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Do your tax problems make tax evasion seem more justifiable? Evidence from a survey experiment☆

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ABSTRACT

Taxpayers often view tax rules and filing processes as complicated. I study whether the perceived tax uncertainty among peers makes tax evasion more acceptable among the general public. I find strong supportive evidence for this hypothesis using a survey experiment and a large representative sample of the German population. Providing randomized information that others are uncertain about how to file their taxable income decreases individual support for tax compliance. This suggests that subjects judge tax evasion less harshly in response to this peer information. Studying related heterogeneous treatment effects, I find that both older and left-wing subjects are more responsive to tax uncertainty of others. Less harsh views on evasion are persistent for very high compliance levels in a follow-up survey.

1. Introduction

Many taxpayers regularly face the task of filing their annual tax declaration, which requires processing large amounts of information and abiding ample documentation requirements. This is all the more cumbersome for taxpayers since modern tax systems are typically complex and involve many tax rules, which are often updated on a yearly basis. Therefore, it may not come as a surprise that existing work finds that people frequently have a poor knowledge on existing tax rules and their implications (Stantcheva, 2021).[1] According to a recent representative survey, people perceive tax filing to be very or rather difficult and about 90% support a move towards simpler tax rules (Blesse et al., 2021). Complex tax schedules and filing processes also have important negative

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[1] People seem to systematically underestimate average tax rates (De Bartolome, 1995; Gideon, 2017; Ballard and Gupta, 2018). This may be due to confusion about the concepts of average and marginal tax rates as well as non-linearities in tax schedules. Rees-Jones and Taubinsky (2020) provide experimental evidence that people regularly engage in heuristics to approximate non-linear tax schedules (i.e. "Schmeduling", as discussed by Liebman and Zeckhauser, 2004). Stantcheva (2021), Aghion et al. (2017) show that people do not correctly understand income tax schedules. Hoopes et al. (2015) report that taxpayers are often not fully informed about taxes but search for relevant information when the tax becomes more salient. Chetty et al. (2009) highlight the role of tax salience for economic behavior. Acquiring information is, however, costly and evidence indicates that learning about taxes and how to benefit from them takes time and is typically far from complete (Aghion et al., 2017).

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implications such as low-take up rates of tax benefits (e.g. Chetty et al., 2013; Bhargava and Manoli, 2015), large compliance costs on taxpayers (Benzarti, 2020), inattention to new tax incentives (Abeler and Jaeger, 2015) and the fact that taxpayers are confused and misinterpret economic incentives of taxes (Feldman et al., 2016; Aghion et al., 2017).[2]

Against this background, complex tax rules may reduce compliance and enforcement levels (Krause, 2000). Notably, Bellemare et al. (2019) show lab evidence that people use the ambiguity from unintentional filing mistakes in complex tax settings as an excuse for non-compliance. This shows that complex tax rules have a negative direct effect on tax compliance by creating tax payer confusion and opening up wiggle room for individuals to opt-out of compliance. However, even though people also make individual tax compliance decisions in a social context (e.g. Traxler, 2010; Frey and Torgler, 2007), it remains unclear whether there may be indirect negative spillovers of observing other taxpayers to be confused and not being able to claim what benefits the tax system offers. Specifically, taxpayers may interpret such filing uncertainty of others as having lower perceived costs of tax non-compliance. Also, people may perceive tax avoidance of those with access to tax knowledge either as unfair or as legitimate and change their compliance accordingly.

This paper addresses this issue and provides causal evidence on spillover effects of peer information about tax confusion of others on attitudes towards tax evasion. Specifically, I show whether information about the perceived uncertainty of others how to file their taxes reduces individual support for tax compliance.[3] In order to do this, I designed a survey experiment which asked participants about their tax compliance preference, i.e. their view on the justifiability of tax evasion (of both oneself or others), and compared their answers across three experimental groups which differ in the information about the taxpayer uncertainty among others in the context of complex taxes. The analysis is inspired by a recent representative survey among the general population in Germany from Blesse et al. (2021) which finds that half of survey respondents find their tax declaration difficult and especially see the chance of forgetting something or reporting falsely as the source of these difficulties in tax filing (Blesse et al., 2021, p. 56). While forgetting to claim eligible deductions may result in paying a needlessly large amount of taxes for those affected, uncertainty over existing tax rules may also lead to unintentional and 'honest' mistakes when declaring one's taxable income. Regardless, tax uncertainty of others how to file their taxable income may increase empathy for non-compliance and judge tax evasion less harshly. Tax evasion likely comes with a social stigma in the eyes of the general public since survey-data shows consistently high support for tax compliance in Germany (see Section 2.1). Thus, information regarding taxpayer uncertainty among others and their respective lack of ability to optimize their taxable income over eligible benefits in the tax system should make people more accepting of tax non-compliance.

The study was fielded in the German Internet Panel (GIP) which is a large probability-based population sample in Germany. The survey has 3 experimental groups to study the role of taxpayer uncertainty of others for tax compliance preferences.

First, the *Uncertainty* condition gives respondents the information about prevalent difficulties of others when filing their annual tax declaration, which is inspired from a previous survey of the author (Blesse et al., 2021). Specifically, the information states that in the context of complex tax laws due to many deduction and exemption possibilities many citizens are often not sure about whether they report all incomes correctly in their tax declaration. Respondents in this treatment should be more aware of other taxpayers' lack of tax knowledge and their uncertainty on how to file their taxable income properly. This treatment condition thus allows me to test whether people are more lenient towards tax evasion when becoming aware of other taxpayer's uncertainty about how to file their tax declarations and, thereby, their lower ability to optimize their taxable income over potential benefits the tax system provides or to make unintentional filing errors.

Second, the *Unequal knowledge* treatment augments the peer information from the *Uncertainty* group with the contrasting notion that other citizens exist who possess the relevant tax knowledge or have access to it through tax advisors and use that knowledge in order to reduce their tax burden through avoidance. Given different degrees of tax knowledge in both treatments, these groups are described to have different opportunities to optimize their after-tax incomes to their benefit. Third and last, a control group does not receive any information. All three experimental groups, however, read the same neutral opening statement about tax evasion in order to become familiar with the topic.

Please note that both treatment scenarios are realistic and relevant in non-prefilled tax systems (as the German one) where complicated rules make tax filing conditional on extensive tax knowledge. Naturally, someone who is uncertain how to file his or her income cannot knowingly (and thereby, intentionally) evade taxes which then leads to the question whether one's support for tax compliance can be reduced by the statement that many cannot optimize their after-tax incomes likely due to under-reporting eligible tax deductions in the first treatment. The second intervention tests whether active avoidance behavior of others while taking benefit of tax knowledge affects the willingness to justify tax evasion from oneself and others. The treatments test interesting channels of how acceptance of deliberate tax evasion changes when subjects become aware of potential non-compliance in the context of complex taxes, be it either through taxpayer confusion and thereby potential non-compliance among others or through the fact that other taxpayers can take benefit of tax knowledge and optimize over deduction possibilities.

The results show that informing respondents about the prevalent uncertainties of others when filing taxes significantly decreases support for tax compliance. First, this shows that people are not necessarily aware of tax filing uncertainties of other taxpayers. This is true despite the fact that 50% of respondents elicited in an earlier wave of the GIP that they find tax declarations somewhat or very difficult themselves (Blesse et al., 2021). Second, the significant negative effect of the *Uncertainty* treatment shows that subjects

[2] For a recent review of the economic implications of tax complexity, please see Blesse et al. (2021).

[3] A related concept to the one elicited here is tax morale, i.e. all non-pecuniary motives or one's intrinsic motivation to pay taxes (Luttmer and Singhal, 2014). See Section 2.1 for more information.

empathize with problems of others in optimizing their after-tax incomes in the context of complex taxes, making them more lenient towards tax evasion. The *Unequal knowledge* group also significantly reduces support for tax compliance as compared to the control group but one cannot reject the equality of effects between both treatments.

Moreover, I find that the negative information effect of both treatments results entirely from fewer respondents choosing the highest answer categories for supporting tax compliance. Thus, information about uncertainties regarding tax filing due to complex tax rules especially reduces the prevalence of very honest taxpayers. Related effects are larger for the *Uncertainty* group. Importantly, I also check for a potential alternative channel in which the treatments not only increase compliance costs due to the uncertainty of others on how to file taxes as originally intended but may have also increased the perception of own compliance costs of paying taxes. Using prior beliefs on individual perceptions of compliance costs to declare one's taxes from a previous survey wave allows me to disentangle whether treated individuals update their views on tax evasion due to either channel. Since I do not find evidence on significant effects of individual perceptions of own compliance costs on attitudes towards tax evasion in the context of the experiment, I interpret this as supporting evidence that the results speak actually in favor of a peer information effect rather than a mere increase in own compliance costs. Please note that even though the peer effect channel seems to dominate the alternative channel regarding own compliance costs through the treatment provision, I cannot fully exclude that the latter mechanism may be valid and play some role in the present design. Related effects and potential caveats to this issue are discussed at length in Section 3.3.

I also analyze whether certain groups of participants respond more or less to either treatment with respect to their tax compliance preferences. Given longitudinal data of the GIP, I can exploit rich background information from previous survey waves. Older respondents show stronger negative responses than younger subjects to the *Uncertainty* information, i.e. that many people are uncertain how to properly declare their taxable income.[4] Left-wing subjects explain lower support for tax compliance in the *Unequal knowledge* condition. This corresponds to the results of Alesina et al. (2018) who find that political preferences play a large for redistributive preferences. In line with their results, I argue that leftists are more lenient towards tax non-compliance if they are informed about active avoidance activities of taxpayers who have tax knowledge or access to it since these people are presumably more rich. Put differently, leftists are more empathic towards tax evasion, likely as a means of redistribution towards tax filers who either lack tax knowledge or do not have the means to access it through (presumably costly) advice.

I also study persistence using a follow-up survey two months after the main experiment. The treatment effects indeed appear to be largely persistent. Specifically, the share of high support for compliance is significantly reduced by peer information even two months after the intervention. Thus, peer information about tax uncertainty of others has persistent effects on very high levels of support for tax compliance but the resulting reductions in support grow somewhat less strong again over time. Persistent treatment effects, however, also suggest that the results arise due to new information rather than due to an increased salience of taxpayer confusion. They also alleviate potential concerns about experimenter demand in the experiment of the main survey. Again, I find that political ideology is an important driver of the negative effect of the *Unequal knowledge* condition. The point estimates are virtually identical with the effects in the main survey. It appears that left-wing respondents internalized a more lenient view towards tax evasion when being informed that taxpayer uncertainties are common and when possible negative distributional implications for unaware taxpayers are highlighted to the participants.

This study makes several contributions to the literature. First, I add to the general literature on tax compliance and in particular to work regarding the intrinsic motivation of tax compliance (see Luttmer and Singhal, 2014 for a recent review). The treatment conditions both speak to peer effects and social influences as a channel of tax compliance and related attitudes (for reviews, see Luttmer and Singhal, 2014; Hashimzade et al., 2013, respectively). Cross-country survey evidence supports the hypothesis of 'conditional cooperation' where people decide to comply depending on the (perceived) compliance of others (Frey and Torgler, 2007). Several randomized control trials (RCTs), however, provide a mixed picture whether information provision regarding compliance behavior of others has an effect on individual tax compliance. Some studies indeed find positive effects of peer information on compliance behavior (e.g. Hallsworth et al., 2017; Bott et al., 2020). Moreover, Del Carpio (2014) shows that informing taxpayers about average compliance has long-lasting positive effects but information about enforcement levels does not. Other studies show spillovers in tax compliance among peer networks (Drago et al., 2020 for the case of TV license fees; Paetzold and Winner, 2016 for reporting a commuter tax allowance). Other RCTs, however, do not find peer effects on average (such as Slemrod et al., 2001; Fellner et al., 2013, Castro and Scartascini, 2015 or Perez-Truglia and Troiano, 2018). Also social image concerns play a role for tax compliance and governments can exploit these concerns, e.g. through shaming (Perez-Truglia and Troiano, 2018; Dwenger and Treber, 2022). Rewards for compliance, however, can also backfire depending on the intrinsic motivation of taxpayers (Dwenger et al., 2016).

