Investigating Tax Compliance with Mixed-Methods Approach: The Effect of Normative Appeals Among the Firms in Latvia

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CONFLICT OF INTEREST
None reported

Investigating Tax Compliance with Mixed-Methods Approach: The Effect of Normative Appeals Among the Firms in Latvia[1]

This study employs a field experiment and qualitative content analysis to examine the effect of various behaviourally-informed messages on increasing tax compliance in Latvia. In a field experiment, more than 3,000 businesses received a message with a normative appeal to increase the relatively low salaries compared to firms operating in the same industry and region. Other treatment groups received the same message with an additional paragraph that varied audit probabilities or included prosocial messages. All treatments effectively increased the average declared salaries in the enterprises relative to not sending a message. Even though the overall fiscal effect was positive, the qualitative analysis of the feedback by the firms indicates that messages, particularly those that did not state the future actions of the tax administration, provoked discontent and distrust between the taxpayer and the tax administration. Our findings demonstrate that clear communication of the intended actions of the tax administration is the most effective approach to promoting tax compliance. Furthermore, our research indicates that a relatively small audit probability (5%) is as effective as a larger probability (66%), implying that there is no need to carry out audits on a large scale to address tax evasion.

Keywords: tax collection, shadow economy, prosocial behaviour, tax audits, mixed-methods

JEL Classification: C93; D03; H26, H32; H83;

Introduction

How do taxpayers perceive the communication with the tax administration, and can nudging improve tax compliance? Employing threats of audits or promoting prosocial behaviour in the messages to the taxpayers have been found to be effective in increasing tax revenues. However, less is known about how the receivers interpret these messages. This study reports on the insights from a study with 3,813 firms in Latvia with a mixed-method approach that allows us to gather a nuanced understanding of the motives behind the behavioural change. First, we conducted a field experiment replicating previous empirical studies in which businesses were randomly assigned to various behaviourally-informed messages sent by the State Revenue Service (SRS). Second, after the intervention, we followed up with a qualitative study that included the analysis of the feedback received from the firms to understand how the messages were interpreted and what kind of reactions they triggered.

Field experiments have been criticised for being unable to explain reasons behind the behavioural change or focusing exclusively on single outcomes (Beshears and Kosowsky 2020; Deaton and Cartwright 2018; Slemrod 2019). To our knowledge, this is the first study that employs field experiment in combination with the qualitative content analysis of firms' reactions to letters from the tax authorities to investigate the behaviour of taxpayers. Many tax compliance studies have employed qualitative research to develop the design for a

[1] The experimental design and the subsequent analysis of the field experiment was pre-registered ([reference partly hidden for preserving anonymity of authors for the reviewers] 2021).

quantitative study (Enachescu et al. 2019; Nguyen et al. 2020; Vainre et al. 2020). Our approach is different. First, we develop the experimental design based on previous studies in tax compliance. As such, we contribute to the field of experimental economics through replication to establish the robustness and validity of findings. Second, we pursue the qualitative study *after* the intervention by thoroughly analysing the feedback provided by the firms. We know only of a single experimental study on tax compliance that monitored the feedback by the firms on interventions (Harju, Kosonen, and Ropponen 2014, 8).

Overall, our approach adheres to the good practice of follow-up interviews and other inquiries after the interventions to understand the motives behind the behavioural change (see, for instance, Ganzach and Karsahi 1995; Hallsworth et al. 2017; Roll et al. 2019). In addition, participants in our study are unaware that they are participating in the research at any stage of data collection, as would be in the case of focus groups or formal interviews. Therefore, we base our findings on naturally-occurring behaviour, also employing observational research similar to that in social anthropology on the correspondence and archival studies (see, for instance, Saulītis 2016; Stoler 2009; Verdery 2018; Zeitlyn 2012).

The study contributes to the various strands of literature in several significant ways. First, our study adds to the literature on nudges in tax compliance and the role of communication between the tax administration and the taxpayer. Several studies have shown that enforcement messages effectively increase tax compliance (Dwenger et al. 2016; Slemrod, Blumenthal, and Christian 2001). However, the demonstration of coercive power can undermine trust and trigger reactant behaviour (Gangl et al. 2017; Hofmann et al. 2017; Mendoza, Wielhouwer, and Kirchler 2017). An alternative way is to communicate with the taxpayer in a non-deterrence manner. This approach assumes that tax compliance is founded on broader propositions than pure rationality (Dasgupta 1990; Fehr and Fischbacher 2006; Górecki and Letki 2021). For instance, trust in state institutions is one of the factors that has been found to positively affect tax morale (Alm, Martinez-Vazque, and Torgler 2006; Kucher and Götte 1998; Slemrod 2003; Uslaner 2010). The evidence on the effect of prosocial messages on tax compliance is mixed. Prosocial messages increase timely tax payments (Hallsworth et al. 2017; Jamison, Mazar, and Sen 2021). Other studies have shown that invoking tax morale messages can backfire on tax compliance when deterrence messages are effective in the same context (Castro and Scartascini 2015; De Neve et al. 2021; Fellner, Sausgruber, and Traxler 2013).

Our study allows us to investigate further the social factors that influence the decisions on tax compliance when nudged with normative appeals. Normative appeals, such as social norms, are a special case, with many contextual factors affecting tax compliance (Blumenthal, Christian, and Slemrod 2001). Hallsworth et al. (2017) found descriptive social minority norms the most persuasive for tax compliance. In other studies, social norms have no effect (Carpio 2014; Cranor et al. 2020; Perez-Truglia and Troiano 2018), and in some cases, even backfire tax collection efforts (De Neve et al. 2021; John and Blume 2018). Our mixed-methods approach allows us to thoroughly investigate the contextual factors and understand the perspective of the firms that are making decisions on tax compliance.

By analysing the feedback, we can identify how the firms perceive normative appeals. As such, our study contributes to the literature on behavioural insights of corporate businesses. Iyer

et al. (2010) examined the deterrence approach by sending letters to businesses in the construction industry. They found that tax compliance improves with sanction awareness and threats of an audit. Similar results are delivered in other studies that threaten audit possibility and penalty rates (Bergolo et al. 2019; Harju, Kosonen, and Ropponen 2014; Holz et al. 2023; Pomeranz 2015). We also find that explicit audit probabilities increase tax compliance. However, we also observe that it is not necessary to foster compliant behaviour, as the messages that do not explicitly disclose the commitment by the tax administration to carry out audits are as effective.

Our work also contributes to tax compliance studies, specifically in the field of labour income that employers report to the tax administration. Third-party reporting effectively improves tax compliance (Adhikari, Alm, and Harris 2021; Alm, Deskins, and McKee 2009; Kleven, Kreiner, and Saez 2016). In practice, however, tax evasion for labour taxes occurs at a significant level even in high-income countries and particularly among small businesses (Feinmann, Hsu Rocha, and Lauletta 2022; Kumler, Verhoogen, and Frías 2020; Mortenson and Whitten 2020). Increasing levels of audits and carrying them out significantly improves tax compliance (Bíró, Prinz, and Sándor 2022; Bjørneby, Alstadsæter, and Telle 2021). Evidence on employing normative appeals and prosocial messages in collecting labour taxes is mixed. A positive effect was found by Vainre et al. (2020) when behaviourally-informed emails were sent to the businesses with information that the average salary for the enterprise was below 70% of the industry average. At the same time, Boning et al. (2020) found that informational letters have small and fleeing effects on remittances of employees' taxes.

The paper is organized as follows. First, we describe the design of the study. We then report on the findings, discussing experimental results and delivering insights from the firms' feedback. Our follow-up qualitative study identifies several adverse effects because of the intervention. In the paper's conclusion, we summarise findings and discuss them in the context of the current literature on tax compliance. Overall, our findings, based on the mixed-methods approach, suggest that the nudging approach in tax collection, as employed in this experiment – and in the previous studies that we replicated – can have unintended adverse effects, even though the fiscal effect is positive.

1. Experimental setting and design of the study

In Latvia, the communication between businesses and tax administration is mostly digital via the Electronic Declaration System (EDS) hosted by the SRS. Within this platform, enterprises submit monthly tax declarations, consisting of information on the number of employees, salaries for each employee, turnout and the taxes to be paid. During this process, the system automatically calculates the taxes to be paid and those that will be reimbursed to the firm based on claimed deductions. EDS also provides an opportunity for communication between the taxpayer and the tax administration. The study was conducted in this communication environment by sending assigned messages and observing the responses.

The businesses included in the study were already pre-selected by the SRS to inquire about the average declared salary of less than 70% of the average in the industry and region. Usually, SRS asks these firms to prepare and submit various financial documents and contracts to

examine their tax compliance. This time, we cooperated with the SRS to develop alternative messages to examine if messages that require no immediate action are also effective in fostering tax compliance. At first, we developed the messages and examined them in a pilot study carried out two months before the intervention. The pilot indicated that around one in four firms is writing or calling back to the SRS. As a result, the number of businesses included in the trial was limited to the estimated number of received replies to the messages and the ability of the SRS to respond to these inquiries in legally binding time. In total, 3,929 firms were selected for the trial.

In the baseline message, businesses were only informed that, in their case, the average salary in the first half of 2021 has been below 70% of the average in the region and sector in which the firm operates. Consequently, it was explained that this estimate is considered a risk for engaging in the shadow economy. At the end of the first paragraph, firms were asked to minimise the abovementioned risk by considering raising the average salary in the next declarations submitted to the SRS (see Appendix A for the baseline message, translated into English). Next to the baseline message, we additionally designed six behaviourally-informed treatment texts that were included in the messages (see Table 1). These treatment texts were one paragraph long, with three of them varying audit probabilities and the remaining three employing pro-socialprosocial

Examination of explicit audit threats was based on the study by Harju et al. (2014), where they varied the audit probabilities (5% and 33%) in the letters and analyzed their effect on tax compliance among hairdressers. In the original study, only a high probability (33%) of the audit had a positive effect. We extended this research by varying the audit probabilities at three different levels (5%-33%-66%) to investigate whether increased audit probability would increase tax compliance, as suggested by the economics-of-crime based tax compliance model (Allingham and Sandmo 1972). It is important to note that even when audit probabilities were explicitly stated, it was emphasised that audits wouldn't be carried out earlier than January 2022 and for a period no earlier than September 2021. In other words, the audits would be performed only on tax declarations submitted in the future, giving time for the firms to reconsider their wage policies.[2]

