while avoiding communication that is perceived as unfriendly. To reduce any historical or firm-specific experiences with the tax administration we focus only on newly founded firms. In addition, we explore firms that are classified as high-risk groups in regard to tax evasion. To avoid tax compliance measurement biases we analyze the timely payment of taxes and the amount of the delayed taxes that were not paid.

## 2. Sample

The sample consists of all the 1721 firms that began operation during the year 2011 within the tax district “East-Styria” in Austria. Each of these businesses was obliged to pay its full taxes before November 15, 2012. Ninety-three of these firms were randomly selected, mostly among the high-risk businesses in terms of tax evasion (gastronomy: 54.8%, construction: 22.6%, trading: 19.4%, mining: 1.1%, counseling: 1.1%) to compose the treatment group that we call “supervision”. The remaining 1628 enterprises comprise the non-treatment group of which 35.5% are high-risk businesses (gastronomy: 4.2%, construction: 6.4%, trading: 14.5%, mining: 0.1%, counseling: 10.3%) and 65.5% low-risk businesses, mostly in the real estate (19.6%), service (8.2%) and agriculture business (7.2%). It should be noted that we will also present results limiting this control group to only those sectors who appear

in the treatment group. Most enterprises had a turnover of up to 29,999 Euro (treatment group: 62.4%, non-treatment group: 74.2%;  $p = 0.07$ ). Finally, the majority of firms had the legal status of a natural person (treatment group: 79.6%, non-treatment group: 72.2%,  $p = 0.22$ ) and an employed tax practitioner (treatment group: 86.0%, non-treatment group: 69.9%;  $p = 0.003$ ). Using a multivariate analysis we control for the legal status of a firm, turnover, and the tax practitioner.

## 3. Procedure

The supervision consisted of two parts: (a) an introductory visit, and (b) constant auditing throughout the first year of the firm. Both phases were conducted and administered by a tax auditor. The introductory visit took place at the firm following an application for a tax number. The tax auditor offered advice regarding the tax law and the subsequent rights and duties of a taxpayer, handed out information brochures and give-aways (a pen, a pad, and a candy). The tax auditor explicitly used friendly and respectful communication and invited the firms to contact the auditor if there were any further questions. Importantly, the auditor informed the firm that he/she would audit the reports and payment liabilities on a monthly basis throughout the year. The component of constant auditing ensured that the tax auditor monitored the tax files of the enterprise each month according to Austrian tax law. All other firms that were not part of the treatment were deliberately not contacted, informed, or audited by the tax authorities.

## 4. Measurements

According to the IRS, tax compliance comprises three aspects: accurate reporting, timely filing, and timely paying (Slemrod et al., 2001). As mentioned previously we only focus on timely paying as the quality and frequency of an audit make accurate reporting comparatively hard to assess. The variable on timely payment has no measurement errors as one is able to assess whether a taxpayer paid before or after the deadline, which is November 15 for Austrian firms. Thus, we compiled the anonymized tax accounts of December 15, 2012, including all taxes from 2011 (VAT, income tax, property tax etc.). Obviously, at this date all taxes owing can be considered as late. Accordingly, timely payment is assessed as both a dichotomous (paid in time or not) and a continuous (amount of tax due for those who are late) variable. The continuous variable was logarithmized to take into account the skewed distribution of the variable's values (skewness =  $-1.98$ ).

Additionally, we clustered the analyses over the business sector and included as control variables the turnover, legal status, and whether they have used a tax practitioner. The opportunity of tax evasion is seen as one of the most important determinants of tax compliance (Engström and Holmlund, 2009; Kleven et al., 2011). Certain types of businesses such as gastronomy, construction or trading operate with cash and thus have increased opportunities to engage in tax evasion than, for example, real estate businesses. The legal status allows us to differentiate between one-person enterprises and larger enterprises. Finally, involvement of a tax practitioner is an important factor for tax compliance. There is evidence that tax practitioners increase non-compliance (Erard, 1993) and that changes in tax authorities' interaction style influence tax compliance of taxpayers who prepare their own taxes but not of those who employ a tax practitioner (Hasseldine et al., 2007).

## 5. Results

In the following, two regression analyses are presented (Table 1). First we use a probit model to explore whether our treatment has an influence on timely paying (specification 1–3). We then restrict our sample to those cases where firms did not pay on time, using OLS specifications to analyze whether the treatment