The present paper provides novel evidence on the effect of a yet overlooked type of peer information on attitudes towards tax compliance, i.e. the perceived taxpayer uncertainty among other taxpayers, using a survey experiment among the general public.[5] My results suggest that once people become aware of tax confusion among others and their following limited ability to reduce

[4] This corresponds with evidence that higher age groups show higher support for simpler taxes (Blesse et al., 2021). Aghion et al. (2017) also report that older individuals know less about tax incentives and are also less able to learn, indicating higher cognitive costs in adjusting to complex tax rules.

[5] A few other survey experiments study attitudes towards tax compliance. Doerrenberg and Peichl (2020) analyze the role of social norms and reciprocity and Sjoberg et al. (2019) study the effect of anti-corruption efforts as well as the opportunity for citizens to voice their public expenditure preferences to the government. Ortega et al. (2016) estimate the effect of government performance on tax compliance. Some papers use hypothetical scenarios to study the role of emotions for compliance (e.g., Privitera et al., 2021) and Górecki and Letki (2021) provide cross-country evidence on how social norms moderate incentives to evade taxes.

their tax burden within their lawful opportunities, they become more accepting of tax evasion. The treatment likely increases the perceived individual cost of tax compliance through the tax filing uncertainty of one's peers.

Second, my results complement recent studies on the effects of tax complexity on tax compliance (see the opening paragraph above). None of these papers show whether the perceived tax confusion among others (e.g., established in Blesse et al., 2021) itself has a causal effect on the acceptance of tax evasion.[6] I show that information about the prevalence of tax filing uncertainty among others leads to more acceptance of tax evasion. High levels of support for tax compliance also become less frequent when distributional consequences of complex taxes are highlighted in favor of presumably rich taxpayers that can actively avoid taxes. This is especially so among left-wing respondents. These findings suggest a role for tax knowledge and its distribution among taxpayers in determining fairness and legitimacy perceptions of the tax system (see also Eriksen and Fallan, 1996).

2. Survey details and experimental design

2.1. Tax compliance preferences

The main survey. I field the survey experiment in the *German Internet Panel (GIP)*.[7] The panel is organized as an omnibus survey, where researchers of different fields collect information on attitudes and preferences relevant to economic and political decision making (Blom et al., 2015). The survey ensures representativeness of the general German population aged between 16–75 years at the time of recruitment based on a probability sample of both the German offline and online population. The latest panel refreshment in 2018 invited a random draw of eligible individuals by postal mail to participate in the bi-monthly web-based surveys of the GIP. Regular invitations to participate were then typically sent via email. Before the 2018 update, there was support for those who did not have the necessary online access or hardware equipment to participate online by providing web-access, web-enabled devices and technical assistance (Blom et al., 2015). These efforts constitute a rare and invaluable feature in survey research (Blom et al., 2015, 2016). Blom et al. (2015, 2017) show that including offline households from the general public in a web-based survey significantly increase survey coverage and representativeness. For practical reasons, however, the support of offline subjects was then discontinued.

The survey-embedded experiment analyzed in this paper was conducted in March 2019 (wave 40) of the GIP. Altogether, 4890 respondents participated in wave 40. 72 participants dropped out until the survey experiment and the main outcome question was reached. Only 7 respondents chose not to answer the relevant outcome question, leaving me with 4809 persons that participated in the experiment and answered the tax compliance question. While the experiment was fielded in wave 40 of the GIP, the panel structure of the survey allows me to gauge detailed information about each respondent from former waves of the GIP as well. The summary statistics discussed in Section 2.5 outline all variables used in the main results of the paper.

Measuring individual preferences for tax compliance. I elicit tax compliance preferences in this paper on the basis of the following question in the GIP: *How justifiable do you think it is to evade taxes?* The question is an adapted version of the World Value Survey (WVS) question which is considered standard in the tax morale literature.[8] Respondents could answer on a 6 point scale with response categories ranging from absolutely justifiable, justifiable, rather or rather not justifiable, not and absolutely not justifiable.[9] Higher values imply higher individual support for tax compliance.

The question measures the general and unframed view of a respondent to comply with taxes. Only about 10.06% of all respondents stated that tax evasion is absolutely justifiable, justifiable, or rather justifiable to them (i.e. 1.14, 2.52, and 6.4% of all answers, respectively), with 89.94% of answers depicting that evading taxes is either rather not justifiable (19.67%), not justifiable (35.95%) or absolutely not justifiable (34.31%). Comparably high levels of support for tax compliance for Germany were also found in Doerrenberg and Peichl (2020) in an earlier wave of the GIP. The numbers are also well in line with similar questions from the WVS and EVS (see Möhlmann, 2014; Torgler, 2002; Feld and Torgler, 2007 for evidence on support for tax compliance in Germany and related West-East differences). In the WVS wave 7 (2017–2020) Germany also ranks 3rd with respect to stated support for tax

[6] There is mixed evidence of perceptions of complex taxes on tax compliance with Richardson (2006) finding a negative effect and Torgler et al. (2008) finding none on tax morale. Eriksen and Fallan (1996) also show that tax knowledge improves tax morale and fairness perceptions of the tax system.

[7] The GIP is a survey panel which is administered by the University of Mannheim in the framework of the "Collaborative Research Center 884 on Political Economy of Reforms" (SFB 884), which is funded by the German Science Foundation (DFG). A general description of the GIP and its method of data collection can be found in Blom et al. (2015) and online at https://www.uni-mannheim.de/en/gip/for-data-users/methodology/. The interested reader finds access to the detailed questionnaires via https://www.uni-mannheim.de/en/gip/for-data-users/questionnaires-and-documentation/. The survey data are available to the scientific community and every researcher can order access to the GIP data through the following website: https://reforms.uni-mannheim.de/io-nas/sowi/reforms/internet_panel/Data_access/.

[8] The WVS question reads: *Please tell me for each of the following statements whether you think it can always be justified, never be justified, or something in between*: *Cheating on tax if you have the chance*. The question is measured on a 10 point scale with one (1) meaning 'never justifiable' and ten (10) meaning 'always justifiable'. The European Value Survey (EVS) uses an identical formulation of the question at hand. Please note that the GIP question considers evasion per se (i.e. of oneself and of others) and as a deliberate choice. Since the GIP question differs slightly from the one of the WVS and EVS, I do not refer to my outcome question as tax morale specifically but argue that it measures attitudes and preferences about tax compliance more generally. Even though surveys are considered standard to inquire preferences about voluntary tax compliance and this inquiry is typically non-incentivized (i.e. comes without sanctions or costs) for respondents, it can be argued that justifying tax evasion may also underly a pure economic rationale (Allingham and Sandmo, 1972). Specifically, (justification of) evasion may be positive in the presence of compliance costs (see below) even without a role for tax morale.

[9] The original question in German reads: *Fuer wie vertretbar halten Sie es Steuern zu hinterziehen?*. Response categories in original wording read: *fuer sehr vertretbar, fuer vertretbar, fuer eher vertretbar, fuer eher nicht vertretbar, fuer nicht vertretbar* and *fuer ueberhaupt nicht vertretbar*.

compliance levels in a sample of 48 countries (World Value Survey, 2020). Hence, Germany is a country with a relatively high tax culture, where evading taxes likely comes with a social stigma among the general public.

Survey-based measures of voluntary tax compliance are not free of criticism. For instance, respondents may elevate their self-reported compliance in surveys and answer not truthfully (Andreoni et al., 1998). In line with this argumentation, Elffers et al. (1987) link tax audit and survey data and find that self-reported tax compliance can be substantially overstated. Other research, however, finds that survey-based levels of tax morale and (perceived) tax evasion are strong correlates (Richardson, 2006; Frey and Torgler, 2007; Torgler et al., 2008). Cummings et al. (2009) replicate the findings from artefactual field experiments on tax compliance with self-reported survey measures of tax morale. Several papers show also that tax morale is negatively correlated with the size of the shadow economy (e.g. Alm and Torgler, 2006; Torgler, 2005). Notably, Halla (2012) finds a direct causal link between tax morale and compliance behavior. According to Andreoni et al. (1998, p. 837) survey data is especially useful in order to test taxpayer motivations and behavior. This is exactly what the present paper does by using compliance preferences and an experiment to test changes in voluntary compliance.

Moreover, the tax compliance question represents a hypothetical and abstract concept of tax compliance and does not ask directly about tax evasion behavior of respondents, which should increase honesty in responses. Similar to the WVS and EVS, the GIP survey is a comprehensive questionnaire where participants are not likely to get suspicious about individual tax compliance questions and may answer more honestly. Based on these considerations, I argue that the respective question in the GIP suits the purpose of measuring changes in attitudes towards tax evasion across the following experimental groups. Please note that the question explicitly asks the respondents about the justifiability of evasion rather than the acceptance of the legal counterpart of avoidance.

2.2. Experimental interventions

Before eliciting their support for tax compliance, survey participants were allocated to three experimental groups in a between-subject design: the control group, the *Uncertainty* as well as the *Unequal knowledge* group. The experiment uses an augmented treatment structure which gradually adds information. This means that respondents in the *Uncertainty* group receive the same information as the control group plus extra information, and those in the *Unequal knowledge* group receive the same information as in the *Uncertainty* group as well as extra information. Figure A.1, A.2 and A.3 of the Appendix show screenshots of the respective experimental conditions. Please note that treatment effects may not only occur due to information but also due to a higher salience or a priming of the information. Since Section 3.4 provides evidence on persistent treatment effects using the follow-up survey, I argue, however, that the treatments indeed convey new information that respondents then adapt in their stated decision-making.

Control group participants only read a short opener which states that tax evasion is frequently discussed by the media. All experimental groups are preceded by that same statement in order to introduce the topic of tax evasion and indicate its relevance to the respondents. Just like survey items in other omnibus questionnaires, most questions in the GIP are preceded by a short and neutral statement to familiarize respondents with a new set of questions. 1603 participants are being allocated to the control group.

Members of the *Uncertainty* group receive the following statement after the short introductory opener about the relevance of tax evasion in the public debate: *Tax laws are often complicated due to many possible deductions and allowances. Given these complexities of the tax system, many citizens are often not sure whether they report all incomes correctly in their tax declaration.* Subjects are thus informed about the tax confusion of others and their uncertainty about declaring their taxable income.[10] Since taxpayer uncertainty cannot be easily measured, I do not rely on information on actual taxpayer behavior but on information about taxpayer perceptions regarding tax filing (see below).[11] The treatment should affect support for tax compliance through information about other's perceptions about the complexity of tax declarations and its link to tax non-compliance. To be precise, people may have limited information about how other taxpayers comply (Bruno, 2019) and the information may then act as a negative shock to compliance expectations among others for those who were not aware of this fact and assumed that all or most taxpayers perceive tax filing as unproblematic. Thus, perceived compliance costs among affected respondents should decrease in a social context. Specifically, respondents are informed about the perceived filing difficulty among others in the German population regarding income taxes. The treatment is motivated by the fact that half of the respondents in a prior GIP survey stated that they think filing their annual income tax declaration is difficult or very difficult if they have filed their own taxes (Blesse et al., 2021). Since I did not want to restrict the statement to those who file their taxes themselves (about 62.8% of all answers in the GIP, see Blesse et al., 2021) as compared to those who do not, i.e. if they do not have to file a tax return (for instance, retirees) or if someone else files their return on their behalf (e.g. a spouse or a tax adviser), I refer only to "many citizens" as the relevant peer group and do not provide exact figures on taxpayer uncertainty. The treatment then states that many citizens are often not sure, whether they report all incomes correctly.[12] Among others, this perception is well in line with evidence that complexity in tax filing due to many tax rules leads to cognitive costs

[10] Luttmer and Singhal (2014) refer to this channel as peer effects and social influences. Di Gioacchino and Fichera (2020) label it social networks. The treatment links tax compliance, however, also to government policy, e.g. the provision of transparent tax laws or the fact that taxpayers are able to claim tax benefits they are eligible for and can thus also be related to reciprocal motives. If support for tax compliance is (at least) in part derived from benefits of taxation and the legitimacy or fairness of policy, then related support could fall (e.g. Besley et al., 2021; Besley, 2020b; Luttmer and Singhal, 2014).

[11] Also, other papers resort to randomly giving survey-participants information about the beliefs, preferences and actions of others (Bursztyn et al., 2020a,b; Coibion et al., 2021). Just as in the present paper, the relevant information from these papers is derived from survey-based perceptions.