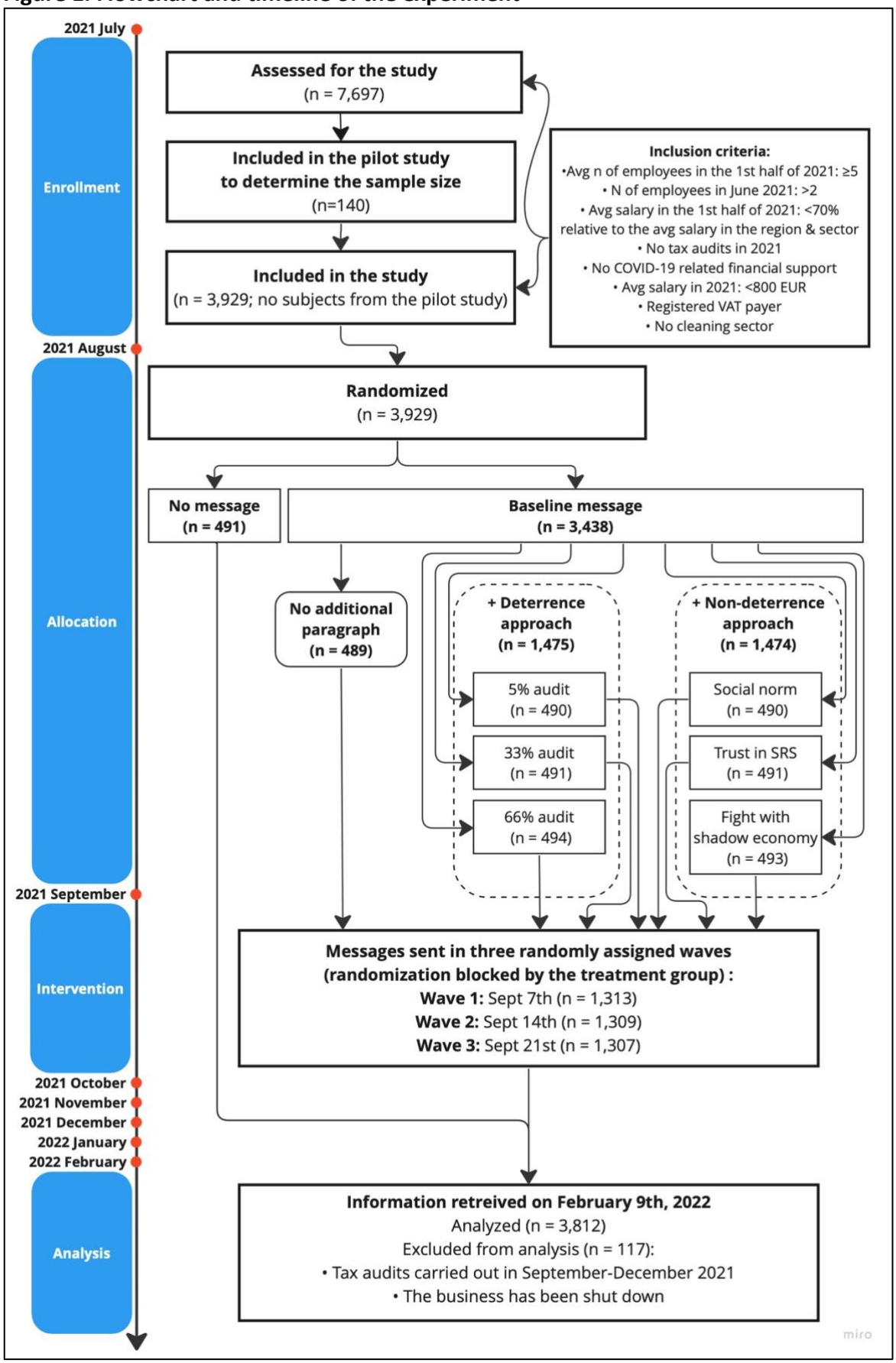
[2] In January 2022, a random list of enterprises from the sample were prepared to be audited by the SRS. As such, there was no deception involved. However, there was no timeline when and how exactly the audits will be carried out and the process is out of our control.

Table 1. Treatment texts in the experiment

Approach	Treatment	Additional treatment paragraph
No message (N=491)	Control group	No message
Baseline (N=489)	Baseline	Not included
Audit (N=1,475)	5% audit (N=490)	We inform you that starting from January 2022, randomly selected 5% of companies from the recipients of this letter will be invited to provide the SRS Tax Payment Compliance Division with explanations and information about the correctness of labour taxes and compliance with the requirements of the law in the declarations submitted during the period from October 2021 to for December 2021.
	33% audit (N=491)	We inform you that starting from January 2022, randomly selected 33% of companies, i.e., one out of every three recipients of this letter, will be invited to provide the SRS Tax Payment Compliance Division with explanations and information about the correctness of labour taxes and compliance with the requirements of the law in the declarations submitted during the period from October 2021 to for December 2021.
	66% audit (N=494)	We inform you that starting from January 2022, randomly selected 66% of companies, i.e., two out of every three recipients of this letter, will be invited to provide the SRS Tax Payment Compliance Division with explanations and information about the correctness of labour taxes and compliance with the requirements of the law in the declarations submitted during the period from October 2021 to for December 2021.
Prosocial (N=1,474)	Social norm (N=490)	Most people pay taxes: according to a survey conducted by *Latvijas Fakti* last fall, 84% of Latvian residents and their employers have honestly reported all earned income and have not received an "envelope salary".
	Trust in SRS (N=491)	Trust-oriented communication and cooperation is the strategic goal of the SRS. Latvian citizens increasingly trust the SRS and appreciate the "Consult first" principle implemented in its operations. In both 2018 and 2019, the SRS was awarded the initiative's "Consult first" award "Leader in the monitoring strategy". We invite you to trust the SRS as your ally in tax matters for honest business and public welfare!
	Fight with the shadow economy (N=493)	The shadow economy is diminishing: in the last ten years, the share of envelope wages in Latvia has decreased by more than 10 percentage points. There is also an improvement in the segments of other taxes, and the collection of taxes is improving. SRS estimates for the so-called VAT gap show that it will have decreased from 9.4% to 8.6% in 2020, continuing the declining trend for several years.

The remaining three treatments evoked a prosocial message on top of the baseline message. In one of the messages, we used descriptive social norm that "characterise the perception of what most people do" (Cialdini, Kallgren, and Reno 1991, 203). Particularly, the letter stated that, according to a recent survey, 84% of Latvians have truthfully reported their income and have not received cash in an envelope. Another treatment message emphasised that trust towards the SRS has increased. The last treatment message included information about the successful fight against the shadow economy. It emphasized a recent decrease in the size of the shadow economy and the estimated VAT gap. There was an additional experimental group that did not receive any message.

Figure 1. Flowchart and timeline of the experiment



Next to the average salary level, several additional factors were used as the selection criteria (see Figure 1). During the randomisation procedure, the firms were blocked by the statistical region and balanced on the key control variables (see Appendix B for the descriptive statistics and balance tests). Consequently, the treatment messages were sent in three waves (one-third of the sample each week) during September 2021, starting from September 7th. The treatment arms were used as blocks in the random assignment to the waves. The last messages were sent on September 21st – roughly a month before the next tax declaration was due to be submitted. After the intervention, no audits were carried out for the firms in the sample. The exception was detecting fraud or any other illegal activity requiring immediate action. In such a case, the case was dropped from the sample, as was the case if the business was closed.

The study results include experimental, quantitative content, and ethnographic text analyses. For the experimental part, we focused on the average salary for the employees reported to the SRS. To estimate the treatment effects on average salary, we used the difference-in-difference approach with employer-level monthly panel data that covers three consecutive months before the treatment (June-August 2021) and four tax declarations reported following the treatment (September-December 2021). We used the following regression model

$$y_{it} = \alpha_i + \sigma T_i + \gamma A_t + \beta (T_i * A_t) + u_{it}$$

where y is the dependent variable (average salary) reported by firm i (i = 1… N) in a month t (t=June,…, December 2021), T_i denotes the time trend, and intervention type is denoted as A_t (A='No message', 'Baseline', 'Audit', 'Prosocial') of dummy variables to check whether a company was under treatment intervention of one of three types at time *t,* and u_{it} is an error term. Our main aim is to provide estimates for β values of the interaction term for each type of possible intervention after treatment took place.

For the robustness checks, we examined changes in declared labour taxes, turnout, number of employees, and claimed tax deductions. The goal was to inspect whether the possible increase in reported average salaries is not accompanied by changes in the declaration of other taxable revenues that would signal larger engagement with the shadow economy.

For the quantitative content analysis, we coded the feedback received from the firms via a call or messages in the EDS. Employees at the tax administration reviewed the content of the responses and marked it into four categories: (1) no response; (2) promised to increase the salaries; (3) declared that the salaries will not be increased; (4) provided an indefinite answer. We then ran non-parametric tests (Kruskal-Wallis) to compare the growth in declared salaries depending on the response type.

For the qualitative analysis, we examined the written feedback by employing ethnographic text analysis to provide qualitative narrative data from the text (see Silverman 2011). Before receiving the written correspondence from the SRS, all identifiable information was erased. At the same time, each message was pseudonymized to associate it with a specific firm to identify which treatment message the sender received. The goal of the qualitative study, as

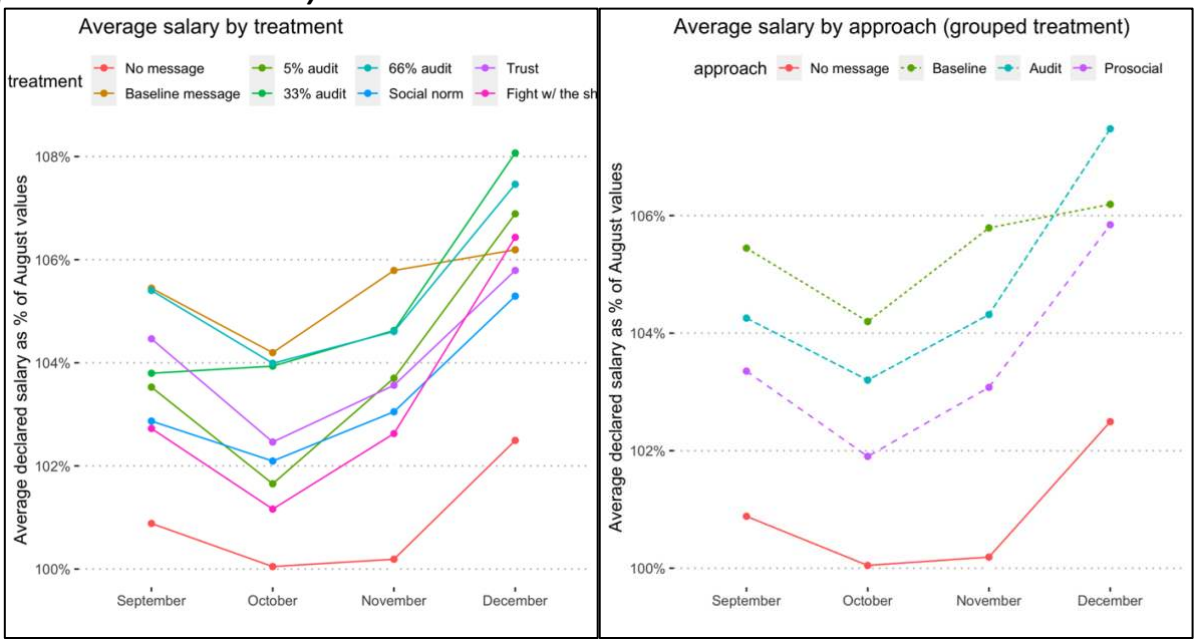
articulated by Storr and John (2018), is to "better understand people's economic choices and the economic outcomes that emerge from those choices"(Storr and John 2018, 28). Ethnographic text analysis gives voice to the studied people and allows unforeseen and unpredictable explanations of the outcomes (Chamlee-Wright 2010). At the same time, we second Piore (2006) that qualitative research in economics should not be treated as direct empirical evidence but rather offers a critical perspective on standard theoretical assumptions and presenting alternative viewpoints. As such, we interrogate the correspondence in the context of experimental and quantitative content analysis results.