**Table 1**  
Effect of supervision on not paying on time and the amount of delayed tax payment.

| Dependent variable            | <i>Paying on time</i>                      |  |  | <i>Amount of delayed tax payment</i> |                    |
|-------------------------------|--|--|--|--------------------------------------|--------------------|
|                               | Probit                                     |  |  | OLS regression                       |                    |
| Model                         | Clustering over business sector            |  |  |                                      |                    |
|                               | (1)  | (2)  | (3)  | (4)                                  | (5)                |
| Supervision                   | 0.475***<br>4.68<br><b>0.120</b>           | 0.450***<br>4.76<br><b>0.112</b>           | 0.327***<br>5.24<br><b>0.092</b>           | −0.311<br>−1.08                      | −0.699***<br>−3.84 |
| 30,000–90,999                 | 0.420*<br>2.34<br><b>0.102</b>             | 0.395*<br>2.14<br><b>0.095</b>             | 0.129<br>0.66<br><b>0.034</b>              | −0.223<br>−0.37                      | −1.194<br>−1.35    |
| 100,000–219,999               | 0.184<br>0.77<br><b>0.041</b>              | 0.166<br>0.69<br><b>0.037</b>              | 0.009<br>0.04<br><b>0.002</b>              | −0.714<br>−0.68                      | −0.684<br>−0.58    |
| 220,000–699,999               | −0.035<br>−0.13<br>− <b>0.007</b>          | −0.064<br>−0.23<br>− <b>0.012</b>          | −0.066<br>−0.19<br>− <b>0.016</b>          | 2.565***<br>5.18                     | 1.817*<br>3.85     |
| 700,000–9,679,999             | 0.422 <sup>a</sup><br>1.69<br><b>0.106</b> | 0.396<br>1.58<br><b>0.098</b>              | −0.069<br>−0.34<br>− <b>0.017</b>          | 0.101<br>0.09                        | −0.903<br>−0.43    |
| Natural person                | 0.513**<br>3.02<br><b>0.089</b>            | 0.527**<br>3.19<br><b>0.091</b>            | 0.880*<br>2.57<br><b>0.179</b>             | −0.361<br>−0.80                      | 0.053<br>0.30      |
| Limited liability corporation | 0.975***<br>4.60<br><b>0.283</b>           | 0.941***<br>4.39<br><b>0.270</b>           | 1.266**<br>3.29<br><b>0.428</b>            | −0.904<br>−1.21                      | −0.102<br>−0.15    |
| Limited partnership           | 0.083**<br>2.80<br><b>0.241</b>            | 0.799**<br>2.79<br><b>0.231</b>            | 0.966 <sup>a</sup><br>1.83<br><b>0.330</b> | 0.882<br>1.14                        | 0.442<br>1.11      |
| Commercial corporation        | 0.570 <sup>a</sup><br>1.69<br><b>0.152</b> | 0.556 <sup>a</sup><br>1.67<br><b>0.147</b> | 1.012*<br>2.09<br><b>0.348</b>             | −3.571<br>−1.61                      | −3.509<br>−1.42    |
| Tax practitioner              |  | 0.171 <sup>a</sup><br>1.66<br><b>0.033</b> | 0.233<br>1.54<br><b>0.056</b>              | 0.084<br>0.18                        | −0.31<br>−0.66     |
| Observations                  | 1713                                       | 1713                                       | 714  | 227                                  | 130                |
| Pseudo R <sup>2</sup>         | 0.0497                                     | 0.0523                                     | 0.0368                                     | 0.079                                | 0.1594             |

Note: z-values and t-values are given in italics, marginal effects in bold.

<sup>a</sup> Represent statistical significance at the 10 ( $p < .10$ ).

\* Represent statistical significance at the 5 ( $p < .05$ ).

\*\* Represent statistical significance at the 1 ( $p < .01$ ).

\*\*\* Represent statistical significance at the 0.1 ( $p < .001$ ) levels, respectively; the reference group of turnover is 0–29,999 Euro, the reference group for legal status consists of all the other possibilities (club, business partnership, consortium, civil law association, capital company, hiring association, silent partnership, and house owner association).

influences the amount of the delayed tax (specification 4–5). In specifications 3 and 5 we provide a robustness check by restricting the control group sample to only those industries that appear in the treatment group (high-risk firms). In all specifications standard errors are clustered by business sectors to capture unobserved sector-specific characteristics. For paying on time the results report that the coefficient for our treatment variable is always statistically significant at the 1% level with marginal effects between 9.2% and 12%. Thus, the results on timely paying indicate that the supervision actually crowds-out compliance.

When exploring the amount of tax owed by non-compliant firms (those that did not pay on time) we actually observe that supervision has a positive effect, reducing the amount of tax due. In specification 4 we control for turnover, legal status, and tax practitioner: the resulting coefficient is far from statistically significant. However, when we restrict our sample to the same business industries as in the control group, the coefficient becomes highly statistically significant. The estimated reduction of the amount of tax due based on supervision is between 27% ( $100[\exp(-0.311) - 1]$ , specification 4) and 50% (specification 5) taking into account that the average tax due in our data set is 2723 Euro ( $SD = 6546$ ).

To better acknowledge observable differences between control and treatment group that can also be seen when estimating the propensity score, namely the conditional probability of receiving a treatment given pretreatment characteristics (see Table A.1), we report in Table 2 estimations of average treatment effects

based on propensity score matching. We report several methods jointly to offer a better assessment of the robustness of estimates.<sup>1</sup> The results reported in Table 1 remain robust. The ATT (Average effect of Treatment on Treated) is always statistically significant for paying on time but not for the amount of delayed tax payment.