[12] Supporting evidence for this implication of uncertainty comes from another GIP survey from March 2020, which asked about exactly what makes the income tax system difficult and where 40.16, 41.69 and 45.48% of all respondents reported that the scope of documentation requirements, the fear of forgetting something important when filing one's tax return or the fear of filing something wrong in the tax return is making income tax declarations difficult (multiple answers were possible, see Blesse et al., 2021).

and poor decision quality (Aghion et al., 2017; Benzarti, 2020; Abeler and Jaeger, 2015) and creates ambiguity in tax compliance behavior (Bellemare et al., 2019).

The treatment information in the *Uncertainty* condition effectively reduces the perceived costs of evasion in the context of complex taxes since it signals that uncertain taxpayers are not uncommon and not necessarily compliant. Non-compliance to complex tax rules is likely to be unintended since people would not be aware of the consequences of their actions (or would not know any better).[13] Moreover, uncertain taxpayers may be similarly not able to claim benefits that the tax system offers them due to their lack of tax knowledge. Regardless, tax uncertainty of others may increase empathy for non-compliance and judge tax evasion less harshly. Altogether, I hypothesize that the support for tax compliance for this treatment is lower (as compared to the control group) because it informs respondents that taxpayer uncertainty is common among the general population. 1604 respondents receive the *Uncertainty* information.[14]

Participants of the augmented *Unequal knowledge* group additionally receive a further statement after reading both the opener and the *Uncertainty* statement with the following message: *Citizens who know tax laws well or use a tax attorney can possibly take advantage of the complexities of the tax law and reduce their tax burden.* While the first treatment only gives information regarding the uncertainty of ordinary citizens with respect to filing taxes, the second treatment highlights that other taxpayers have the relevant tax knowledge (or access to it through tax attorneys) and can actively optimize their after-tax income through avoidance. Hence, even though people learn about taxes in various ways (if need be), complex taxes remain an important source of uncertainty for many taxpayers when making economic decisions. Evasion motives are explicitly not referred to in order to avoid possible confounding effects due to the fact that people could associate the *Unequal knowledge* group with such intentions. The condition also qualifies the *Uncertainty* statement further since many (but not all) citizens are subject to filing uncertainty. The treatment is again motivated by earlier work on tax filing perceptions as well as the finding that a majority believes that complex taxes (based on abundant deduction possibilities) contribute to larger perceived income inequalities (see Blesse et al., 2021) and that the rich engage in more tax evasion and avoidance (Stantcheva, 2021).[15]

Conditional cooperation and support for tax compliance may be different with respect to these two groups of taxpayers who differ in their opportunities to optimize their after-tax income in the presence of complex tax rules (Traxler, 2010). First, if support for tax compliance is significantly higher for the *Unequal knowledge* than for the *Uncertainty* treatment, then respondents likely view that uncertainty is less prevalent among the general population than under the first treatment condition. Second, if support for tax compliance is significantly lower for the *Unequal knowledge* than for the *Uncertainty* condition, then respondents appear to empathize relatively more with uncertain taxpayers than presumably rich taxpayers who can actively avoid taxes and claim their lawful benefits in the tax system and view it as a legitimate reason not to comply with taxes. Alternatively, they may view filing errors of uncertain taxpayers as unintentional and therefore more legitimate. Third, if the estimated coefficients of both treatments are different from zero but the difference between both comparison groups is statistically indistinguishable, we cannot reject the notion that respondents only care for the disadvantaged and unaware taxpayers when stating their support for tax compliance. Please note that unlike to the *Uncertainty* treatment, I do not have a clear a priori expectation about the effects of the second condition. 1602 respondents are subject to this treatment.

Please note that there may be a slight dissonance between the target question regarding one's support for tax compliance and the design of both treatment conditions. While the outcome measure views evasion as a deliberate choice to take illegal measures not to pay taxes, both treatments have a slightly different focus. The *Uncertainty* condition points towards honest and unintentional mistakes among others when declaring taxes and the *Unequal knowledge* information points to the fact that some taxpayers actively avoid rather than evade taxable income. As argued in Section 1 the treatments test interesting channels of how acceptance of deliberate tax evasion changes when subjects become aware of potential non-compliance in the context of complex taxes, be it either through taxpayer confusion and thereby potential non-compliance among others or through the fact that other taxpayers can take benefit of tax knowledge and optimize over deduction possibilities. One caveat is that due to space constraints, I cannot test what exact associations people have when reflecting on either treatment condition.

[13] Please note that the German tax law distinguishes between tax evasion and careless tax deficiency (so called *leichtfertige Steuerverkürzung*). Both are based on witholding information to the tax authorities which leads to a reduction of tax revenues but tax deficiency is based on light-mindedness and a lack of knowledge while tax evasion is done on purpose (Fromm, 2019). Tax deficiency is thus associated with lower levels of punishment than tax evasion and is classified as a petty offense (unlike the criminal act of evasion). The law differentiates between these two acts based on the personal (ability to process) tax knowledge. While the outcome question of the experiment, however, clearly refers to the act of evasion, the treatment may lead to more empathy towards uncertain taxpayers which are presumably less able to comply with the law or make their rightful claims of tax deductions granted to them. The logic of 'honest mistakes' is also in line with practiced tax law, although taxpayers are oblidged to search for relevant information to a reasonable extent. Legal information in this footnote are based on Fromm (2019).

[14] A further decrease in support for tax compliance could come from the first sentence of the treatment which may be interpreted as increased compliance costs since it potentially makes the filing costs of the tax system salient for the individual respondent (independent of the peer effect from the second sentence). Essentially, this should also lead to more acceptance towards tax evasion. Section 3.3 uses prior beliefs on own perceived tax filing difficulties to control for potential confounding effects of this channel and shows that the peer effect channel likely dominates this alternative channel.

[15] This perception of the general public aligns with papers which find that, predominantly, the very rich evade (Alstadsæter et al., 2019a), that more educated (and richer) individuals know more about the tax code, learn faster and can adjust to tax incentives (Aghion et al., 2017) and that tax advisers can help their clients to reduce tax liabilities (Andreoni et al., 1998; Slemrod, 1989) and are a vital source of tax information for their clients (Chetty and Saez, 2013; Chetty et al., 2013).

2.3. Follow-up survey

In order to test the persistence of my main experiment in wave 40 of the GIP, I use a follow-up question two months after the main survey in the subsequent wave of the GIP. Follow-up surveys are also typically an effective way to alleviate concerns about experimenter demand bias (e.g. Alesina et al., 2018; Haaland and Roth, 2020, 2021). Altogether, 4824 respondents participated in wave 41 of the GIP in May 2019. 4760 people answered the respective question on tax compliance preferences.

No other information experiment was fielded in the GIP after the main intervention in wave 40 (appearing as the last item in the omnibus module) and the follow-up question in wave 41. The tax compliance preference question itself is slightly different, which should make it harder to find persistent effects. The wording of the respective question in wave 41 reads: *How justifiable do you think it is to evade taxes if a good opportunity to do so presents itself?* with the same response categories as in wave 40 of the GIP. The question now added a qualification with respect to the justification of tax evasion if a good opportunity to do so presents itself. The question is thus closer to the WVS version and is equal to the question Doerrenberg and Peichl (2020) use in an earlier wave of the GIP. The question was preceded by the same opener statement as in wave 40 to gauge the interest of respondents and to familiarize them with the context of tax evasion.

The distribution of responses for members of the control group appear to be largely stable over time and in between questions (see Section 3.4). Note that any concerns about consistent answering between subsequent survey waves of the GIP are very negligible since both waves are fielded with a comparably large time gap of two months when compared to other follow-up surveys present in the literature which are typically fielded only a few weeks after the main intervention. Consistent survey answers in wave 40 and 41 are further alleviated by the fact that the GIP is a omnibus survey module on a repeated basis for the same set of individuals. This means that in both survey waves, tax compliance preference questions were placed in between questions of other topics which should further disguise the connection between the question in the main survey and the follow-up question. While the tax compliance question in wave 40 was placed in between questions about the debt brake and fiscal equalization in Germany as well as feedback questions at the end of the survey, the respective question in wave 41 was embedded in a question about redistribution preferences as well as public support for EU policy reforms. The respondents are also not aware of the identity of the involved researchers when answering questions.

2.4. Discussion of experimenter demand bias

Surveys and by extension also survey experiments may come with a caveat of potential social desirability bias or experimenter demand bias. Herein, subjects anticipate what experimenter's aim for and answer accordingly. I argue that the results in the present context are not dominated by experimenter demand concerns for several reasons.

First, a follow-up question in a subsequent omnibus survey shows largely persistent effects even two months after the intervention (see Section 3.4). The effects, especially among high compliance levels, are statistically significant in the follow-up even though they become, of course, weaker over time. Also treatment patterns are similar since only the highest answer categories are affected in both survey waves. This makes it unlikely that subjects try to only pander to experimenter demand instead of genuinely updating their beliefs. The follow-up question is obfuscated by taking a slightly different wording as well as being placed in another omnibus survey which does not directly reveal the identity of the experimenter to the subjects for that specific question and placing the tax compliance question in between largely unrelated questions (see above in Section 2.3). These features contribute to disguise the connection between main survey and follow-up. Showing persistent information effects in obfuscated follow-up surveys is a state-of-the art method to alleviate experimenter demand bias (Haaland et al., 2023). Second, experimenter demand bias is also unlikely to drive results given the substantial treatment heterogeneity I observe in the main survey (Section 3.3) and even in the follow-up survey (Section 3.4) since it is unlikely that such a desirability bias exactly aligns with the heterogeneities observed.[16] Generally, there could be experimenter bias due to the framing of the treatment which leads with a statement that tax declarations are difficult due to exemptions and allowances and afterward asking respondents about their support for tax compliance. Given space constraints, the tax compliance question could not have positioned later (note that the experiment was already positioned at the end of the GIP wave 40). All in all, it is unlikely that the results are driven by experimenter demand.

2.5. Summary statistics

Table 1 provides detailed summary statistics of the GIP survey. The table reflects sample information about household size, age structure, marital and retirement status as well as employment, education, household income and political orientation. Not all information were necessarily surveyed in wave 40 of the experiment but may come from earlier waves. Specifically, I matched information on both political preferences derived from a variable with respect to a person's self-placement on a 11 point left–right scale as well as elicited net household incomes from wave 37 to wave 40. Moreover, some attributes of respondents that do not regularly change over time (e.g. gender or education status) are typically updated only about once a year and are also linked to wave 40.

[16] For instance, if especially left-wing respondents for which we find robust treatment heterogeneity were only to express a feeling that the government should allow them to easily file for their lawful tax breaks (and, thereby, redistribute tax revenues) or otherwise they were to evade taxes, one would also expect treatment effects on the redistribution preference question in wave 41 given that treatment effects on support for tax compliance prevail in the follow-up as well. This question is immediately placed before the compliance question. Neither do I find significant effects of the treatments on redistributive preferences in general nor for left-wing subjects in particular (results available upon request). This suggests that effects on support for tax compliance for leftists are not entirely due to experimenter bias. Leftists report higher compliance than conservatives in the control group (Table B.1).

Table 1
Summary statistics.