2. Experimental results

First, we present descriptive statistics on average salaries between June and December 2022. Intervention messages have a clear positive effect on the average salaries for September, i.e., in the first tax declaration submitted after the intervention (see Figure 2). Among the firms that received a message, there was an increase in average salary in September by around 5% points, while a decrease is observable for businesses that did not receive the message. After September, the trend is relatively equal to all the firms in the sample. We do not find any effects on firms' behaviour regarding the message's timing. No significant differences are observable if a message was sent in the first or subsequent wave.

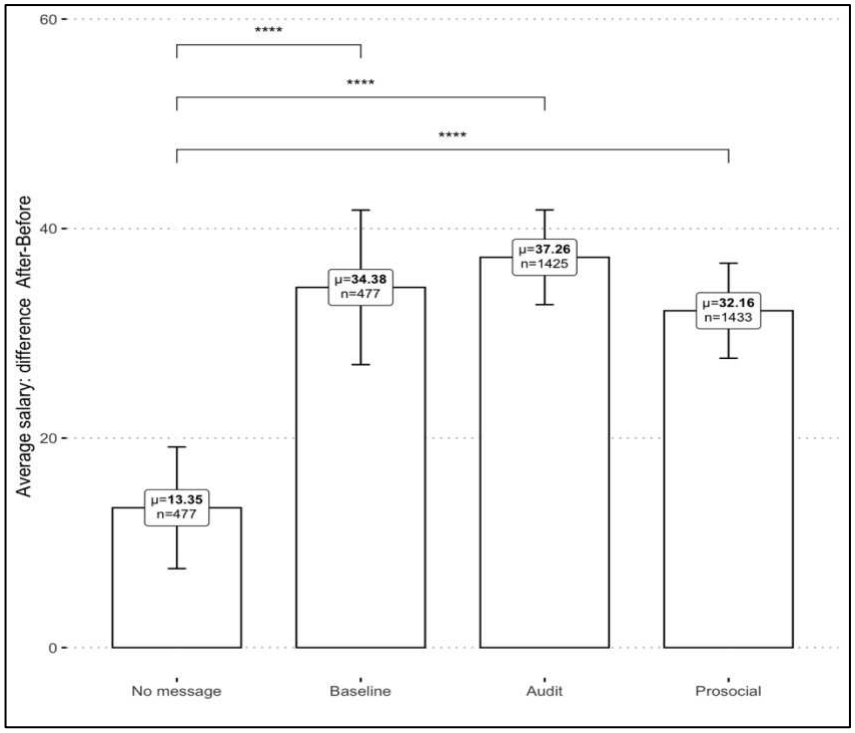
Overall, we observe that among the firms that did not receive any message, the average declared salaries increased by €13 relative to the pre-intervention period. In contrast, in other conditions, the increase is more than double the size (see Figure 3). We do not observe significant differences in the average wage increase among various messages. In the subsequent analysis, we compare treatment effects among different approaches (no message, baseline, audit and prosocial).

Figure 2. The average salary in each month after intervention as a share of August (the last pre-intervention month)



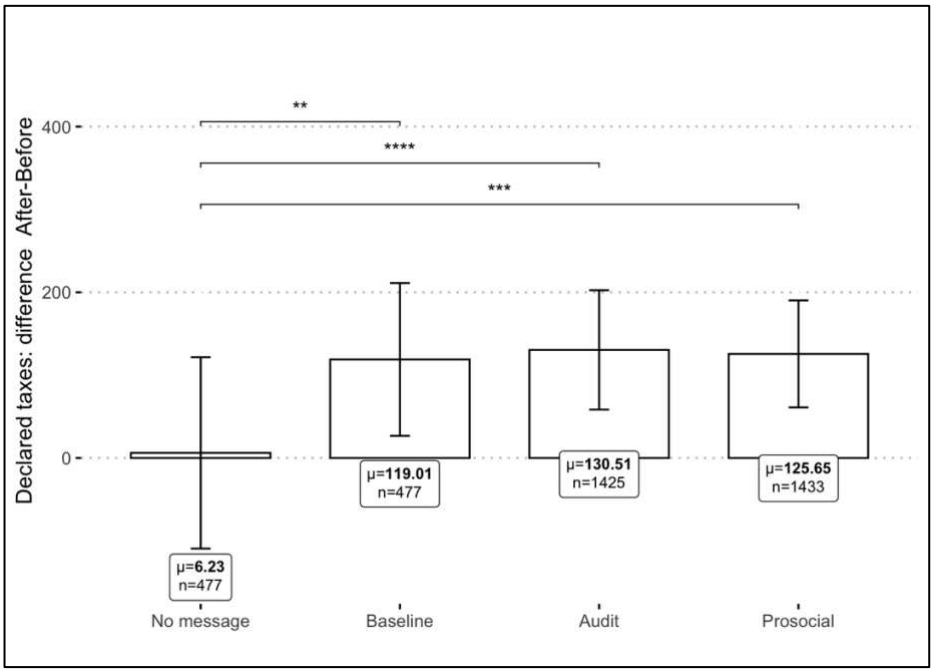
Note: Please see Appendix for a graph of absolute average salaries per month.

Figure 3.1. The difference in average declared salaries before the intervention (June-August) and after (October-December)



*Notes: Whiskers show 95% confidence intervals. Labels show the means and number of observations per grouped treatment (approach). Mean comparisons show results of Mann-Whitney tests, and symbols indicate statistical significance: ****: p <= 0.0001.*

Figure 3.2. The difference in average declared taxes before the intervention (June-August) and after (October-December)



*Whiskers show 95% confidence intervals. Labels show the means and number of observations per grouped treatment (approach). Mean comparisons show results of Mann-Whitney tests, and symbols indicate statistical significance: **: p <= 0.01, ***: p <= 0.001, ****: p <= 0.0001.*

The Fixed-effects panel models in Table 2 show that all three approaches (Baseline, Audit and Prosocial) deliver statistically significant growth of declared average salary (from 2% to 4% of a median declared amount). The result is robust across industries and regions; it is stronger for small companies (with fewer declared employees). The effect of the Audit approach is somewhat stronger than the Baseline and Prosocial approach, but this difference is not statistically significant.

Neither the main dependent variable (average declared salary per month), nor the residuals of regressions have passed tests for normality or homogeneity of variances (see Appendix C for the test results). Thus, as a robustness check, we conducted additional non-parametric tests (Kruskal-Wallis) of the difference of mean changes of declared average salary from months June-August to September-December. The results of these tests demonstrate a significant deviation in reported average salary in all treatments compared to the 'No message' treatment and a barely significant difference between the Audit approach compared to Prosocial (see Graph 1 in Appendix C).

Table 2. Estimation Results for Fixed-effects models.

	model 1	model 2	model 3
Dependent Var.:	log(avg_salary)	log(avg_salary)	log(avg_salary)
Constant	6.2*** (0.01)	5.3*** (0.04)	4.7*** (0.04)
Post-treatment	0.02 (0.01)	0.02* (0.01)	0.03** (0.009)
Post-treatment x Baseline	0.04* (0.02)	0.04* (0.02)	0.04** (0.01)
Post-treatment x Audit	0.05** (0.02)	0.05*** (0.01)	0.04*** (0.01)
Post-treatment x Prosocial	Prosocial02)	0.03* (0.01)	0.02* (0.01)
wave	-0.002 (0.006)	-0.005 (0.005)	-0.002 (0.004)
log(employees)		-0.002 (0.007)	-0.03*** (0.006)
log(turnout)		0.09*** (0.004)	0.07*** (0.003)
Bin_grant			0.03*** (0.009)
Years in business			-0.007* (0.003)
sal2021_ratio			1.4*** (0.04)
Taxes paid in 2021			-0.004 (0.003)
Control for industry	NO	NO	YES
Control for region	NO	NO	YES
S.E.: Clustered	by: id	by: id	by: id
Observations	26,223	25,801	25,801
R2	0.008	0.124	0.424
Adj. R2	0.008	0.124	0.423

*Notes: Dependent variable: average declared salary per month; omitted reference category is No message treatment group; pre-treatment period is June-August, the post-treatment period is September-December; standard errors clustered at the firm level in the parenthesis; *p<0.1; **p<0.05; ***p<0.01; An alternative specification with the log of average salary as a dependent variable and normalized independent variables is available in Appendix.*

We also examined if the total amount of declared labour taxes significantly differed among the businesses due to the intervention. We find that for businesses that did not receive the message, there is almost no increase in average declared taxes before and after the intervention. For other firms, we can observe the increase in declared taxes during the post-intervention period (see Figure 3.2).

We also looked at the declared turnout and number of employees to examine possible adverse effects. The pressure towards firms to increase the salaries (such as an increase in the minimum wage) can push businesses into the shadow economy (Arsić et al. 2015; Davidescu and Schneider 2019). To compensate for the increase in labour taxes, firms could declare smaller turnout and, as a result, pay less value-added tax. They could also move the workers with the lowest salaries to the shadow economy to increase the declared average wage level. However, we do not find statistically significant differences in turnout or the number of employees declared among the firms in the post-treatment period. Hence, we do not find evidence that the designed interventions triggered businesses to engage in the shadow economy. Also, we looked at the claimed tax deductions that could increase because of intervention, as evident in a study by Ariel (2012). We do not find that any message would increase the claimed tax deductions in the post-intervention period relative to no message condition (see Table D6 Appendix for non-parametric tests for differences in means between approaches).

Overall, we can argue that messages had a fiscally positive effect with no evidence that firms would engage in a shadow economy, claim more tax deductions or that a message trigger any other financially adverse effect. A simple back-of-the-envelope calculation reveals that our study delivered a fiscally positive result of around 1.1 million euros, with each firm declaring, on average, around 100 euros more in labour taxes each month after the intervention.