## 6. Discussion

The reported results indicate that supervision can backfire. Rather than increasing tax compliance, even a friendly version of deterrence reduces tax compliance. Thus, supervision seems to crowd out the intrinsic motivation of tax compliance (Feld and Frey, 2002; Torgler, 2002; Kirchler et al., 2008). It might be that such interventions are perceived as too controlling, which reduces self-determination and self-esteem, thereby decreasing intrinsic motivation. Such an effect is observed in the literature on work morale (Frey, 1997a). There is also evidence that sanctions are perceived as a “price”. For example, Gneezy and Rustichini (2000) observe that the introduction of a fine for parents arriving late to a day-care center was perceived as a price rather than as a signal encouraging on-time collection of children. Therefore, delayed pick-up of children increased and was persistent even after the fine was removed.

<sup>1</sup> For a discussion see Becker and Ichino (2002) and Guo and Fraser (2010).

**Table 2**  
Estimation of average treatment effects based on propensity scores using various matching methods.

|   | n. treat. | n. control. | ATT    | Std. Err. | t      |
|---|-----------|-------------|--------|-----------|--------|
| <i>Not Paying on Time (logit)</i>                               |           |             |        |           |        |
| Matching  |           |             |        |           |        |
| Nearest-Neighbor  | 93        | 1480        | 0.132  | 0.048     | 2.715  |
| Nearest-Neighbor bootstrapping<br>(2000 bootstrap replications) | 93        | 1480        | 0.132  | 0.05      | 2.622  |
| Kernel (Gaussian)<br>(2000 bootstrap replications)              | 93        | 1627        | 0.143  | 0.048     | 2.974  |
| Stratification<br>(2000 bootstrap replications)                 | 93        | 1627        | 0.129  | 0.049     | 2.638  |
| <i>Amount of delayed tax payment</i>                            |           |             |        |           |        |
| Matching  |           |             |        |           |        |
| Nearest-Neighbor  | 93        | 168         | -0.616 | 0.377     | -1.631 |
| Nearest-Neighbor bootstrapping<br>(2000 bootstrap replications) | 93        | 168         | -0.616 | 0.776     | -0.793 |
| Kernel (Gaussian)<br>(2000 bootstrap replications)              | 93        | 1627        | -0.689 | 0.707     | -0.975 |
| Stratification<br>(2000 bootstrap replications)                 | 93        | 1627        | -0.885 | 0.635     | -1.393 |

Note: ATT: Average effect of the Treatment on Treated.

Thus, it does not seem that this external intervention was perceived as supportive despite establishing a personal relationship between the tax administration and the taxpayer which could have been expected to reduce crowding-out of the firm's intrinsic motivation to pay taxes (Frey, 1997b). On the other hand, for those who were non-compliant, supervision tends to reduce the amount of late taxes due, particularly when restricting the sample size to high-risk industries.

In sum, the negative effect of supervision on timely paying and the positive effect on the tax due which was not statistically significant in most of the estimates lead to the conclusion that close supervision of newly created high-risk firms offers no overall positive effect on tax compliance. Accordingly, alternatives to enforcement measurements such as service and/or trust approaches might be recommended to the tax administration to increase tax compliance (Alm and Torgler, 2011).

It should be noted that the study has some limitations. The present outcomes might not apply to countries with a different tax culture to Austria (Alm and Torgler, 2006; Balliet and van Lange, 2013). Also, the relatively small sample size of our treatment group makes it necessary to replicate the current outcome with a larger treatment sample and in other countries. It might be argued that supervised firms have adapted their behavior based on the additional information available (e.g., a better understanding of the sanctions for paying late, which are not that severe after all). Additionally, it can be argued that the inexperienced non-treatment group faced a much more ambiguous situation than the supervised firms causing them perhaps to be more risk averse with respect to reporting, and as a result more tax compliant.

To conclude, tax authorities are recommended to invest in further services such as telephone hotlines or a website to increase tax compliance (Braithwaite et al., 2007; Alm and Torgler, 2011; Gangl et al., 2013). Future research could study the effects of such services in the field to determine whether it is possible to generalize the positive impact of "soft-factors" reported in survey and laboratory studies.

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**Table A.1**  
Estimation of the propensity score.

| Probit estimates                | Coef.    | z     |
|---------------------------------|----------|-------|
| 30,000–90,999 Euro turnover     | 0.630*** | 4.49  |
| 100,000–219,999 Euro turnover   | 0.762*** | 3.05  |
| 220,000–699,999 Euro turnover   | 0.517*   | 1.70  |
| 700,000–9,679,999 Euro turnover | -0.035   | -0.08 |
| Natural person                  | 0.580*** | 2.75  |
| Limited liability corporation   | 0.224    | 0.83  |
| Commercial corporation          | 1.069*** | 3.33  |
| Tax practitioner                | 0.485*** | 3.61  |
| N                               | 1721     |       |
| Pseudo R <sup>2</sup>           | 0.088    |       |

Note: Common support condition imposed. Region of common support is [.0044, .3820]. Balancing property is satisfied with the reported specification. Number of blocks: 4.

\* Represent statistical significance at the 10% ( $p < .10$ ) levels.

\*\* Represent statistical significance at the 5% ( $p < .05$ ) levels.

\*\*\* Represent statistical significance at the 1% ( $p < .01$ ) and 0.1% ( $p < .001$ ) levels.

## Appendix

See Table A.1.

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