	N	Mean	Std.Dev.	Min	Max
Experimental intervention					
Control	4890	0.33	0.47	0	1
Uncertainty	4890	0.33	0.47	0	1
Unequal knowledge	4890	0.33	0.47	0	1
Demographics					
Single households	4876	0.17	0.38	0	1
2	4876	0.43	0.50	0	1
3	4876	0.18	0.39	0	1
4	4876	0.16	0.36	0	1
5+	4876	0.05	0.23	0	1
Age <= 28	4887	0.14	0.35	0	1
Age 29–38	4887	0.15	0.36	0	1
Age 39–48	4887	0.16	0.36	0	1
Age 49–58	4887	0.24	0.43	0	1
Age >= 59	4887	0.31	0.46	0	1
Married	4890	0.58	0.49	0	1
Female	4888	0.48	0.50	0	1
Full time-employed	4866	0.46	0.50	0	1
Retired	4866	0.19	0.40	0	1
Low education	4810	0.04	0.20	0	1
Low-med education	4810	0.47	0.50	0	1
High-med education	4810	0.16	0.37	0	1
High education	4810	0.33	0.47	0	1
Personal net income					
Poor	4890	0.30	0.46	0	1
2	4890	0.27	0.44	0	1
3	4890	0.14	0.35	0	1
4	4890	0.06	0.23	0	1
Rich	4890	0.05	0.21	0	1
No income stated	4890	0.13	0.34	0	1
Not merged	4890	0.06	0.23	0	1
Political orientation					
Conservatives	4890	0.40	0.49	0	1
Left-wing	4890	0.44	0.50	0	1
Non partisans	4890	0.11	0.31	0	1
Not merged	4890	0.05	0.23	0	1

Notes: The table depicts the summary statistics for all treatment group dummies and all covariates used. I define variables as follows, Control, *Uncertainty* and *Unequal Knowledge* group realizations represent the respective allocations of respondents to either group; household size comprises single households and household with 2, 3, 4 and 5+ members; age categories are ≤28, 29–38, 39–48, 49–55 and ≥59; Married equals 1 if respondent is married, 0 otherwise; Female equals 1 if respondent is female, 0 otherwise; Full time equals 1 if respondent is full time employed, 0 otherwise; Retired equals 1 if respondent is retired, 0 otherwise; education categories comprise low (secondary schooling, no job training), low to medium education (upper secondary schooling or finished job training), high to medium education (upper secondary schooling and finished job training) and high eduction (tertiary education); household income variables define net monthly household incomes on a 5-point scale from poor, i.e. 1 (≤1500 Euro), 2 (1500≥ x <2500 Euro), 3 (2500≥ x <3500 Euro), 4 (3500≥ x <4500 Euro) to 5 being rich (≥4500 Euro) as well as a dummy for no answers (No income stated) and a dummy for those observations which had not been in wave 37 of the GIP where the income question was asked; conservatives equals 1 if >5 on a 11-scale left-right placement variable, for ≤5 left-wing equals 1. Non partisans did not report a score for the left-right placement variable. I include a dummy for observations which had not been in the GIP wave where the political preference question was asked. Data comes from the German Internet Panel (GIP) wave 40, except for political preferences as well as household incomes (wave 37).

The table indicates that the most frequent household size covers two household members (43%) and 17% of participants live in single households. The sample pool reaches a balanced gender composition with 48% females and covers all age cohorts with a somewhat higher share of older participants (24% being between 49 and 58 years old and 31% being at least 58 years old) corresponding with an aging German society. 58% of all participants are married. The sample comprises 46% full-time workers and 19% retirees. Participants are relatively well distributed across education levels. About 33% of all respondents are highly educated, i.e. have a tertiary degree. Individuals are split in 5 net household income groups ranging from poor (less than 1500 Euro) to rich (more than 4500 Euro). 30%, 27% and 14% of respondents have net household incomes of less 1500 Euro, 1500≥x<2500 Euro or 2500≥x<3500 Euro. Only 6% and 5% have either between 3500 and 4500 Euro or are 'rich' with more than 4500 Euro. 13% of all participants do not declare their household income to the interviewers and income information of 6% of individuals cannot be matched to the current survey. Furthermore, the sample appears to have a relatively balanced distribution with respect to political ideology, with 40% of individuals being labeled as conservatives and 44% being categorized as left-wing. 11% of respondents do not declare a political ideology (non-partisans).

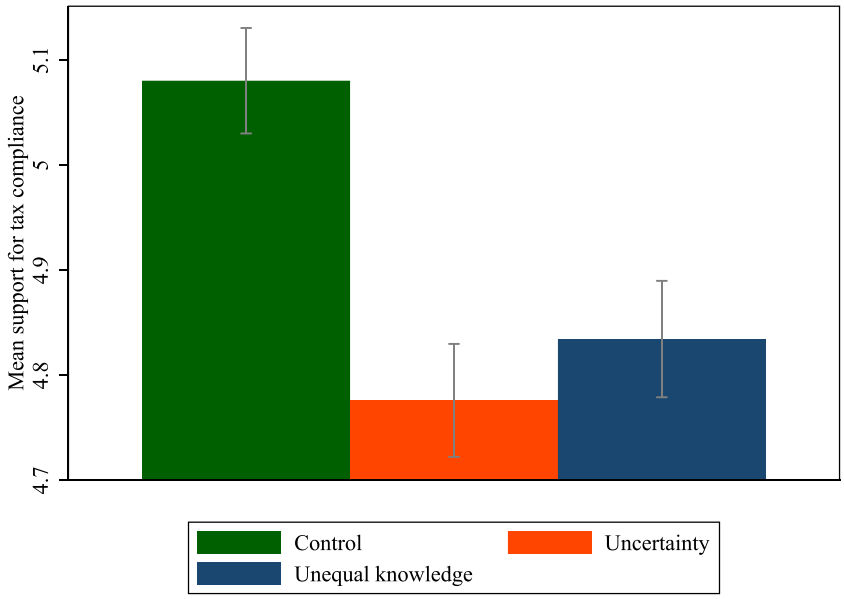

Fig. 1. Support for tax compliance by experimental group.
Notes: Average support for tax compliance by experimental group with 95% confidence bars. The outcome variable is the survey question about tax compliance preferences as described in Section Section 2.1. Treatment groups as described in Section Section 2.2. Total number of observations is 4809 with even distribution across experimental groups. Data come from GIP wave 40 (Blom et al., 2015).

2.6. Balancedness of experimental groups

Table A.1 of the Appendix tests the balancedness of the experimental groups with respect to the demographic information summarized earlier in Section 2.5. Specifically, I run three OLS regressions for each covariate which can be formulated as follows: $y_i = \beta Covariate_i + \epsilon_i$. While $Covariate_i$ represents the respective covariate listed above, the dependent variables depict dummy variables for the respective treatment status for each participant i, i.e. being either among the control group, the *Uncertainty* or the *Unequal Knowledge* group. Given 9 covariates and 3 dummies representing my experimental conditions, I end up with 27 separate regressions in total. These regressions yield 72 estimated coefficients and I find that only one is significant at the 10% significance level and 6 and 2 are significant at the 5 and 1% significance level, respectively. This is by and large in line with the estimates being significant within their margin of error. All in all, covariates appear to be balanced across experimental conditions. Please note that I still control for covariates in my main specifications to reduce standard errors and increase precision.

3. Results

3.1. Main results

Graphical evidence. Fig. 1 shows the average response for the tax compliance preference question and a 95% confidence interval. Average responses on a 6-point Likert scale equal 5.08 in the control group as well as 4.78 and 4.83 in the *Uncertainty* and *Unequal Knowledge* group, respectively. P-values from two sample t-tests indicate that responses differ significantly with $p<0.01$ between control group and both treatment groups. The respective p-value of 0.1381 from this test does, however, not reject the hypothesis of mean equality of the *Uncertainty* and *Unequal Knowledge* group.

Regression model. Now I present the results of the following OLS regression

$$Compliance_i = \beta_1 Treat_i + \beta_2 Covariate_i + \epsilon_i,$$

where I measure support for tax compliance, i.e. $Compliance_i$, of respondent i on a 6-point Likert scale (ranging from 1 evasion being 'absolutely justifiable' to 6 'absolutely not justifiable'). $Treat_i$ represent dummy variables for either the *Uncertainty* and *Unequal Knowledge* group. The respective coefficients of these variables are the treatment effects of interest relative to the omitted control group. In my preferred specification, I also control for a full set of covariates, i.e. demographic information such as household size, age groups, marital status, gender, employment status, retirement and education categories as well as disposable household income and political preferences, i.e. left-wing ideology.

Reported standard errors are robust to heteroscedasticity. I use OLS specifications in the main regressions in order to ease interpretation of the treatment effects of interest. Alternative model specifications, including Linear Probability Models (LPM) as well as Ordered Probit Models are tested as robustness checks in Section 3.2.

Table 2
Effect of experiment on support for tax compliance, Baseline results.

	(1)	(2)	(3)	(4)
Uncertainty	−0.304***	−0.290***	−0.288***	−0.290***
	(0.038)	(0.038)	(0.038)	(0.037)
Unequal knowledge	−0.246***	−0.235***	−0.238***	−0.238***
	(0.038)	(0.038)	(0.038)	(0.038)
Constant	5.080***	4.469***	4.401***	4.347***
	(0.026)	(0.100)	(0.108)	(0.110)
test (p-val T1 vs. T2)	0.138	0.171	0.199	0.189
N	4809	4698	4698	4698
r2	0.015	0.037	0.040	0.043
Demographics	No	Yes	Yes	Yes
Household Income	No	No	Yes	Yes
Political Preference	No	No	No	Yes

Notes: The table presents the effects of the randomized treatment interventions on tax compliance preferences. This is estimated by OLS regressions of tax compliance preferences on treatment dummies. Tax compliance support is measured on a 6 point scale based on the question, "How justifiable do you think it is to evade taxes?". Answer categories range from absolutely justifiable (1) to absolutely not justifiable (6). The experimental groups are, Control group, *Uncertainty* and *Unequal Knowledge* group. Control is omitted, implying that the effects are relative to the Control Group. All participants receive the following information, "There are frequent reports on tax evasion in the media." Participants in the *Uncertainty* group receive the following information, "Tax laws are often complicated due to many possible deductions and allowances. Given these complexities of the tax system, many citizens are often not sure, whether they report all incomes correctly in their tax declaration." Participants in the *Unequal Knowledge* group receive the following information, "Tax laws are often complicated due to many possible deductions and allowances. Given these complexities of the tax system, many citizens are often not sure, whether they report all incomes correctly in their tax declaration. Citizens who know tax laws well or use a tax attorney can possibly take advantage of the complexities of the tax law and reduce their tax burden." The line p-val T1 vs. T2 presents the p-values from t-tests which compare if the regression coefficient for the *Uncertainty* group is different from the regression coefficient for the *Unequal Knowledge* group. Columns (1)–(4) differ in the included sets of covariates. (1): no covariates, (2): gender, age, marital status, household size, employment status, retirement status, and education, (3): (2) plus net household income, (4): (3) plus political preferences. The scale of the outcome variable is 1 (absolutely justifiable) to 6 (absolutely not justifiable). Robust standard errors are in parentheses *** p<0.01, ** p<0.05, * p<0.1.

Main effects. Table 2 shows the regression results for the effects of the experimental interventions on support for tax compliance. Column (1) shows the coefficients of the treatment dummies relative to the control group without controlling for any covariates. The other columns add further covariates in order to improve statistical precision. Specifically, column (2) controls for demographic information including gender, age, marital status, household size, employment status, retirement status, and education, while column (3) adds household income information and column (4) additionally accounts for political preferences. For a detailed discussion of the effects of individual covariates on elicited tax compliance preferences, please see the respective chapter B.1 of the Appendix.

The coefficient of the *Uncertainty* treatment is negative in all specifications and statistically significant at the 1% level. This suggests that providing information about the prevalence of uncertainty in filing taxes among others does indeed have a negative effect on support for tax compliance, making people more accepting of tax evasion. Uncertainty here likely represents 'honest' mistakes of taxpayers in their income reporting rather than evading on purpose which then, in turn, affects the individual willingness to accept tax evasion in a broader sense. Similarly, affected taxpayers may be less able to claim benefits offered by the tax system if they are unknowledgable about them. Unfortunately, my design does not allow to disentangle these two potential channels. In any case, the treatment likely increases the perceived compliance costs of respondents through the uncertainty (and, thus, lower compliance) of others or related fairness considerations.

The effects are very stable across specifications. In my preferred specification of column (4) which controls for a full set of controls, the *Uncertainty* treatment reduces support for tax compliance by about 6.7% (−0.290/4.347) when evaluated at the conditional control group average, relative to the control group which did not receive further information. Therefore, the results imply that support for tax compliance is elastic to salient filing uncertainties from peers in the context of complex taxes. Hence, related information triggers subjects to judge evasion less harshly. The effect relative to the control group amounts to 0.278 of a standard deviation (without controls). The effect size may be not very large but needs to be interpreted against the background of a very strong support for tax compliance. It is also remarkable that people are more accepting of deliberate tax evasion (in the way the question was posed to respondents) when becoming aware of others being uncertain on how to file their taxable income properly. Partially, subjects may consider 'honest' mistakes also as a more acceptable form of tax evasion. The German law officially knows this as careless deficiency which was not asked for in the survey but is also considered as a less severe version of evasion (see details in Section 2.2). Given large misperceptions and lack of knowledge of the tax system in general (Stantcheva, 2021), it is unlikely that laymen are actually able to distinguish deliberate evasion, avoidance and careless deficiency. My results may be reflective of this.