3. Quantitative analysis of the firms' feedback

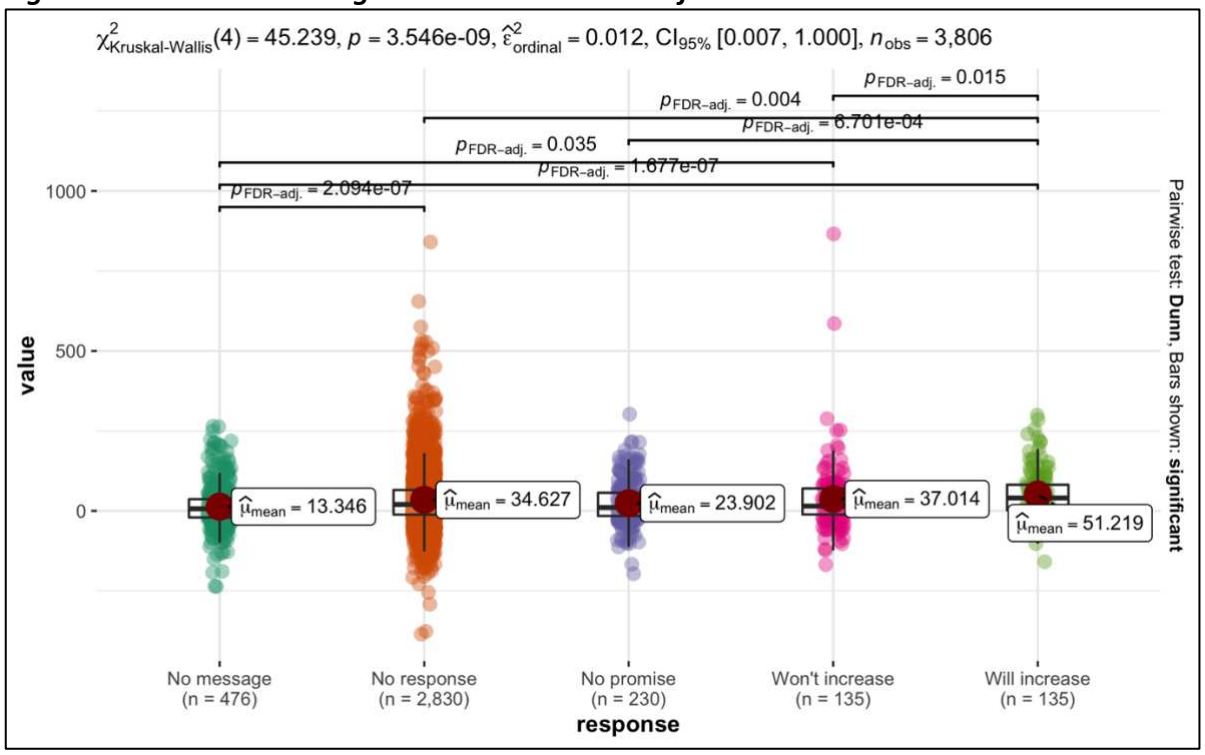
Around one in six (15%) firms that received the message responded by calling or writing back to the SRS (see Appendix D). The level of responses is approximately equal among the experimental groups that received a message, except for the message that stated the 5% audit probability with a significantly lower response rate (see Table D4 for the logistic regression results). In this group, the response rate was only 8%. It suggests that disclosing the future action of the SRS with low levels of audit is the most effective way to foster tax compliance behaviour with simultaneously provoking as little feedback as possible.

How the taxpayer experiences the enforcement mediates the subsequent compliance behaviour (Murphy 2008; Privitera et al. 2021). In our study, almost half (46%) of businesses that responded did not disclose their intended future actions. The remaining responses were equally divided by those who promised to raise their salaries (27%) and those who explicitly stated that the increase was not planned (27%). We find that the promise given to the SRS to raise the salaries is not cheap talk, as these firms significantly increased their average salaries compared to firms who either did not make such a promise or did not respond (see Figure 4). In other words, if there is a possibility to raise the salaries, it is highly likely for the firm to reach out to the SRS to inform them of such a decision and demonstrate compliant behaviour.

Such behaviour indicates how businesses try to minimize the probability of being audited, even if such a measure is not explicitly stated in the letter.

Informing on the intentions is just one strategy the firms use in response to the intervention. There is a much larger heterogeneity in the average salaries among those who did not respond to the message than among those who responded (see Figure 4). Hence, some firms increase their salaries after receiving a message without informing the SRS.

Figure 4. Increase in average salaries based on the feedback



4. Qualitative analysis of the firms' feedback

Many firms communicate resentment and describe their daily hardships that have pushed their business to the limits with high risks of terminating it completely. Seemingly, when the tax authority explicitly asks to pay more in taxes, businesses, in return, are implicitly threatening that they will shut down the business and there won't be any taxes to collect:

[Name of the firm] received a notification from the State Revenue Service that it was included in the envelope salary risk group. A company board member admits that he was unpleasantly surprised when he received such a statement. [...] Unfortunately, due to the Covid-19 situation, the number of orders significantly decreased, and our company was forced to lay off most of the employees. In conclusion, as the net turnover decreases, we have to observe a trend that soon we will no longer have the opportunity to continue our economic activity and will be forced to terminate it.

/ID 24; Condition: Trust towards SRS/

During the pandemic, our turnover dropped dramatically, and we had to close several units and lay off people. There is only one small grocery store that does not yet generate reportable income to raise wages. On the

contrary, we are operating at a loss, also due to minimum wage and tax increases. There is a big risk of closing this last store and with it the whole company. So there can be no question of any salary in envelopes!

/ID: 4301; Condition: 5% audit/

Negative feelings, such as anger, fear and self-blame, that are evident in the quotes above and other messages are common in the context of taxation, especially among small businesses, and significantly affect tax compliance decisions (Enachescu et al. 2019; Kamleitner, Korunka, and Kirchler 2012). In the responses to the tax administration, many express discontents about being suspected as tax evaders in the very first sentences:

After reading your message, I was devastated that I had to read words like envelope wages. I can say that we are one of those who pay all taxes, and we don't have an envelope. You can ask any employee - are there envelope wages????? Let's respect honest people and not put everyone in the same bag as dishonest. I hope for your understanding.

/ID 2667; Condition: Social norm/

Others remind that they have always been tax compliant in terms of no delays in tax payments – even though it has no direct relation to envelope wages that the baseline message refers to. Apparently, by highlighting their payment discipline in the past, businesses attempt to signal that they are trustful partners that should not be treated as deviant debtors:

As a member of the board of [Name of the firm], I am happy that I can still pay the minimum wage set by the law, and so far, I have not delayed the tax payments.

/ID 5640; Condition: Fight with the shadow economy/

Another firm emphasized that they are a small enterprise that should not be compared with the large ones that the firm believes have a much higher risk of tax evasion. This highlights that normative appeals that refer to the behaviour of a particular group can be contested as not relevant for the receiver:

This kind of letter from you hurts me a lot as a small Latvian entrepreneur-homemaker, because I am absolutely sure the data analysis is incorrect. I would like to see with great interest such an analysis of the data for the companies registered in the Food and Veterinary Service in our region in the HOMEMAKER sector.

/ID 1848; Condition: Baseline message/

Other firms note that they are working in a different region or industry than the one officially declared and promise to change their operating business industry code and location instead of committing to a salary increase. Others refer that there is no legal term "average salary" in the tax code, and only a minimum wage is fixed in the law. Moreover, many firms emphasize that they are paying more than the minimum wage and, therefore, are compliant:

Unfortunately, in our business sector, we are facing a shortage of qualified labour; the company lacks workers who would fulfil their duties honestly; part of the existing workforce is a bunch of people that do not come to work and therefore do not earn the wages specified in the contract. [...] "Stable" employees, who regularly and honestly perform the duties stipulated in the employment contract, have adequate wages above the minimum wage set by the state; this can be seen in the submitted reports on labour taxes.

/ID 61; Condition: Social norm/

Such responses indicates that firms consider tax compliance a formal affair in which informal rules, such as social norms, do not apply. It suggests that formal language referencing law,

legal obligations, and regulations in communicating with the taxpayer make social norm appeals less persuasive.

Not all feedback contains negative emotions. Some letters praise the "consult first" approach of the SRS based on information provision rather than execution of power. In some responses, businesses tend to refer to this policy and express their willingness to cooperate with the tax administration in the future:

Following the basic principles of cooperation between the state administration and the private sector as described in the Memorandum of Cooperation "On the Implementation of the "Consult First" Principle" signed by the SRS [...], [company name] asks the SRS to request additional information, if such a need is found, and to give to the company instructions on what other information and/or documents should it submit to substantiate the correctness and completeness of its declared data. At the same time, please consider meeting the company's representatives with the SRS's responsible officials in person or using video conference mode to receive an explanation from the company [...].

/ID 75; Condition: Trust towards SRS/

As evident in this correspondence, the goal of the firm, which also states in the letter that it has increased the salaries of some of its employees after receiving the letter, is twofold. On the one hand, it attempts to deliver full information on its daily business. On the other, it signals that it is unclear what the firm must do to comply and be off the radar of the SRS. For this reason, the firm reaches out and asks for additional information or meets with the tax administrators. Some firms already in the first reply message provide specific information on workers whose salaries have been increased because of the received information from the SRS. However, the tone in these letters is rather formal and expresses obedience rather than cooperation based on equal terms and still resembles the danger of closing down the business because of rising costs:

We would like to explain the situation and note that 2021 has not been easy for the company, and the fight for survival continues. [...] Understanding the situation and how important it is for employees to be socially protected, especially during this period when activities may have to be stopped suddenly due to the pandemic, we have found an opportunity to raise the hourly rate by 5-10% for all employees in structural units from October 2021.

/ID 7248; Condition: 5% audit/

Overall, the firms' feedback indicates that even messages with prosocial statements included are considered coercive by many. Firms object to the non-personalized approach and criticize the normative appeals to increase the wage level as irrelevant in their particular situation. Even if the rise in average salary has followed or promised, businesses remind that they could close down the business, implying that no taxes will be paid but the jobless benefits by the state to the former workers. These responses resemble the sentiments expressed by the Croatia businesses in Istria when faced with tax reform, as Smith (2020) documented. Croatian entrepreneurs consider themselves good citizens willing to comply while being punished for having a successful business. They felt that the tax administration sought to restrict their economic agency, which could be interpreted as a long-standing tension between the state and the private sector. Therefore, a mere nudge, without addressing businesses' underlying issues and perceptions towards taxation and the state, may not be enough to bring about significant change in tax compliance behaviour.

5. Conclusions and discussion

This study used a natural setting to conduct an experimental study and analyse its results using a mixed-methods approach. We investigated the behaviour of businesses with risks of engaging with the shadow economy. Our focus is on the changes in the declared average salary for the employees in the firms after receiving a message that did not ask an immediate action by the SRS or the firm. In addition, we investigated if and how firms responded to the messages regarding their monthly tax declarations, including turnout, claimed deductions, number of employees and other information, and the feedback they provided.

Overall, the field experiment delivered positive results (see Table 3 for the summary of the experimental results). Average salaries increased, claimed tax deductions did not change, and declared turnout and the number of employees remained similar to the firms that did not receive a message. However, the fiscal effect, i.e., an increase in paid taxes, is not as large as the increase in the declared average salary, which was our main variable of interest. We believe the reason is the low share of labour taxes in the total tax burden for the firms in our sample. The average salaries are relatively low, so labour taxes do not make the most of tax payments. Hence, the intervention has a larger effect on the social security for the employees with low salaries than the overall tax revenues.

Table 3. Overview of the experimental results relative to not sending a message

Condition	Declared salary	Declared labour taxes	Feedback	Declared turnout	Number of employees	Claimed tax deductions
Baseline	Increase	Increase	High	No change	No change	No change
5% audit	Increase	Increase	**Low**	No change	No change	No change
33% audit	Increase	Increase	High	No change	No change	No change
66% audit	Increase	Increase	High	No change	No change	No change
Social norm	Increase	Increase	High	No change	No change	No change
Trust in SRS	Increase	Increase	High	No change	No change	No change
Fight with shadow economy	Increase	Increase	High	No change	No change	No change

Overall, our designed behaviourally-informed messages significantly improved the average salary level by around 5% relative to not sending a message. There is no increased effect for the messages that combined normative appeals, i.e., information on the firm's standing relative to others regarding the average salary level, with various audit probabilities or prosocial messages. Explicit threats of the audit are not necessary to foster tax compliance, even in such a high-risk tax evasion area as labour taxes, where employees tend to collude with employers to underreport their wages or employers might report lower salaries to reduce their tax liability or to remain competitive in the market.