The *Unequal knowledge* treatment also shows consistently negative treatment effects across all columns and is statistically significant at the 1% level when compared to the control condition. The treatment essentially augments the uncertainty treatment

with a contrasting statement that certain people (i.e. those with tax knowledge or those with access to tax advise) can indeed make proper use of the tax system in their favor through avoidance. Again, point estimates are very stable across specifications. The respective coefficients are somewhat weaker but not statistically different at conventional levels when compared to the *Uncertainty* treatment. In my preferred specification of column (4), the p-value of the respective Wald test is 0.189. Also in economic terms the difference of effect sizes is small, representing only about 0.1 standard deviations. Highlighting avoidance opportunities through some taxpayers in this experimental condition as compared to those who cannot optimize their after-tax income through tax knowledge (as expressed in *Uncertainty* condition) therefore does not affect the acceptance of tax evasion on average any further. Taken together, these findings suggest that information about taxpayer confusion among others lets subjects become more lenient on tax evasion.

Discussing the anatomy of the support for tax compliance. Table B.1 of the Appendix shows the 'anatomy' of elicited support for tax compliance using OLS regressions of tax compliance preferences on different sets of covariates via a broad set of observable respondent characteristics. The control variables are similar to those being used in the baseline regressions studying the effect of both treatment interventions on tax compliance preferences (see Table 2). However, Table B.1 of the Appendix illustrates the influence of individual background characteristics on individual support for tax compliance. Thus, the results of Table B.1 of the Appendix show which (socio-demographic) group is more or less likely to find tax evasion justifiable. Please note that the respective coefficients of the included covariates show only (conditional) correlations but do not reflect causal relationships. Detecting heterogeneous responses to the tax compliance preference question allows me, however, to get an impression of how well drivers of tax compliance preferences among the general population in the GIP correspond to existing evidence on tax morale.

Column (1)–(3) always control for the allocation of respondents to both treatment interventions and gradually add covariates. Specifically, column (1) considers demographic features (gender, age, marital status, household size, employment status, retirement status, and education), column (2) adds net household income categories and column (3) also includes political preferences, i.e. left-right political ideology. The results suggest that important determinants of elicited support for tax compliance are age and gender. Specifically, we find that older respondents have a statistically higher support which is independent of other factors that go along with seniority such as marital status, employment, being retired or having higher income. Moreover, women have a higher preference for tax compliance. Both age and gender effects are in line with the evidence on tax morale from developed and developing countries (e.g. Frey and Torgler, 2007 and Alm and Torgler, 2006; for a brief review of this literature, see Dörrenberg and Peichl, 2013 and Lago-Peñas and Lago-Peñas, 2010) and also fit to findings from a related paper using GIP data (Doerrenberg and Peichl, 2020). Corroborating with most existing papers (again, see the review in Dörrenberg and Peichl, 2013), being married correlates with higher support for tax compliance (e.g., see also Alm and Torgler, 2006). Unlike Doerrenberg and Peichl (2020), however, we do find robust evidence that stated preferences for tax compliance increases statistically with a higher individual education status. According to Table B.1 of the Appendix, education is a significant and positive determinant of elicited support for tax compliance. While existing evidence is also ambiguous with respect to the effect of income on tax morale,[17] I find statistically significant effects for the highest declared income category suggesting that higher incomes have a somewhat higher support for tax compliance. Interestingly, I also find statistically significant and positive effects on compliance support when respondents do not declare their income in the survey. Furthermore, the results suggest that respondents with a left-wing political ideology have a higher preference for tax compliance compared to rather conservative individuals. This finding matches evidence from Doerrenberg and Peichl (2020) using an earlier wave of the GIP. Finally, I do not find significant effects of household size, employment status, and retirement on preferences for tax compliance.

3.2. Robustness checks and extensions

Sensitivity checks. Now I present several robustness tests of the main results. Firstly, I check whether a binary measure of tax compliance leads to different treatment effects. For this purpose, I code support for tax compliance as a dummy variable being 1 if responses are equal to 4, 5 or 6 for the question: "How justifiable do you think it is to evade taxes?" which is measured on a 6-point scale, and 0 if otherwise. Table A.2 of the Appendix estimates the respective Linear Probability (LPM) models on both treatment dummies and using a binary measure of tax compliance. The effects remain qualitatively very similar to the main specification with both treatment effects being consistently significant across specifications at the 1% level. Again, the *Uncertainty* treatment results in larger point estimates than the *Unequal knowledge* group, although both groups are repeatedly not significantly different from one another according to Wald tests.

While the main models (and the LPM) use OLS in order to ease the interpretation of the treatment effects, the question on support for tax compliance is measured on a 6-point Likert scale, which may speak for alternative model specifications that directly account for the discrete and ordinal nature of the outcome variable. Hence and secondly, I use ordered probit models to account for the ordered nature of the tax compliance preference question. Table A.3 of the Appendix shows the results. The treatment effects are again very similar to the OLS baseline results. Accounting for the ordinary nature of the outcome variable, we can, however, reject that both treatment groups are equal at the 10% level. Therefore, it seems that the negative treatment effects of the *Uncertainty* condition are statistically somewhat stronger than with the second augmented treatment group. However, just like in the main results the respective differences between both experimental groups are typically not meaningful in an economic sense.[18]

[17] Some papers find positive (e.g. Lago-Peñas and Lago-Peñas, 2010), some insignificant (e.g. Konrad and Qari, 2012) and others find negative effects (e.g. Alm and Torgler, 2006).

[18] In addition to potential concerns about the implications of misspecification to my main estimates, I also check whether the inclusion of covariates in the main results leads to a sample selection bias since not all covariates are necessarily observed for all respondents. Table A.4 of the Appendix shows the regression

Do treatment effects vary across compliance levels? Moreover, I show how the experimental conditions change the distribution of response categories differently across experimental groups. Preliminary evidence can be taken from a test of difference in distributions.[19] To test the shift in response distributions econometrically, I do the following: For each of the six response categories of the tax compliance question ranging from (1) the respondent finds tax evasion absolutely justifiable to (6) the respondent states that he/she deems tax evasion absolutely not justifiable, I create an individual dummy variable. Then, I use each of these six binary compliance variables as alternative dependent variables in LPM specifications. Table 3 shows the respective results for all response categories and both treatment conditions. All specifications account for a full set of covariates. This exercise helps to understand whether the negative information effect of tax confusion among peers on individual support for tax compliance results from a decline in several answer categories or only from the highest levels of compliance (see Dwenger et al., 2016; Dwenger and Treber, 2022 for the role of different motivational types for the effectiveness of rewards or shaming on tax compliance, respectively).

While most answers can be found in the highest response category of tax evasion being absolutely not justifiable (41.42% of answers in the control group), both treatment conditions show large negative treatment effects in this category which are statistically significant at the 1% level. While respondents in the *Uncertainty* group chose this category about 12.6 percentage points less often on average, subjects in the augmented treatment chose it about 8.0 percentage points less often. According to the table, the entire negative average treatment effects emerge from a reduction of answers in the highest category of support for tax compliance, i.e. a lower share of very 'honest' taxpayers. The difference in effects between both treatment groups, however, is significant at the 1% level. Other answer categories do not show significant negative treatment effects. However, the treatment groups shift response patterns somewhat differently. While both groups show significantly more answers in response category 4 (tax evasion somewhat not justifiable), i.e. they alleviate concerns about evasion by making it look more legitimate through prevalent tax filing uncertainties, the augmented *Unequal knowledge* treatment significantly shifts preferences from category 6 even towards response category 2 (evasion being justifiable). The *Uncertainty* group also significantly shifts respondents towards category 3 (evasion being somewhat justifiable) if compared to the control group. Altogether, this set of findings speaks to the fact that peer information about taxpayer confusion especially reduces the share of highly motivated individuals in our between subject design. The *Unequal knowledge* condition has a significantly lower effect on very high compliance levels than the *Uncertainty* group and thus alleviates the extent to which participants perceive tax confusion to be present and problematic among others.

3.3. Heterogeneous treatment effects

In the following, I first discuss the interpretation of the treatment interventions using a prior belief on perceived tax difficulty to disentangle own perceived compliance costs and related peer information. Second, I analyze whether certain groups of participants respond more or less elastically to either of the treatment interventions with respect to their support for tax compliance. Specifically, I interact the treatment dummies with different characteristics of the sample population. Given the longitudinal structure of the survey data, I can exploit rich background information on each respondent from previous survey waves. All related results need to be interpreted as suggestive and not as causal.

Interpretation of treatment effects. A potential caveat of the treatment information relates to the fact that the peer information may be confounded by perceived own compliance costs in the respective statements. Specifically, this relates to the first sentence "Tax laws are often complicated due to many possible deductions and allowances." which is both part of the *Uncertainty* and the *Unequal knowledge* condition (see Section 2.2 for the detailed wording). The second sentence in either treatment, however, refers clearly to peer information about perceived tax problems as can be often found the literature in very similar wording and detail but in different contexts. In addition to formulating that taxes are complicated, the treatment therefore also relates to the fact that "many citizens" cannot reasonably report their incomes in the second sentence.

Therefore, the treatment information may be a compound of an information which merely increases perceived *own* tax compliance costs due to tax complexities in the annual tax declarations and a peer information about perceived compliance costs *among others* in the context of tax complexity. Please note, however, that either perceptions of *own* or *other's* tax filing problems would likely increase one's perceived costs of tax compliance since in both cases the (indirect) impression is that it is harder complying with the law.

Information experiments typically study information updating through the use of prior beliefs (Haaland et al., 2023). Specifically, prior beliefs of individual respondents regarding the difficulty of filing taxes would allow me to disentangle whether treated individuals update their views on tax evasion due to the statement of one's own tax difficulties or the statement relating to other's tax problems. Against this background, earlier work of Blesse et al. (2021) allows me to directly control for perceived own tax compliance costs at the individual level in order to tease out the intended peer information effect. Specifically, I include information on the perceived difficulty of filing one's own annual tax declaration and interact them with the two treatment dummies of the baseline model (see also column (1)–(4) in Table 4 below). The respective information comes from wave 36 and I can match 2238

results when using the reduced sample of 4698 respondents for which all covariates are available, which we use as control variables across all specifications. My main results prevail when gradually adding control variables and keeping the number of observations fixed throughout all specifications.

[19] While I rejected the hypothesis of mean equality between both treatment groups in my baseline estimates, the distributions appear to differ between groups. P-values from pairwise Kolmogorov-Smirnoff tests indicate that responses differ significantly with $p<0.01$ between control group and both treatment groups, respectively. The respective p-value of 0.075 from that test rejects the equality of the distributions in the *Uncertainty* and *Unequal knowledge* groups at the 10% level. Figure A.4 of the Appendix shows treatment effects across individual answer categories graphically. Results are similar to those in Table 3.

Table 3
Effect of treatments on the distribution of tax compliance support, LPM models.