The study found that smaller businesses tended to respond better to the intervention than larger firms due to a higher likelihood of small firms engaging in wage envelopes, which carry a smaller risk of being reported (Kleven, Kreiner, and Saez 2016). This might indicate that the interventions effectively targeted tax evasion among small businesses. However, increasing average salaries for companies with few workers is easier and less expensive than for larger enterprises with many employees. Therefore, it is unclear to what extent the intervention

reduced the size of the shadow economy or encouraged small businesses that are compliant to increase salaries at a marginal cost.

At the same time, we found that a significant number of businesses start active communication with the tax administration after receiving a message. It allowed us to critically examine if and how messages promote the "service" paradigm in the daily operations of the tax administration and foster tax morale (Alm and Torgler 2011). Our qualitative analysis of the feedback reveals that many businesses perceived the delivered message as coercive. Others do not consider tax compliance a field where normative appeals are at play and respond that only legal requirements, such as minimum wage, must be followed.

Firms may interpret the baseline message as a signal that the tax agency is monitoring their behaviour and that they are at increased risk of an audit, despite that an audit is neither planned nor stated in the message. In other words, the baseline message could have implicit threats. Under such an interpretation, one conclusion is that adding a prosocial message does not improve tax compliance but generates a willingness to respond. Businesses are eager to signal that they are compliant and trustworthy partners. At the same time, adding a small (5%) audit probability minimizes this adverse effect.

Our finding of the effect of a 5% audit probability message is contrary to the study of Harju et al. (2014), in which 5% audit probability did not increase the declared turnout relative to no message group. In our study, we believe that the positive effect of the small audit probability is based on the baseline message that explicitly informs businesses on their current standing to other firms in the industry and region they operate. Firms consider threats more seriously when the selection criteria for possible audits are transparent.

Even if firms considered our messages as based on threats and audits, our study aimed to investigate whether communication without explicit audit threats effectively increases tax compliance among firms. Previous studies have mostly relied on audit threats to foster tax compliance, with informative messages on tax morale having a less reliable effect. That has also been the approach in communication with taxpayers by the SRS of Latvia. The experimental results confirm that the baseline message that requires immediate action neither by the SRS nor the firm is sufficient in inducing tax compliance behaviour. However, regarding the most effective message for increasing tax compliance, a combination of normative appeals with a 5% audit probability is the best strategy. It triggers a significantly smaller feedback level while improving tax compliance equally to other messages. Based on our ethnographic text study of the feedback by the firms, we strongly discourage using explicit threats in messages mentioning jail and fines, even if it's a 100$ million worth nudge in the short-term (Holz et al. 2023). As observed by our and other studies, such an approach in tax collection contributes to breaking the trust in public institutions and, subsequently, lower tax morale and compliance (Kirchler, Kogler, and Muehlbacher 2014; Mas'ud, Manaf, and Saad 2019; Smith 2020).

Our results on feedback are close to one found by Harju et al. (2014), where letters stating explicit threats of audit (either 5% or 33% probability) triggered "not many contacts to the help phone number provided by the tax authority" (Harju, Kosonen, and Ropponen 2014, 8).

We believe that 5% of audit message delivered full information on the tax administration's intended actions besides the explanation of why normative appeals were communicated. Inducing enforcement in a high-trust environment increases willingness to comply (Olsen et al. 2018). Perhaps, a 5% audit rate was considered a reasonable enforcement level, and consequently, the negative feedback was minimized while the trust towards the tax administration increased.

Based on our findings, we have several recommendations for future studies and how nudges could be implemented in daily tax collection operations. On the one hand, we propose a specific way of framing the messages that nudge taxpayers. On the other hand, we agree that part of the answer to tax compliance lies in the system-level changes rather than just identifying the best nudge based on average treatment effect estimates from a trial (Cartwright 2021; Chater and Loewenstein 2022). Therefore, we discuss the structural changes necessary to bring sustainable behavioural change.

First, the context in which the normative appeals are communicated is important. Based on previous studies, we constructed the baseline message emphasising that the firm is part of a minority that does not pay their employees as much as others. Such a normative appeal message shifts the focus on deviance rather than on compliance in the messages. It triggered negative feedback among many businesses. For this reason, we believe that normative appeals and social norms in tax collection should avoid bringing attention to minority behaviour. Alternatively, based on prospect theory (Kahneman and Tversky 1979), social norms should emphasize gains and benefits achieved by joining the majority that pays more to their employees.

Second, we suggest critically examining the necessity of including legal information in the taxpayer's communication. Nudging is just one tool for the choice architecture that organizes the context (Thaler and Sunstein 2008, 3). Inserting a nudge in a message without reorganizing the communication style is ineffective. In our case, we see that the effect of normative appeals is undermined if included in a message referencing legal requirements and regulations. In such a case, businesses consider tax compliance a formal affair, where anything above the minimum requirements is not mandatory. In other words, using formal language referencing law is ineffective in promoting the non-deterrence approach and prosocial behaviour in tax compliance.

So far, about the nudging. As regards the structural changes, we believe that the interaction between a tax authority and a taxpayer should be encouraged rather than minimized. Our findings suggest that transparency on future actions by the SRS improves overall satisfaction with the tax authority. Tax administration can foster increased trust and cooperation and minimize the audit rate by seeking feedback on the information they deliver. Through surveys, broader use of experimental methods, and other research methods that are easy to administer, SRS could better understand taxpayers' information needs and how they perceive the authority's intentions and actions. It also gives valuable insights into the reasons behind the varied responses to interventions and the factors that lead some firms to increase compliance while others do not. We are aware that maintaining a one-on-one relationship between the tax administrator and the firm could be time-consuming. Future studies could investigate how artificial intelligence and chatbots could help minimize administrative costs,

increase reciprocity and pursue personalized communication with the taxpayers. Alternatively, tax administrations could employ the so-called “referendum approach” in surveys (see Robinson, Stoutenborough, and Vedlitz 2017). That would help to determine the acceptable audit rate, which this study highlights as a crucial factor in promoting tax compliance.

Our study has reasonable limitations that must be considered when interpreting taxpayer behaviour. First, we investigate the behaviour of firms that are a minority regarding labour tax payments. However, our mixed-methods approach delivers informative insights for a broader set of taxpayers. Second, we acknowledge that we can investigate the reactions to intervention among only those firms that responded. As noted, there is a large heterogeneity among those who did not respond to the interventions. We invite future studies to gather feedback on a larger scale. If our suggestion for interactive communication in tax collection is implemented, it will allow researchers to develop a mixed-methods approach to gather additional behavioural insights on how taxpayers perceive normative appeals.

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Appendix A. Treatment texts in the experiment

Baseline message

Welcome!

The data analysis by the State Revenue Service (hereinafter, SRS) on the submitted tax reports for the 1st half of 2021 shows that the salary in your company does not reach 70% of the average salary in the sector and region, according to the data from the Central Statistics Office (hereinafter - CSB) on the 1st quarter of 2021.

Companies whose average wages are significantly lower than the industry average in the region are at higher risk of envelope wages. Therefore, we invite you to consider the possibility of raising the salary of the company's employees in the coming months, bringing it closer to the average salary of the industry in the region, thus reducing the risk of envelope wages. Information about the average salary of the specific industry in the region is publicly available on the CSB website:
https://data.stat.gov.lv/pxweb/lv/OSP_PUB/START__EMP__DS__DSV/DSV050c/table/tableViewLayout1

[Treatment texts for the experimental groups go here; see Table 1]

Per the regulatory enactments, the task of the SRS is to control the correctness of the calculation and payment of taxes, duties, as well as other payments determined by the state[1], as well as to ensure the collection of taxes, duties and other mandatory payments determined by the state in the territory of Latvia[2]. To ensure the fulfilment of these tasks, the SRS monitors the economic and financial activities of any legal and natural persons[3].

In case of additional questions or uncertainties, please call 67121369, write to the Electronic Declaration System or the e-mail address.

Sincerely,

State Revenue Service

_____

[1] The law "On Taxes and Fees", Article 18, the first part of Clause 2
[2] The law "On the State Revenue Service", Article 2, Clause 1.
[3] The law "On the State Revenue Service", Article 8, Clause 8

Appendix B. Summary Statistics

Approach	No message			Baseline			Audit			Prosocial			
Variable	**N**	**Mean**	**SD**	**N**	**Mean**	**SD**	**N**	**Mean**	**SD**	**N**	**Mean**	**SD**	**Test**
The average salary in 2021 (Months I-VI)	477	466.953	123.224	477	469.007	118.392	1425	472.102	116.634	1433	468.849	117.966	F=0.31
The average number of employees in 2021 (Months I-VI)	477	13.055	20.817	477	14.382	27.127	1425	13.201	14.855	1433	14.179	25.631	F=0.773
The average number of employees in 2020	474	11.788	13.952	471	14.699	35.961	1413	12.323	14.736	1423	13.228	19.642	F=2.213*
Turnout 07 2021	467	59233.507	84458.432	459	74861.996	223052.138	1394	65361.476	168052.159	1392	66135.015	178388.861	F=0.654
Turnout 06 2021	477	53577.84	74952.083	477	71926.677	227398.667	1424	60209.494	113180.014	1433	63509.959	174457.023	F=1.262
Turnout 2021	477	359244.024	513428.105	477	453021.202	1523749.682	1425	393002.693	789688.98	1433	400781.927	1065235.834	F=0.746
Turnout 2021	471	566930.051	821582.87	470	690167.566	1989123.096	1409	594757.566	999664.786	1416	625193.373	1262566.007	F=0.96
Employees in 07 2021	477	13.597	23.402	477	14.532	27.864	1425	13.688	15.036	1433	14.665	27.428	F=0.563
Employees in 06 2021	477	13.899	28.548	477	14.849	27.937	1425	13.703	15.944	1433	14.742	27.115	F=0.585
The average salary in 07 2021	477	507.376	129.725	477	512.789	130.942	1425	512.589	128.272	1433	507.225	129.349	F=0.551
The average salary in 06 2021	477	479.67	134.119	477	478.809	130.905	1425	480.75	129.816	1433	477.641	127.886	F=0.14

Approach	No message			Baseline			Audit			Prosocial			
Variable	**N**	**Mean**	**SD**	**N**	**Mean**	**SD**	**N**	**Mean**	**SD**	**N**	**Mean**	**SD**	**Test**
The average salary in 05 2021	477	470.833	135.285	477	467.826	127.062	1425	476.561	129.872	1433	472.877	132.323	F=0.632
The average salary in 04 2021	476	461.492	140.471	476	464.902	127.129	1422	469.968	133.972	1431	468.633	136.493	F=0.561
Paid taxes in 2021 (Months I to VI)	477	39528.636	99998.581	477	45098.647	115137.769	1425	37485.602	64430.662	1433	43905.092	167391.65	F=0.86
Paid taxes in 2020	476	52744.918	121710.48	474	70344.074	235321.408	1418	54074.926	102632.105	1426	60908.065	241924.584	F=1.136
Grants received	477	4531.385	17720.359	477	5058.344	23285.134	1425	4445.52	16550.296	1433	4204.143	19904.871	F=0.247
Region	477			477			1425			1433			X2=0.438
Kurzeme	51	10.7%		50	10.5%		150	10.5%		149	10.4%		
Latgale	53	11.1%		51	10.7%		149	10.5%		149	10.4%		
Pierīga	86	18%		87	18.2%		263	18.5%		267	18.6%		
Rīga	199	41.7%		201	42.1%		605	42.5%		605	42.2%		
Vidzeme	39	8.2%		39	8.2%		116	8.1%		119	8.3%		
Zemgale	49	10.3%		49	10.3%		142	10%		144	10%		
Industry	477			477			1425			1433			X2=30.058**
Retail	111	23.3%		114	23.9%		329	23.1%		321	22.4%		
Construction	96	20.1%		123	25.8%		249	17.5%		272	19%		

Approach	No message			Baseline			Audit			Prosocial			
Variable	**N**	**Mean**	**SD**	**N**	**Mean**	**SD**	**N**	**Mean**	**SD**	**N**	**Mean**	**SD**	**Test**
Manufacturing	77	16.1%		80	16.8%		253	17.8%		268	18.7%		
Agriculture	40	8.4%		39	8.2%		133	9.3%		132	9.2%		
Transport & Logistics	26	5.5%		19	4%		81	5.7%		61	4.3%		
Services	76	15.9%		75	15.7%		228	16%		236	16.5%		
Other	51	10.7%		27	5.7%		152	10.7%		143	10%		
Grants received (binary)	477	0.119	0.325	477	0.147	0.354	1425	0.139	0.346	1433	0.123	0.328	F=1.07
Age of the firm	477	15.407	8.965	477	14.804	8.61	1425	15.23	8.932	1433	15.387	8.862	F=0.566
Ratio to the average salary in the industry & region in 2021 (months I to VI)	477	0.458	0.129	477	0.457	0.126	1425	0.464	0.132	1433	0.459	0.13	F=0.57
Ratio to the average salary in the industry & region in July 2021	477	0.5	0.146	477	0.502	0.147	1425	0.505	0.151	1433	0.497	0.146	F=0.631
Wave	477	2.01	0.819	477	2.004	0.817	1425	2.001	0.818	1433	1.999	0.818	F=0.027
The average salary in June 2021	477	479.67	134.119	477	478.809	130.905	1424	480.874	129.778	1433	477.641	127.886	F=0.151
The average salary in July 2021	467	511.269	127.129	459	514.788	129.121	1394	514.132	127.251	1392	509.494	127.293	F=0.387

Approach	No message			Baseline			Audit			Prosocial			
Variable	**N**	**Mean**	**SD**	**N**	**Mean**	**SD**	**N**	**Mean**	**SD**	**N**	**Mean**	**SD**	**Test**
The average salary in August 2021	467	523.031	137.333	459	526.307	144.65	1398	527.096	139.89	1401	522.259	136.215	The average
The average salary in September 2021	476	515.008	134.522	475	540.227	152.641	1421	541.411	152.669	1431	533.009	151.385	F=3.956***
The average salary in October 2021	467	514.104	145.729	457	534.069	153.666	1381	536.889	152.239	1385	526.571	147.822	F=3.072**
The average salary in November 2021	466	515.675	143.367	460	541.629	160.942	1391	541.085	161.419	1396	532.914	162.698	F=3.291**
The average salary in December 2021	470	522.816	150.706	474	546.131	176.831	1407	555.93	176.751	1418	545.321	197.733	F=3.931***

Appendix C. Tests for the difference in means

Table C1. Pairwise Wilcoxon tests for the difference in means for the average salary

.y.	group1	group2	n1	n2	statistic	p	p.adj	p.adj.signif
value	No message	Baseline	477	477	93646.0	3.70e-06	1.10e-05	****
value	No message	Audit	477	1425	278574.0	0.00e+00	0.00e+00	****
value	No message	Prosocial	477	1433	295648.0	1.58e-05	3.16e-05	****
value	Baseline	Audit	477	1425	334148.5	6.62e-01	6.62e-01	ns
value	Baseline	Prosocial	477	1433	352888.0	2.37e-01	2.84e-01	ns
value	Audit	Prosocial	1425	1433	1065294.0	3.20e-02	4.80e-02	•

Table C2. Kruskal-Wallis tests for difference in means across approaches in declared taxes (change from June-August to September-December)

.y.	group1	group2	n1	n2	statistic	p	p.adj	p.adj.signif
value	No message	Baseline	477	477	101694.0	6.00e-03	0.013000	•
value	No message	Audit	477	1425	296273.5	4.24e-05	0.000254	***
value	No message	Prosocial	477	1433	301500.0	1.73e-04	0.000519	***
value	Baseline	Audit	477	1425	329945.0	3.99e-01	0.599000	ns
value	Baseline	Prosocial	477	1433	336417.0	6.89e-01	0.689000	ns
value	Audit	Prosocial	1425	1433	1032547.0	5.13e-01	0.616000	ns

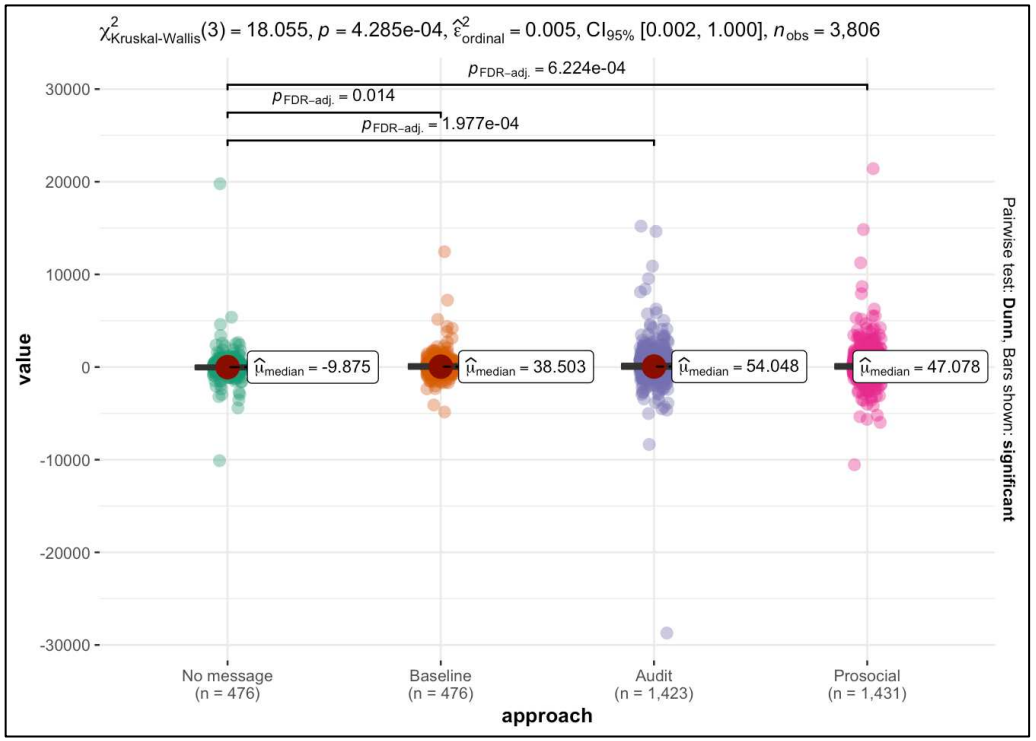


Table C3. Difference across approaches in declared turnout (change from June-August to September-December)

.y.	group1	group2	n1	n2	statistic	p	p.adj	p.adj.signif
value	No message	Baseline	477	477	109764.0	0.406	0.676	ns
value	No message	Audit	477	1425	340419.0	0.866	0.866	ns
value	No message	Prosocial	477	1433	332736.0	0.451	0.676	ns
value	Baseline	Audit	477	1425	350679.0	0.246	0.676	ns
value	Baseline	Prosocial	477	1433	343184.5	0.802	0.866	ns
value	Audit	Prosocial	1425	1433	990305.0	0.206	0.676	ns

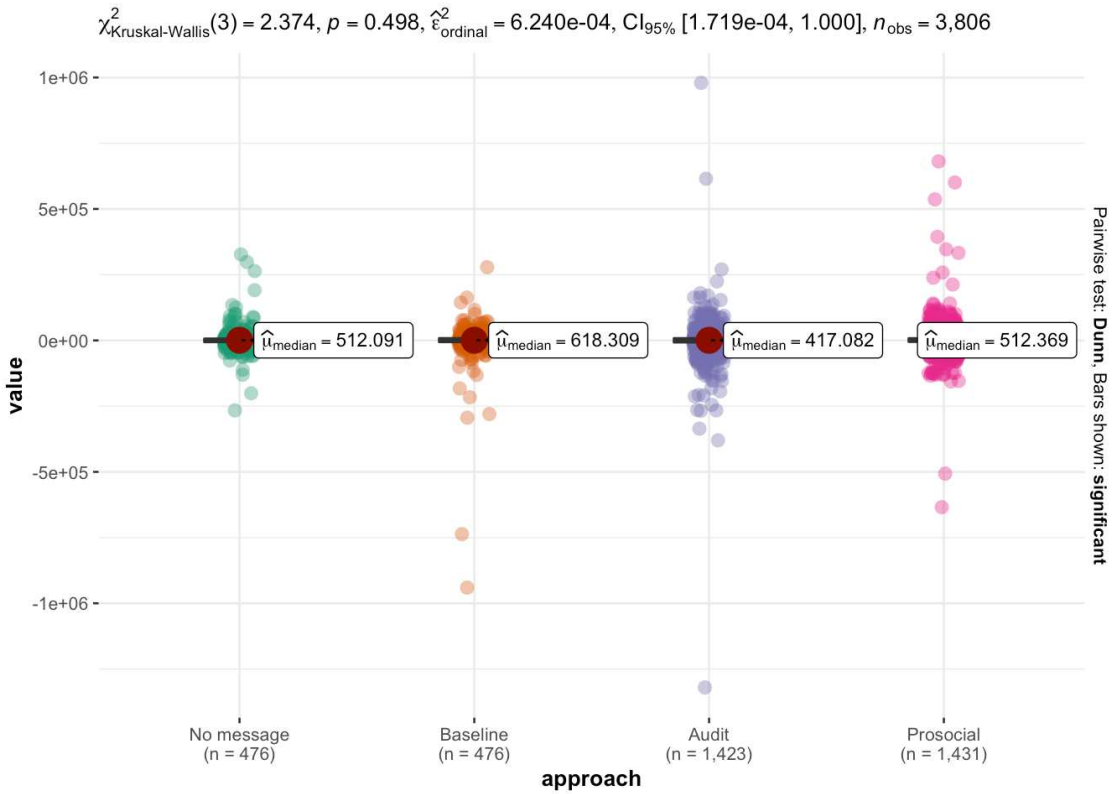


Table C4. Difference across approaches in number of employees (change from June-August to September-December)