	(1)	(2)	(3)	(4)	(5)	(6)
Uncertainty	0.004	0.008	0.027***	0.075***	0.011	−0.124***
	(0.004)	(0.005)	(0.009)	(0.014)	(0.017)	(0.017)
Unequal knowledge	0.003	0.019***	0.012	0.065***	−0.018	−0.080***
	(0.004)	(0.006)	(0.008)	(0.014)	(0.017)	(0.017)
Constant	0.045***	0.057***	0.169***	0.234***	0.223***	0.271***
	(0.014)	(0.016)	(0.025)	(0.038)	(0.043)	(0.043)
test (p-val T1 vs. T2)	0.860	0.063	0.109	0.492	0.090	0.009
N	4698	4698	4698	4698	4698	4698
r2	0.009	0.008	0.024	0.013	0.014	0.019
Demographics	Yes	Yes	Yes	Yes	Yes	Yes
Household Income	Yes	Yes	Yes	Yes	Yes	Yes
Political Preference	Yes	Yes	Yes	Yes	Yes	Yes

Notes: The table presents the effects of the randomized treatment interventions on the distribution of tax compliance preferences. I estimate Linear Probability Model (LPM) estimations of tax compliance preferences on treatment dummies. Dummy variables for support of tax compliance are derived from a 6 point scale question, "How justifiable do you think it is to evade taxes?" in wave 40 of the GIP. Columns (1)–(6) differ in their outcome variables, namely the response categories to the tax compliance preference question, in Column (1) the outcome equals 1 if the respondent answered that he/she finds tax evasion absolutely justifiable, 0 otherwise; in column (2), the outcome equals 1 if the respondent answered that he/she finds tax evasion justifiable, 0 otherwise; in column (3) the outcome equals 1 if the respondent answered that he/she finds tax evasion somewhat justifiable, 0 otherwise; in column (4) the outcome equals 1 if the respondent answered that he/she finds tax evasion somewhat not justifiable, 0 otherwise; in column (5) the outcome equals 1 if the respondent answered that he/she finds tax evasion not justifiable, 0 otherwise and in column (6) the outcome equals 1 if the respondent answered that he/she finds tax evasion absolutely not justifiable, 0 otherwise. Columns (1)–(6) all control for a full set of covariates, including gender, age, marital status, household size, employment status, retirement status, and education, net personal income and political preferences. The experimental groups are Control group, *Uncertainty* and *Unequal Knowledge* group. Control is omitted, implying that the effects are relative to the Control Group. All participants receive the following information, "There are frequent reports on tax evasion in the media." Participants in the *Uncertainty* group receive the following information, "Tax laws are often complicated due to many possible deductions and allowances. Given these complexities of the tax system, many citizens are often not sure, whether they report all incomes correctly in their tax declaration." Participants in the *Unequal Knowledge* group receive the following information, "Tax laws are often complicated due to many possible deductions and allowances. Given these complexities of the tax system, many citizens are often not sure, whether they report all incomes correctly in their tax declaration. Citizens who know tax laws well or use a tax attorney can possibly take advantage of the complexities of the tax law and reduce their tax burden." The line p-val T1 vs. T2 presents the p-values from t-tests which compare if the regression coefficient for the *Uncertainty* group is different from the regression coefficient for the *Unequal Knowledge* group. Robust standard errors are in parentheses *** $p<0.01$, ** $p<0.05$, * $p<0.1$.

respondents to wave 40 of the GIP. Columns (1)–(2) of Table 4 consider interactions of both treatments with a dummy measure of whether a respondent thinks that declaring one's taxes is rather hard/very hard and is zero otherwise. In addition to respondents who file their tax declaration themselves, columns (3)–(4) consider another variant of this measure with extra categories for subjects who do not file income taxes at all or where someone else files their tax on their behalf. For either of these measures, it becomes apparent that controlling for one's perceived difficulty of tax filing, i.e. relating to the information conveyed in the first sentence of both treatment conditions, does not change the main treatment effects and the respective interaction effects are not significant at conventional levels. In other words, I cannot reject the null of own perception levels of tax compliance costs (i.e. one's perception of tax difficulties) to not play a role for the effects of the information intervention. Of course, this does not mean that this channel is irrelevant for my results but, ceteris paribus, the peer effect channel appears to dominate the effect of one's own tax filing problems through the treatment intervention. The observation that one does not see statistically different treatment effects when controlling for this prior belief suggests that the relevant treatment effect is actually a *peer information* effect rather than a mere increase in *own* compliance costs. Hence, the results speak in favor of robust peer information effects independent of own perceived tax problems (and thus, own tax compliance costs). Reporting taxes oneself or not (either not at all or through others) also does not affect the treatment effects either.

It is worth noting that the lack of statistical significance for the interaction effects of prior beliefs and the treatments are not due to insufficient statistical power. Table A.5 of the Appendix shows that the results remain qualitatively and quantitatively similar when we run the baseline regressions with the reduced number of observations of Table A.5, i.e. after matching wave 40 with the prior beliefs in wave 36 of the GIP.

Please note that even though the peer effect channel seems to dominate the alternative channel regarding own compliance costs through the treatment provision, I cannot fully exclude that the latter mechanism may be valid and play some role in the present design.[20] For instance, although there was no different updating among those who previously considered tax filing to be hard, the first sentence of both treatments may have increased the salience of own compliance costs (independent of the peer effects

[20] For instance, one cannot fully exclude the possibility that priors about own compliance costs from tax filing (which I have a measure of) and one's priors about tax filing costs among others (which I do not measure) may interact with one another.

Table 4
Own or peer compliance costs? Exploiting measures of perceived tax complexity.

	(1)	(2)	(3)	(4)
Treatment dummies				
Uncertainty	−0.386***	−0.350***	−0.386***	−0.357***
	(0.088)	(0.088)	(0.088)	(0.088)
Unequal knowledge	−0.270***	−0.250**	−0.270***	−0.256***
	(0.097)	(0.098)	(0.097)	(0.097)
Perceived tax difficulty I. Reference category: Not/rather not hard				
Taxes are hard	−0.069	−0.057		
	(0.092)	(0.091)		
Uncertainty × Taxes are hard	0.199	0.159		
	(0.135)	(0.136)		
Unequal knowledge × Taxes are hard	−0.099	−0.131		
	(0.144)	(0.146)		
Perceived tax difficulty II. Reference category: Not/rather not hard				
Taxes are hard			−0.069	−0.063
			(0.092)	(0.091)
No taxes declared at all			−0.245*	−0.128
			(0.132)	(0.137)
No taxes declared oneself			0.034	0.013
			(0.091)	(0.092)
Uncertainty × Taxes are hard			0.199	0.167
			(0.135)	(0.136)
Uncertainty × No taxes declared at all			0.229	0.230
			(0.212)	(0.214)
Uncertainty × No taxes declared oneself			0.124	0.094
			(0.135)	(0.137)
Unequal knowledge × Taxes are hard			0.182	0.153
			(0.245)	(0.252)
Unequal knowledge × No taxes declared at all			0.182	0.233
			(0.245)	(0.242)
Unequal knowledge × No taxes declared oneself			−0.032	−0.029
			(0.139)	(0.140)
Constant	5.123***	4.049***	5.123***	4.207***
	(0.059)	(0.245)	(0.059)	(0.192)
N	1385	1368	2154	2121
r2	0.021	0.063	0.020	0.051
Full-set of controls	No	Yes	No	Yes

Notes: The table shows the heterogeneous effects of the experimental interventions conditional on different measures of perceived difficulties to file one's annual tax declaration. The respective question comes from wave 36 of the GIP and reads "How difficult is it for you to fill out your tax return?" Respondents could pick one of the following categories: 1 Very easy; ... ; 5 Very difficult; I do not know because no taxes are declared in my name; I do not know because I do not declare taxes myself (rather, my partner or a tax consultant, etc. does this); I do not know. Reported are the coefficients and standard errors (in parentheses) from a series of OLS regressions of the form $y_i = \beta_1 Treat_i + \beta_2 Covariate_i + \beta_3(Treat_i \times Covariate_i) + \epsilon_i$. Where $Covariate_i$ is the respective covariate listed above. y_i represents support for tax compliance from wave 40 of the GIP and is measured on a 6 point scale based on the question, "How justifiable do you think it is to evade taxes?". Answer categories range from absolutely justifiable (1) to absolutely not justifiable (6). $Treat_i$ represents treatment indicators for either the *Uncertainty* or the *Unequal Knowledge* group, the control group is omitted. $(Treat_i \times Covariate_i)$ is a full interaction of the treatment indicators with the respective covariate. Specifications (1) to (2) represent heterogeneous effects for a measure of perceived tax difficulty which does not account for respondents who do not file their income tax and equals 1 if they deem the filing process rather or very difficult and zero otherwise. Specifications (3) to (4) considers heterogeneous effects for a measure of perceived tax difficulty that is 1 if the filing process is rather hard or very hard and zero otherwise but also has separate categories for those who do not report taxes themselves or let others do it on their behalf. Column (1) and (3) do not include covariates while column (2) and (4) include a full-set of covariates covering all demographic, income and political preferences used in previous regressions. Robust standard errors are in parentheses *** p<0.01, ** p<0.05, * p<0.1.

channel). Importantly, the experimental intervention likely leads to an increase in the cost of tax compliance, be it through a own tax compliance costs in the current tax system or via the information of other's tax uncertainty given the current tax system.

Further sub-group analysis. In order to understand what drives the observed treatment effects, I explored rich background information from previous waves of the GIP with respect to demographics (wave 39 and 40), individual perceptions of the income tax system (wave 36), redistributive preferences (wave 35) and government trust (wave 40). Generally, I find that the treatment effects for both experimental conditions appear to be very stable across most sub-groups. The results suggest that only political ideology and older age groups appear to have significant and robust effects on the experimental interventions, and thus, contribute to my treatment effects.

Table 5
Heterogeneity of average treatment effects.

	(1)	(2)	(3)	(4)
Political orientation. Reference category: Conservative				
Uncertainty × Left-wing	−0.130	−0.126		
	(0.081)	(0.081)		
Uncertainty × Non partisans	0.071	0.080		
	(0.138)	(0.137)		
Uncertainty × Not merged	0.121	0.134		
	(0.177)	(0.184)		
Unequal knowledge × Left-wing	−0.195**	−0.200**		
	(0.082)	(0.082)		
Unequal knowledge × Non-partisans	−0.133	−0.209		
	(0.139)	(0.137)		
Unequal knowledge × Not merged	0.161	0.174		
	(0.185)	(0.195)		
Age. Reference category =< 28				
Uncertainty × =< 38			−0.094	−0.120
			(0.152)	(0.153)
Uncertainty × =< 48			−0.211	−0.226
			(0.153)	(0.154)
Uncertainty × =< 58			−0.338**	−0.347**
			(0.140)	(0.141)
Uncertainty × > 58			−0.348***	−0.364***
			(0.134)	(0.135)
Unequal knowledge × =< 38			−0.065	−0.038
			(0.160)	(0.161)
Unequal knowledge × =< 48			−0.017	0.008
			(0.155)	(0.155)
Unequal knowledge × =< 58			−0.081	−0.040
			(0.143)	(0.144)
Unequal knowledge × > 58			−0.125	−0.092
			(0.137)	(0.138)
N	4809	4698	4698	4698
r2	0.020	0.045	0.031	0.046
Full-set of controls	No	Yes	No	Yes

Notes: The table shows the heterogeneous effects of the experimental interventions. Reported are the coefficients and standard errors (in parentheses) from a series of OLS regressions of the form $y_i = \beta_1 Treat_i + \beta_2 Covariate_i + \beta_3(Treat_i \times Covariate_i) + \epsilon_i$. Where $Covariate_i$ is the respective covariate listed above. For the sake of brevity, only the interaction $Treat_i \times Covariate_i$ is reported. y_i represents support for tax compliance from wave 40 of the GIP and is measured on a 6 point scale based on the question, "How justifiable do you think it is to evade taxes?". Answer categories range from absolutely justifiable (1) to absolutely not justifiable (6). $Treat_i$ represents treatment indicators for either the *Uncertainty* or the *Unequal Knowledge* group, the control group is omitted. $(Treat_i \times Covariate_i)$ is a full interaction of the treatment indicators with the respective covariate. Specifications (1) to (4) represent heterogeneous effects for different covariates. Column (1)–(2) reports interaction effects of both treatment indicators with measures of political orientation. Column (3)–(4) reports interaction effects of both treatment indicators with age categories. Column (1) and (3) do not include covariates while column (2) and (4) include a full-set of covariates covering all demographic, income and political preferences used in previous regressions. For the sake of brevity, no heterogeneous effects are listed for which I did not find significant interaction effects (available upon request). Robust standard errors are in parentheses *** p<0.01, ** p<0.05, * p<0.1.

Table 5 depicts the respective results from the interaction models. I only report interaction effects which are significant at conventional levels. Note that I also do not find that other variables explain the treatment effects in a consistent manner. Column (1)–(2) report interaction effects of both treatments with measures of political ideology. Column (3)–(4) reports interaction effects of both treatments with age categories. For each dimension of heterogeneity, I first report results without control variables (column (1) & (3)) and then add a full-set of covariates with information on demographics, income and political preferences used in earlier regressions (column (2) & (4)).

Older respondents ($48 < age <= 58$ and $age > 58$) respond significantly more negative regarding their support for tax compliance when being confronted with the prevalence of uncertainty in filing income taxes. The negative effect of the *Uncertainty* group in Table 5 increases with age but only becomes significant for the two oldest age groups at conventional levels.[21] This corresponds with evidence from Blesse et al. (2021) that preferences towards more simple tax systems are more prevalent among older citizens. It also corresponds to results from Aghion et al. (2017) that older subjects know less about tax incentives and are also less able to

[21] I also find a significant negative effect for respondents who are retired but the effect is arguably nested in the oldest age group. Since the interaction effect for $age > 58$ prevails even when controlling for a full set of controls (including retirement status), I argue that the age effect drives the main results with respect to the *Uncertainty* group independent of the retirement status of the respective participant.

learn, indicating cognitive costs in adjustment to complex tax rules. My results suggest that this group is more lenient towards tax evasion when being informed about the tax filing uncertainty of other taxpayers. Older respondents also report more compliance on average (see Table B.1 of the Appendix). I argue that higher cognitive costs among the elderly Aghion et al. (2017) may make them more susceptible for using the uncertainty of others to judge tax evasion less harshly.

Table 5 also shows that the negative effect of the augmented treatment group can be explained by political ideology. Participants with a left-leaning political ideology have a significantly more negative shift in their reported compliance in the *Unequal knowledge* treatment as compared to conservatives. Thus, left-wing ideology does not only correlate with higher support for tax compliance (for the respective results, see Table B.1), it also makes people also more receptive for distributional concerns regarding their support for tax compliance in the context of tax problems of others. This is in line with Alesina et al. (2018) who find a large role of political preferences in a survey experiment on redistributive preferences. In their study, left-wing respondents demand more redistribution after receiving pessimist information about inequality of opportunity. Corresponding with their finding, I find that left-wing participants care more about the uncertainty of other taxpayers when they are framed as inequitable. Specifically, they reduce their support for tax compliance in response to the information that some taxpayers cannot optimize their after-tax income due their lack of tax knowledge, while others with that respective knowledge or sufficient access to it can. Accordingly, subjects with left-wing ideology appear to find tax evasion more justifiable, likely as a means of redistribution towards the 'unlucky' mass of confused tax filers. My results are robust to interaction models which measure political preferences using individual German parties where I find that the respective effect is driven by the socialist party (*Die Linke*).

3.4. Follow-up

Now I present the empirical results on the persistence of the experimental conditions using a follow-up survey two months after the main experiment (see 2.3 for details).

Main results. In order to draw conclusions on the persistence of the experimental conditions regarding support for tax compliance, I match the respective treatment and control group variation from the experiment in wave 40 of the GIP to the subsequent follow-up survey wave (wave 41) where a similar but slightly changed outcome question was asked to the same respondents (see Sections 2.1 and 2.3 for details on the exact wording). Given the panel structure of the GIP, I can exploit how tax compliance preferences have changed for the same individual two months after the experiment.

First, it may be interesting to know how persistent tax compliance preferences are over time. Given that most papers on the issue of survey-measures of tax compliance use repeated cross-sections rather than longitudinal surveys (e.g. WVS or EVS), not much is known about how much individuals change their opinion on the acceptability of tax evasion over time. To the best of my knowledge, I provide first evidence on within-subject stability regarding support for tax compliance.[22] Fig. 2 shows the changes in individual responses between survey waves for control group members. Specifically, it depicts the difference of tax compliance preference responses from wave 41 to wave 40. Notably, the majority of participants (55.3%) do not change their support on tax compliance. Only 20.6% of respondents show a decrease and about 24.09% of participants state an increase in their support between subsequent survey waves. Altogether, I find that tax compliance preferences appear to be rather stable over time within-subject.

Second, I study how the experimental interventions of the main experiment change support for tax compliance over time using the follow-up question. In order to do that, I restrict the sample of the follow-up survey wave to respondents who were also part of the experiment in the main survey. This leaves me with N = 4405 which underwent the experiment in wave 40 and answered the tax compliance question in the follow-up survey. Accordingly, I argue that attrition should not be a main concern when interpreting the follow-up results.[23] Covariates in the follow-up are also well balanced with respect to the relevant treatment interventions from wave 40 (see Table A.7 of the Appendix).

In order to estimate treatment effects, I simply regress support for tax compliance (now from wave 41) on the treatment dummies of the main experiment in wave 40 using simple OLS, omitting the control group dummy. Table 6 depicts the results of the respective estimations. While column (1) includes only the treatment dummies in the regression but abstains from including covariates, columns (2) to (4) gradually add information on demographic characteristics, income and political ideology of the individual respondents.

While the *Uncertainty* treatment does not appear to have strong lasting effects on support for tax compliance, its augmented version, the *Unequal knowledge* condition, which further specifies who can properly use tax deductions to their advantage, indeed shows a significant negative effect. The effect is statistically significant at the 5% level and appears to be somewhat weaker than in the main experiment (i.e. 35% of the estimate in the main survey). The effect is also significantly different from the effect of the *Uncertainty* condition as illustrated by the rejection of a joint Wald test with a p-value of 0.086. However, the step-wise inclusion of covariates in columns (2) to (4) reduces the treatment effect of the augmented experimental group but it remains statistically significant at the 10% level. Table 7 further estimates an Ordered Probit Model which takes the ordinal nature of the outcome variable into account and may thus be better specified. The table finds robust treatment effects of the *Unequal knowledge* group but again not for the *Uncertainty* condition. Since the respective test of joint significance between the *Uncertainty* and *Unequal knowledge*

[22] Recently, Besley (2020a) shows strong intergenerational stability of tax morale across birth cohorts. His data, however, does not look at the same individuals over time but at repeated cross-sections.

[23] Table A.6 of the Appendix also shows that neither of the treatment conditions of wave 40 significantly affect the likelihood to answer the follow-up question. The calculations are based on 4438 observations.

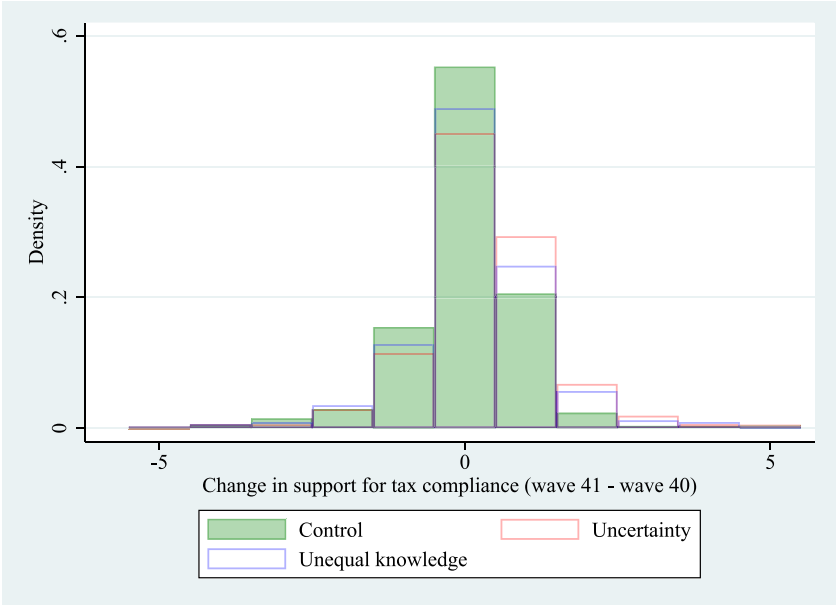

Fig. 2. The persistence of support for tax compliance.
Notes: The figure depicts the distribution in the change of responses for individual support of tax compliance between the follow-up question in wave 41 and the main experiment in wave 40 for control group respondents. Changes in support for tax compliance are measured only for respondents who answer the tax compliance question in both survey waves. Total number of observations is 1461. Data come from GIP wave 40 and 41 (Blom et al., 2015).

Table 6
Effect of experiment on support for tax compliance in follow-up survey.

	(1)	(2)	(3)	(4)
Uncertainty	−0.014	−0.002	−0.001	−0.004
	(0.042)	(0.042)	(0.042)	(0.042)
Unequal knowledge	−0.086**	−0.070*	−0.070*	−0.070*
	(0.043)	(0.042)	(0.042)	(0.042)
Constant	5.107***	4.387***	4.382***	4.298***
	(0.030)	(0.114)	(0.115)	(0.116)
test (p-val T1 vs. T2)	0.086	0.107	0.101	0.115
N	4405	4311	4311	4311
r2	0.001	0.040	0.041	0.048
Demographics	No	Yes	Yes	Yes
Household Income	No	No	Yes	Yes
Political Preference	No	No	No	Yes

Notes: The table presents the effects of the randomized treatment interventions on the support for tax compliance in the follow-up wave 41 of the GIP. This is estimated by OLS regressions of tax compliance preferences on treatment dummies. I restrict the number of observations to respondents who underwent the experiment in wave 40. Support for tax compliance is measured on a 6 point scale based on the question, "How justifiable do you think it is to evade taxes if a good opportunity to do so presents itself?". Answer categories range from absolutely justifiable (1) to absolutely not justifiable (6). The experimental groups from wave 40 are: Control group, *Uncertainty* and *Unequal Knowledge* group. Control is omitted, implying that the effects are relative to the Control Group. All participants receive the following information: "There are frequent reports on tax evasion in the media". The line p-val T1 vs. T2 presents the p-values from t-tests which compare if the regression coefficient for the *Uncertainty* group is different from the regression coefficient for the *Unequal Knowledge* group. Columns (1)–(4) differ in the included sets of covariates. (1): no covariates, (2): gender, age, marital status, household size, employment status, retirement status, and education, (3): (2) plus net personal income, (4): (3) plus political preferences. Robust standard errors are in parentheses *** p<0.01, ** p<0.05, * p<0.1.

cannot be rejected at conventional levels, it appears that the second intervention has persistent effects on support for tax compliance but cannot statistically be distinguished from the first condition.

As seen before in Section 3.2, average treatment effects of peer information may, however, mask important heterogeneities and especially very high compliance levels may be deterred by the tax confusion of others. Hence, I again estimate the respective treatment effects of treatment conditions on individual support for compliance answer categories in order to investigate whether different types of compliance react differently even two months after the intervention. Table 8 shows the respective results. It seems that also in the follow-up only very honest answer categories are negatively affected by peer information about filing uncertainty.

Table 7
Effect of experiment in follow-up, Ordered Probit Model.

	(1)	(2)	(3)	(4)
Uncertainty	−0.029	−0.021	−0.019	−0.024
	(0.041)	(0.042)	(0.042)	(0.042)
Unequal knowledge	−0.099**	−0.088**	−0.087**	−0.090**
	(0.041)	(0.042)	(0.042)	(0.042)
test (p-val T1 vs. T2)	0.082	0.101	0.096	0.109
N	4405	4311	4311	4311
Pseudo r2	0.001	0.014	0.015	0.017
Demographics	No	Yes	Yes	Yes
Household Income	No	No	Yes	Yes
Political Preference	No	No	No	Yes

Notes: The table presents the effects of the randomized treatment interventions on tax compliance preferences in the follow-up wave 41 of the GIP. I estimate ordered probit regressions of tax compliance preferences on treatment dummies. Support for tax compliance is measured on a 6 point scale based on the question: "How justifiable do you think it is to evade taxes if a good opportunity to do so presents itself?" in wave 41 of the GIP. Answer categories range from 1 (absolutely justifiable) to 6 (absolutely not justifiable). The experimental groups are: Control group, *Uncertainty* and *Unequal Knowledge* group. Control is omitted, implying that the effects are relative to the Control Group. All participants receive the following information: "There are frequent reports on tax evasion in the media." Participants in the *Uncertainty* group receive the following information: "Tax laws are often complicated due to many possible deductions and allowances. Given these complexities of the tax system, many citizens are often not sure, whether they report all incomes correctly in their tax declaration." Participants in the *Unequal Knowledge* group receive the following information: "Tax laws are often complicated due to many possible deductions and allowances. Given these complexities of the tax system, many citizens are often not sure, whether they report all incomes correctly in their tax declaration. Citizens who know tax laws well or use a tax attorney can possibly take advantage of the complexities of the tax law and reduce their tax burden." The line p-val T1 vs. T2 presents the p-values from t-tests which compare if the regression coefficient for the *Uncertainty* group is different from the regression coefficient for the *Unequal Knowledge* group. Columns (1)–(4) differ in the included sets of covariates. (1): no covariates, (2): gender, age, marital status, household size, employment status, retirement status, and education, (3): (2) plus net personal income, (4): (3) plus political preferences. The scale of the outcome variable is 1 (absolutely justifiable) to 6 (absolutely not justifiable). Robust standard errors are in parentheses *** p<0.01, ** p<0.05, * p<0.1.