.y.	group1	group2	n1	n2	statistic	p	p.adj	p.adj.signif
value	No message	Baseline	477	477	113372.0	0.984	0.984	ns
value	No message	Audit	477	1425	336451.5	0.830	0.984	ns
value	No message	Prosocial	477	1433	339804.5	0.941	0.984	ns
value	Baseline	Audit	477	1425	336028.5	0.798	0.984	ns
value	Baseline	Prosocial	477	1433	339487.5	0.916	0.984	ns
value	Audit	Prosocial	1425	1433	1022307.0	0.850	0.984	ns

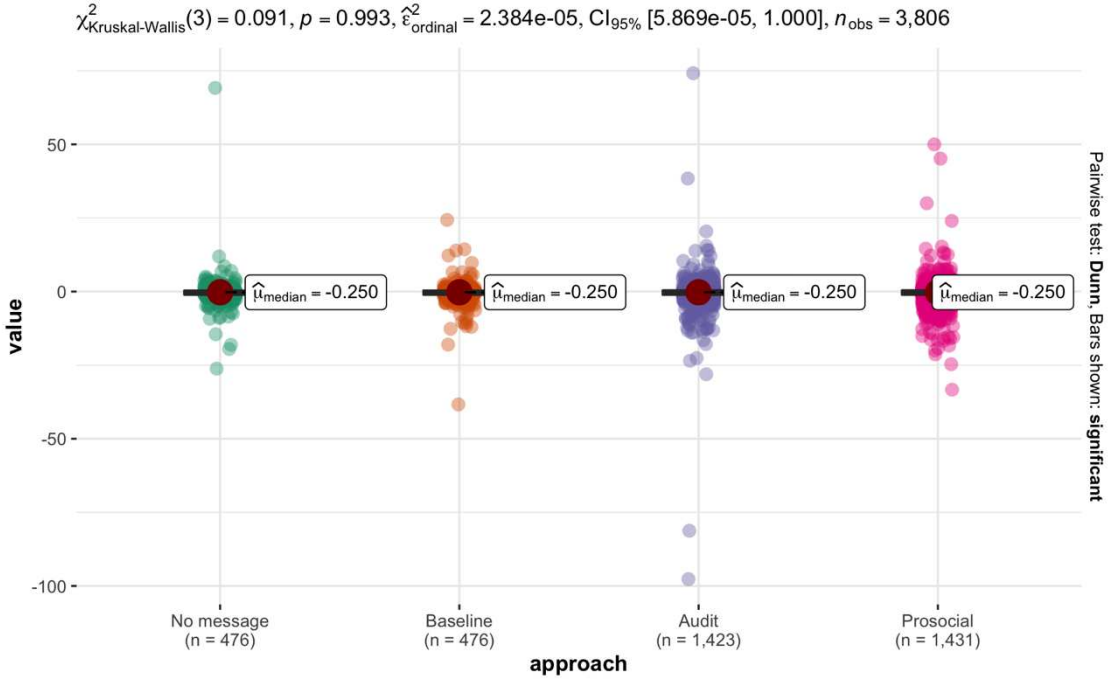
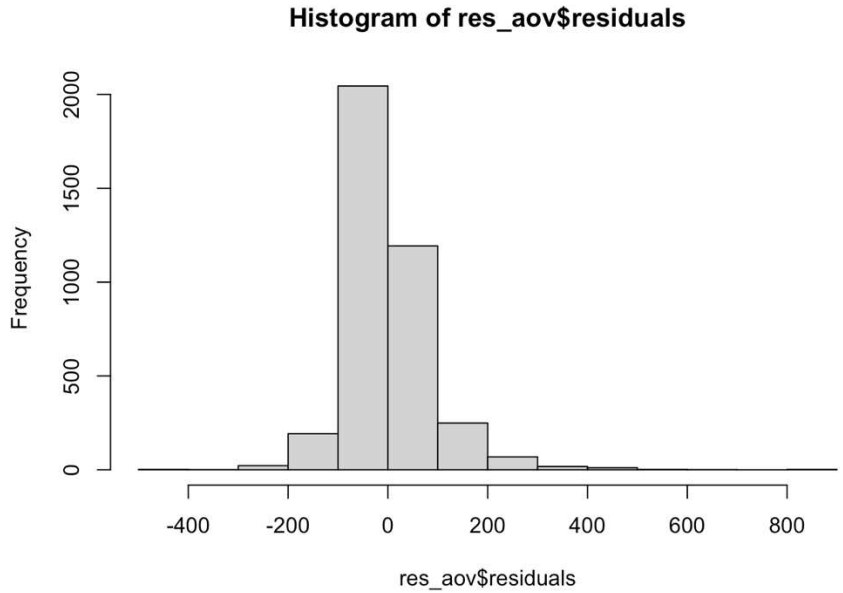
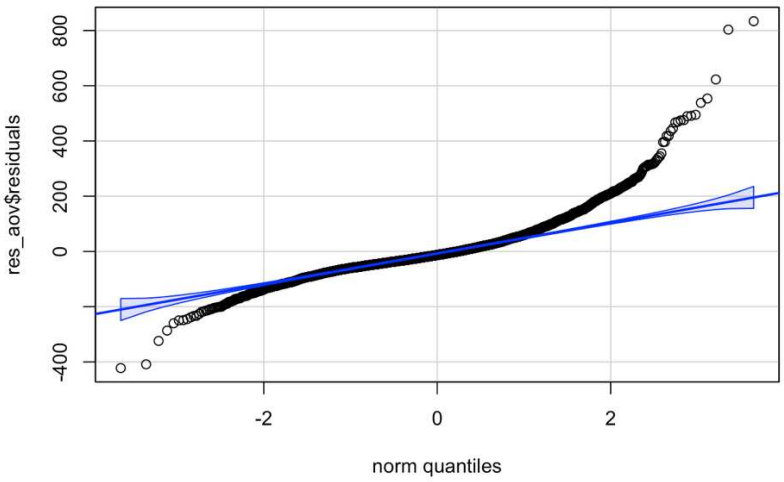


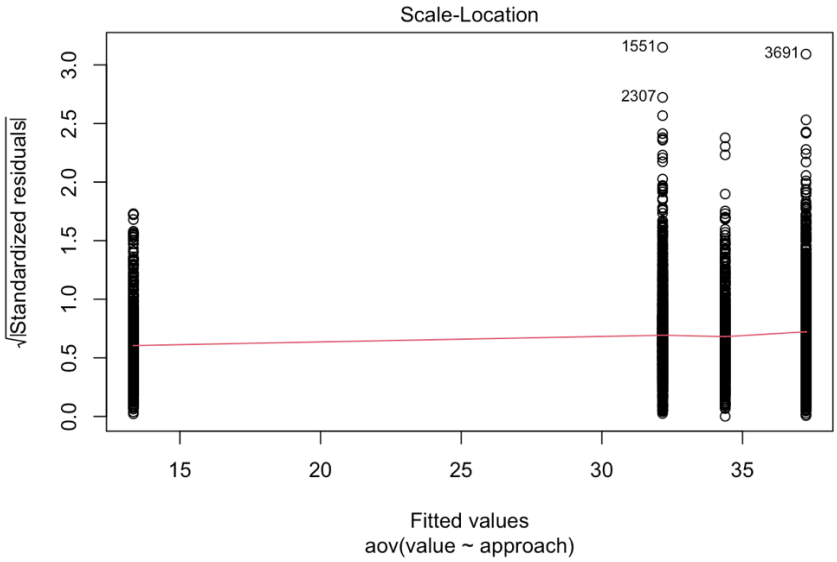
Table C5. Testing for assumptions for linear models (normality and homogeneity of variances)

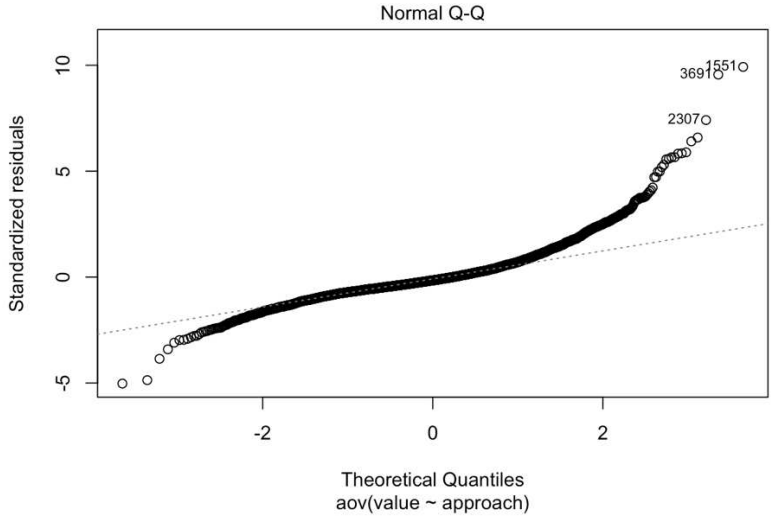
	Df	F value	Pr(>F)
group	3	6.685929	0.0001691
	3802	NA	NA

variable	statistic	p.value
Residuals of Anova model	0.8778177	0




res_aov$residuals
-400
0
200
400
600
800
-2
0
2
norm quantiles


Scale-Location
√|Standardized residuals|
0.0
0.5
1.0
1.5
2.0
2.5
3.0
1551
3691
2307
15
20
25
30
35
Fitted values
aov(value ~ approach)


Normal Q-Q
Standardized residuals
-5
0
5
10
3691
1551
2307
-2
0
2
Theoretical Quantiles
aov(value ~ approach)

Appendix D. Descriptive statistics of the feedback

Table D1. Mean differences in declared salary by response and treatment

Approach	No response	No promise	Won't increase	Will increase
No message	13.34576	NA	NA	NA
Baseline	36.43133	13.52687	24.29079	39.53743
Audit	37.79587	26.49876	25.76213	62.05795
Prosocial	30.71394	25.68260	46.00127	51.13736

Table D2. Population size by response and treatment

approach	No response	No promise	Won't increase	Will increase
No message	477	NA	NA	NA
Baseline	392	40	13	32
Audit	1250	94	46	35
Prosocial	1193	96	76	68

Table D3. Wilcoxon test for difference in means by response type

estimate	group1	group2	n1	n2	statistic	p	p.adj	p.adj.signif
7.357488	No response	No promise	2835	230	348742	0.071000	0.212	ns
2.861858	No response	Won't increase	2835	135	196055	0.605000	0.992	ns
-17.134553	No response	Will increase	2835	135	160615	0.002000	0.009	**
-4.753350	No promise	Won't increase	230	135	14862	0.496000	0.992	ns
-24.071999	No promise	Will increase	230	135	11914	0.000207	0.001	**
-20.495996	Won't increase	Will increase	135	135	7472	0.011000	0.042	•