Both treatment conditions are significantly different from the control condition although the *Unequal knowledge* effect is somewhat larger and statistically significant at the 1% level as compared to the 10% significance level of the *Uncertainty* condition. Both effects are not significantly different from each other. While the negative effect among very honest responses is shifted to harsher judgments on tax evasion in the main survey (see Table 3), we now see a statistically significant shift of answers towards category 5 (i.e. from evasion being absolutely not justifiable towards evasion being not justifiable only). Altogether, it appears that peer information about tax uncertainty of others has persistent effects on very high compliance levels but that resulting changes in judgments grow less harsh over time and effects become somewhat less strong. The *Uncertainty* and *Unequal knowledge* effect amount to 25% (−0.031/−0.124) and 65% (−0.052/−0.080) among very high compliance levels in the follow-up when compared to the main survey (and the baseline results in Table 2), respectively. Persistent treatment effects also suggest that new information rather than the mere salience of the conveyed arguments is the *main* source of changes in support for tax compliance. They also alleviate potential concerns about experimenter demand in the main survey.[24]

Heterogeneous effects on persistence. As for the main experiment, I only report heterogeneous effects of the experimental interventions in the follow-up survey when significant effects at conventional levels could be found. Table 9 depicts the heterogeneous effects for the follow-up question. While column (1) does not condition on covariates, column (2) includes a full-set of covariates covering information on demographics, income as well as political preferences. In line with the null average effects of the *Uncertainty* condition on the support for tax compliance in the follow-up, I do not find related sub-group differences either. However, for the augmented *Unequal knowledge* condition, very similar effects emerge in wave 41 for left-wing respondents when compared to the baseline effects from wave 40. Respondents with left-wing political ideology can also explain the negative baseline effects for that experimental intervention in the follow-up survey. Negative effects of the augmented treatment on support for tax compliance for left-wing subjects (as compared to conservatives) are statistically significant at the 1% level (without further covariates). The results are very similar when including a full-set of controls but are somewhat less precise and significant at the 5% level.

Persistent effects of the *Unequal knowledge* treatment for this sub-group suggest that left-wing respondents internalized a more lenient view towards tax evasion, likely due to the fact that possible negative distributional implications for unaware taxpayers are highlighted. Left-wing subjects may also identify themselves and empathize with these taxpayers and thus adopt their views in their

[24] Different treatment effects in the follow-up for both treatment conditions may also be due to a slightly different question wording which now asks how justifiable tax evasion is when an opportunity presents itself (rather than the justifiability in a general sense as in wave 40). Respondents may have the feeling that these opportunities can be mostly associated with people that have tax knowledge (or access to it), partly explaining the negative effect of the *Unequal knowledge* condition.

Table 8
Change of tax compliance preference answer categories in follow-up survey.

	(1)	(2)	(3)	(4)	(5)	(6)
Uncertainty	−0.000	0.001	−0.013	0.001	0.042**	−0.031*
	(0.004)	(0.007)	(0.009)	(0.013)	(0.017)	(0.019)
Unequal knowledge	0.009**	−0.005	−0.005	0.001	0.052***	−0.052***
	(0.004)	(0.006)	(0.009)	(0.013)	(0.017)	(0.018)
Constant	0.018	0.116***	0.164***	0.228***	0.188***	0.286***
	(0.013)	(0.022)	(0.025)	(0.032)	(0.043)	(0.046)
test (p-val T1 vs. T2)	0.027	0.288	0.347	0.975	0.569	0.243
N	4253	4253	4253	4253	4253	4253
r2	0.009	0.019	0.021	0.008	0.009	0.030
Demographics	Yes	Yes	Yes	Yes	Yes	Yes
Household Income	Yes	Yes	Yes	Yes	Yes	Yes
Political Preference	Yes	Yes	Yes	Yes	Yes	Yes

Notes: The table presents the effects of the randomized treatment interventions on tax compliance preference answer categories in the follow-up wave 41 of the GIP. This is estimated by OLS regressions of tax compliance preferences on treatment dummies. I restrict the number of observations to respondents who underwent the experiment in wave 40. I estimate Linear Probability Model (LPM) estimations of tax compliance preferences on treatment dummies. Dummy variables for support of tax compliance are derived from a 6 point scale question, "How justifiable do you think it is to evade taxes if a good opportunity to do so presents itself?" in wave 41 of the GIP. Columns (1)–(6) differ in their outcome variables, namely the response categories to the tax compliance preference question, in column (1) the outcome equals 1 if the respondent answered that he/she finds tax evasion absolutely justifiable, 0 otherwise; in column (2), the outcome equals 1 if the respondent answered that he/she finds tax evasion justifiable, 0 otherwise; in column (3) the outcome equals 1 if the respondent answered that he/she finds tax evasion somewhat justifiable, 0 otherwise; in column (4) the outcome equals 1 if the respondent answered that he/she finds tax evasion somewhat not justifiable, 0 otherwise; in column (5) the outcome equals 1 if the respondent answered that he/she finds tax evasion not justifiable, 0 otherwise and in column (6) the outcome equals 1 if the respondent answered that he/she finds tax evasion absolutely not justifiable, 0 otherwise. Columns (1)–(6) all control for a full set of covariates, including gender, age, marital status, household size, employment status, retirement status, and education, net personal income and political preferences. The experimental groups are Control group, *Uncertainty* and *Unequal Knowledge* group. Control is omitted, implying that the effects are relative to the Control Group. All participants receive the following information, "There are frequent reports on tax evasion in the media." Participants in the *Uncertainty* group receive the following information, "Tax laws are often complicated due to many possible deductions and allowances. Given these complexities of the tax system, many citizens are often not sure, whether they report all incomes correctly in their tax declaration." Participants in the *Unequal Knowledge* group receive the following information, "Tax laws are often complicated due to many possible deductions and allowances. Given these complexities of the tax system, many citizens are often not sure, whether they report all incomes correctly in their tax declaration. Citizens who know tax laws well or use a tax attorney can possibly take advantage of the complexities of the tax law and reduce their tax burden." The line p-val T1 vs. T2 presents the p-values from t-tests which compare if the regression coefficient for the *Uncertainty* group is different from the regression coefficient for the *Unequal Knowledge* group. Robust standard errors are in parentheses *** p<0.01, ** p<0.05, * p<0.1.

own attitudes towards tax evasion (for the relevance of identification within groups for the norm of tax compliance, see also Wenzel, 2004). They may also reject the idea of inequalities in favor of presumably rich but knowledgeable taxpayers who can optimize their after-tax income.

The results for the follow-up are remarkable for several reasons. First, support for tax compliance among the control group is rather stable over time (even despite slightly different question wordings). Second, we find treatment persistence although the experiment only gave rather short and subtle statements. Third, the follow-up estimates should be interpreted as lower bound because the follow-up was fielded two months after the main survey, which is a large amount of time as compared to other follow-up surveys in the literature. Typically, follow-ups are implemented shortly after the main intervention, e.g. one week (Alesina et al., 2018; Haaland and Roth, 2021, 2020).

4. Conclusion

Taxes are complicated and people also frequently perceive them as such, which may result in uncertainty among many taxpayers how to file taxes themselves but may also create room for negative spillovers on tax compliance. The present paper addresses the latter and answers the question whether perceived taxpayer confusion among others may lead to lower support for tax compliance using a large-scale survey experiment among Germans.

I find supportive evidence for the hypothesis that support for tax compliance is reduced when people are informed about the prevalent uncertainty among other taxpayers. Given that a large majority among the German population is in favor of a simpler tax system and about half perceive their personal income tax returns as difficult (Blesse et al., 2021), this finding speaks to the fact that people on average do not extrapolate their own difficulties with respect to tax filing onto others but people do empathize with the uncertainty of others in filing taxes once they are aware of it. Given these uncertainties, affected taxpayers likely cannot claim

Table 9
Heterogeneous treatment effects in follow-up.

	(1)	(2)
Political orientation. Reference category: Conservative		
Uncertainty × Left-wing	−0.120	−0.127
	(0.090)	(0.084)
Uncertainty × Non-partisans	−0.033	−0.003
	(0.156)	(0.140)
Uncertainty × Not-merged	0.037	0.159
	(0.203)	(0.228)
Unequal knowledge × Left-wing	−0.237***	−0.199**
	(0.091)	(0.085)
Unequal knowledge × Non-partisans	−0.187	−0.241*
	(0.156)	(0.141)
Unequal knowledge × Not merged	−0.481*	0.321
	(0.246)	(0.230)
N	4405	4305
r2	0.011	0.046
Full-set of controls	No	Yes

Notes: The table shows the heterogeneous effects of the experimental interventions in the follow-up survey (wave 41 of the GIP). Reported are the coefficients and standard errors (in parentheses) from a series of OLS regressions of the form $y_i = \beta_1\ Treat_i + \beta_2\ Covariate_i + \beta_3\ (Treat_i \times Covariate_i) + \epsilon_i$. Where $Covariate_i$ is the respective covariate listed above. For the sake of brevity, only the interaction $Treat_i \times Covariate_i$ is reported. y_i represents support for tax compliance from wave 41 of the GIP and is measured on a 6 point scale based on the question, "How justifiable do you think it is to evade taxes?". Answer categories range from absolutely justifiable (1) to absolutely not justifiable (6). $Treat_i$ represents treatment indicators for either the *Uncertainty* or the *Unequal Knowledge* group, the control group is omitted. $(Treat_i \times Covariate_i)$ is a full interaction of the treatment indicators with the respective covariate. Column (1) and (2) represent heterogeneous effects for political ideology. No other heterogeneities were to be found for other covariates. Column (1) does not condition on covariates while column (2) includes a full-set of covariates covering all demographic, income and political preferences used in previous regressions. For the sake of brevity, no heterogeneous effects are listed for which I did not find significant interaction effects (available upon request). Robust standard errors are in parentheses *** p<0.01, ** p<0.05, * p<0.1.

all benefits the tax system offers them and/or are subject to unintentional mistakes when filing their incomes. The treatment effect is on average not different from the *Unequal knowledge* treatment, which augments the uncertainty information with a statement about other taxpayers possessing the tax knowledge (or having access to it through tax advise) and reduce their tax burden.

Negative peer effects are driven by a reduction among very high levels of support for tax compliance. Older respondents also show more empathy towards tax evasion when they become aware of the tax uncertainty of others. Similarly, left-wing subjects show a higher support for compliance in the control group as compared to conservatives but become significantly less supportive when receiving the *Unequal knowledge* highlighting tax avoidance favoring knowledgeable and presumably rich taxpayers. This effect remains virtually identical in a follow-up survey two months after the main experiment. I also find significant negative effects of both treatment conditions among very high compliance levels in the follow-up but related effects grow somewhat weaker over time.

Ultimately, my results raise concerns that complex tax systems may not only have negative direct tax compliance effects through taxpayer confusion but may also reduce concerns about tax evasion more generally through prevalent uncertainties and fairness considerations towards those who cannot properly file their incomes due to a lack of relevant tax knowledge. These mechanisms likely increase the perceived compliance costs for individual taxpayers and make tax evasion more justifiable to them on average.

Taxpayers can at least to some extent become aware of tax filing problems among other taxpayers in real-life. According to Chetty et al. (2013), tax knowledge can diffuse locally in networks such as among welfare recipients who need to file similar tax forms or through the presence of tax advisers. One can argue that not only tax knowledge but also related uncertainties can spread among peers although only to a limited extent since information likely diffuses rather within than between groups.

Against this background, policy makers not only have to account for negative direct effects of taxpayer confusion such as low take-up rates of tax benefits (Chetty et al., 2013; Bhargava and Manoli, 2015) or suboptimal behavioral adjustments (e.g. Abeler and Jaeger, 2015; Feldman et al., 2016) but also do need to consider potential negative spillover effects on tax attitudes and compliance decisions when designing tax rules.

Declaration of competing interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

Data availability

The authors do not have permission to share data.

Appendix A. Supplementary data

Supplementary material related to this article can be found online at https://doi.org/10.1016/j.ejpoleco.2023.102365.

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