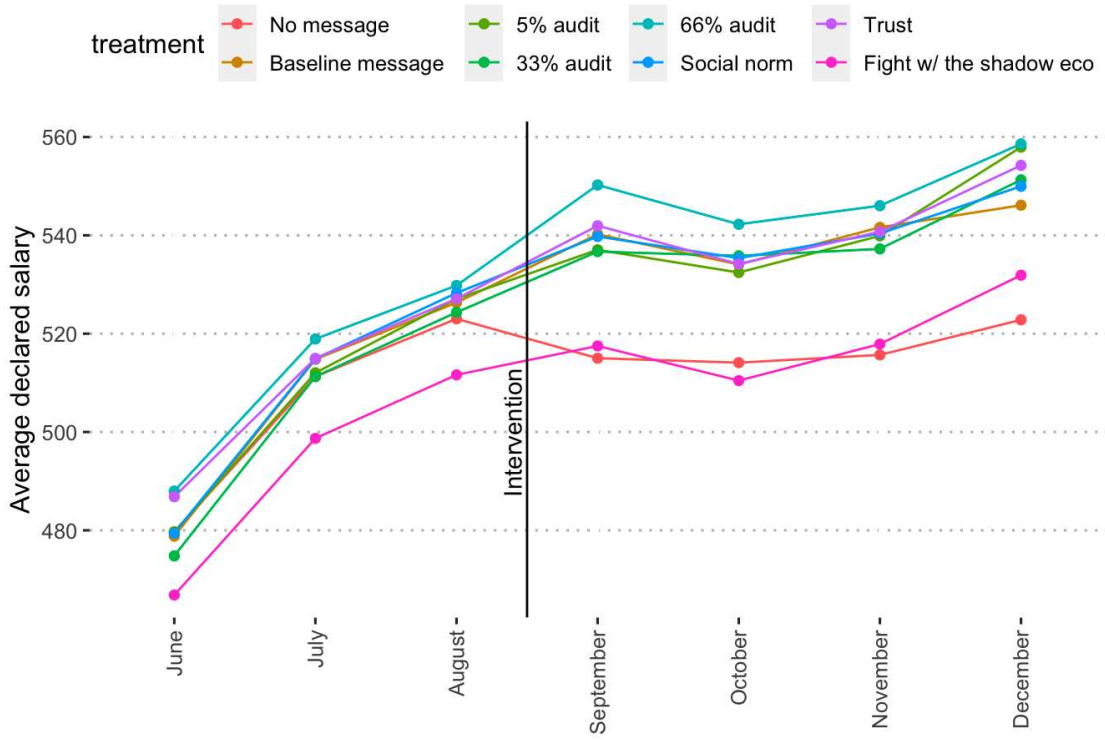
Table D4. Logistic regression for the effect of treatment on the response

Model	(1)	(2)	(3)
Treatment (baseline: Baseline message)			
5% audit	-0.902***	-0.887***	-0.907***
	(0.207)	(0.208)	(0.210)
33% audit	-0.288	-0.281	-0.290
	(0.179)	(0.180)	(0.184)
66% audit	-0.230	-0.218	-0.279
	(0.176)	(0.176)	(0.181)
Social norm	-0.0859	-0.0832	-0.0984
	(0.172)	(0.172)	(0.175)
Trust	-0.0238	-0.0201	-0.0663
	(0.170)	(0.170)	(0.174)
Fight with the shadow economy	-0.116	-0.106	-0.117
	(0.172)	(0.172)	(0.177)
Wave		0.00793	-0.0170
		(0.0609)	(0.0617)
Number of employees		0.00824***	0.00539*
		(0.00253)	(0.00292)
Turnout		-1.78e-07**	-6.71e-08
		(7.26e-08)	(7.05e-08)
Grants received			0.107
			(0.143)
Age of the business			0.00966
			(0.00592)
Average salary level in 2021 relative to region & sector			0.814**
			(0.410)
Paid taxes in 2021			-3.39e-07
			(7.27e-07)
Control for region	No	No	Yes
Control for industry	No	No	Yes
Constant	-1.529***	-1.600***	-2.692***
	(0.120)	(0.170)	(0.375)
Observations	3,335	3,335	3,335

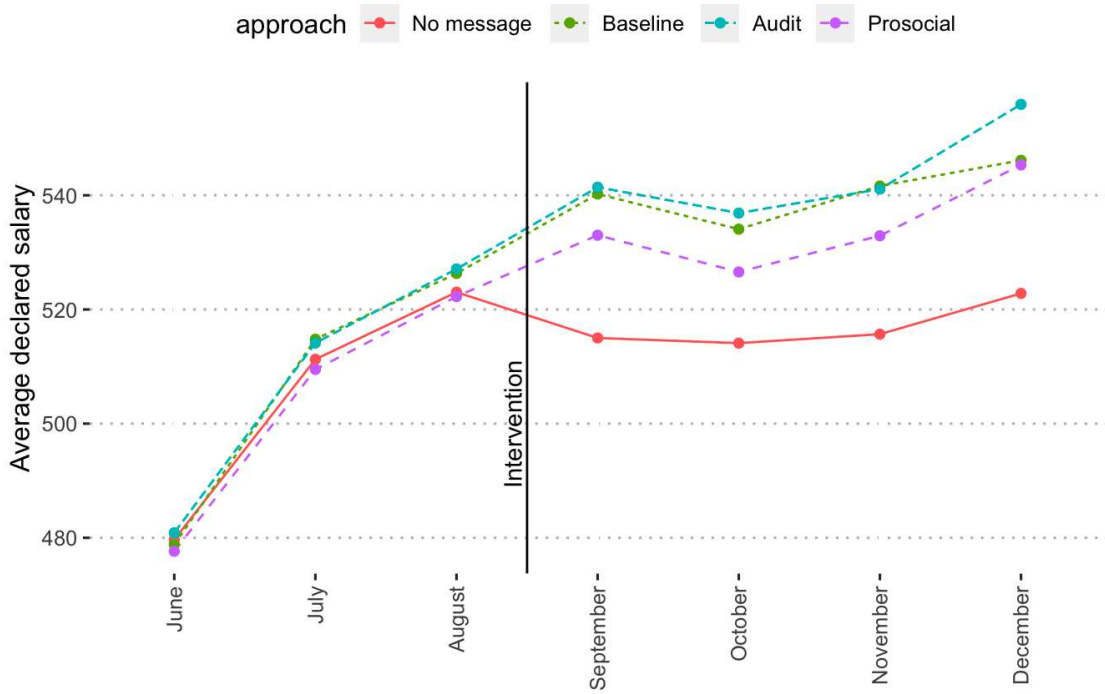
Robust standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

Average absolute values of declared salaries per month:



Average salary by approach (grouped treatment)



Fixed effects model for Audit-only treatments

	model 1	model 2	model 3
Dependent Var.:	avg_salary	avg_salary	avg_salary
Constant	506.9*** (7.8)	498.4*** (11.9)	153.4*** (17.6)
afterTRUE	36.7*** (2.3)	37.0*** (2.3)	36.6*** (2.2)
num_audit	-29.1 (59.2)	-47.4 (58.4)	-74.9. (43.1)
num_audit square	56.8 (80.2)	78.2 (78.7)	121.2* (58.4)
wave		-2.5 (4.1)	-2.7 (3.2)
employees		0.28 (0.27)	-0.74** (0.25)
turnout		0.0002** (6.5e-5)	0.0001*** (4.2e-5)
bin_grants			24.7** (7.5)
years			-1.2*** (0.30)
sal2021_ratio			633.8*** (23.7)
paid_tax_2021			0.0002** (6.2e-5)
regionLatgalesreģions			-95.5*** (11.3)
regionPierīgasreģions			17.2. (10.2)
regionRīgasreģions(Rīga)			37.5*** (9.8)
regionVidzemesreģions			-30.9** (11.6)
regionZemgalesreģions			-0.37 (11.4)
industryBūvniecība			108.7*** (8.0)
industryRūpniecība			103.9*** (7.6)
industryLauksaimniecība			91.9*** (8.1)
industryTransportsunuzglabāšana			8.3 (14.2)
industryPakalpojumi			62.1*** (8.9)
industryCits			125.7*** (10.2)
_____	_____	_____	_____
S.E.: Clustered	by: id	by: id	by: id
Observations	9,816	9,816	9,816
R2	0.015	0.047	0.351
Adj. R2	0.015	0.047	0.350

Table D5: difference in paid taxes

estimate	group1	group2	n1	n2	statistic	conf.low	conf.high	p.adj	p.adj.signif
-38.247	No message	Baseline	477	477	111594	-227.407	162.312	0.764	ns
-107.147	No message	Audit	477	1425	324554	-268.556	48.239	0.667	ns
-61.716	No message	Prosocial	477	1433	332634	-218.494	98.262	0.667	ns
-73.752	Baseline	Audit	477	1425	329256	-238.540	83.743	0.667	ns
-22.791	Baseline	Prosocial	477	1433	337457	-185.943	133.733	0.764	ns
47.012	Audit	Prosocial	1425	1433	1036596	-62.983	161.500	0.667	ns

Table D6. The difference in claimed tax returns (only those companies are counted which applied for tax returns)

estimate	group1	group2	n1	n2	statistic	conf.low	conf.high	p.adj	p.adj.signif
-85.897	No message	Baseline	233	218	23451	-252.176	34.285	0.479	ns
-72.563	No message	Audit	233	689	74807	-187.352	17.183	0.479	ns
-32.770	No message	Prosocial	233	666	74731	-129.825	48.575	0.482	ns
18.064	Baseline	Audit	218	689	76308	-99.269	134.764	0.720	ns
49.566	Baseline	Prosocial	218	666	76142	-43.058	178.876	0.479	ns
29.847	Audit	Prosocial	689	666	236614	-27.799	105.764	0.479	ns

	model 1	model 2	model 3
Dependent Var.:	log(avg_salary)	log(avg_salary)	log(avg_salary)
Constant	6.2*** (0.01)	6.2*** (0.01)	5.3*** (0.03)
afterTRUE	0.02 (0.01)	0.02 (0.01)	0.03** (0.01)
after x approach = Baseline	0.04* (0.02)	0.04* (0.02)	0.04* (0.01)
after x approach = Audit	0.05** (0.02)	0.05** (0.02)	0.04** (0.01)
after x approach = Prosocial	0.03. (0.02)	0.03 (0.02)	0.02 (0.01)
wave	-0.002 (0.006)	-0.003 (0.006)	-0.0006 (0.004)
scale(employees)		0.002 (0.01)	-0.01 (0.008)
scale(turnout)		0.04*** (0.01)	0.04*** (0.008)
i(factor_var=bin_grants,ref_special=TRUE)			0.03* (0.01)
scale(years)			-0.006. (0.004)
sal2021_ratio			1.5*** (0.04)
scale(paid_tax_2021)			-0.003 (0.005)
regionLatgalesreģions			-0.20*** (0.01)
regionPierīgasreģions			0.06*** (0.01)
regionRīgasreģions(Rīga)			0.13*** (0.01)
regionVidzemesreģions			-0.06*** (0.02)
regionZemgalesreģions			0.02 (0.01)
industryBūvniecība			0.22*** (0.01)
industryRūpniecība			0.20*** (0.01)
industryLauksaimniecība			0.19*** (0.01)
industryTransportsunuzglabāšana			0.03 (0.02)
industryPakalpojumi			0.12*** (0.01)
industryCits			0.23*** (0.01)
S.E.: Clustered	by: id	by: id	by: id
Observations	26,223	26,223	26,223
R2	0.008	0.027	0.371
Adj. R2	0.008	0.027	0.370