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You don't need an invoice, do you? An online experiment on collaborative tax evasion

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You Don't Need an Invoice, Do You? An Online Experiment on Collaborative Tax Evasion*

Lilith Burgstaller† Katharina Pfeil‡

Abstract: Collaborative evasion of taxes and social security fees is prevalent in household services, when a household hires a service provider and no third party is involved. However, evidence on the determinants of collaborative tax evasion in general and the household context in particular is lacking. This paper examines two coordination mechanisms of collaborative tax evasion: A partner's signaled intention and information about majority's evasion behavior (empirical evasion expectation). We implement an interactive tax evasion game in an online labor market (MTurk) with 560 participants. Our findings show that priming with an empirical evasion expectation increases the fraction of evaded transactions by 20 percentage points. Our treatment manipulation of intention signals does not render a significant effect on evasion. However, when willingness to evade is signaled first in the chat, the probability of evasion increases by 45 percentage points.

Keywords: Collaborative Tax Evasion, Compliance, Social Norm, Intention, Online Experiment
JEL: H26; E26; O17; D91

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1 Introduction

Evasion of taxes and social security contributions is a widespread phenomenon in private households. In the European Union, 57 % of non-care household work is provided without registration or declaration of services to the authorities (OECD, 2021). In Germany, this estimate amounts to 88 % (Enste, 2020). For the US, Erard (2018) finds that only 5.3 % of households remit Nanny Taxes for their domestic employees. These are prevalent cases of collaborative tax evasion, where households and service providers jointly evade taxes as well as social security contributions.

Although tax withholding schemes and third-party reporting have been found to effectively increase tax compliance (Pomeranz, 2015; Kleven et al., 2011), when two parties collude, they can bypass third-party reporting. This has only recently received attention in the literature (see Doerr & Necker, 2021; Bjørneby et al., 2021; Kotakorpi et al., 2021). In collaborative tax evasion, two parties engage in coordination about compliance. Decision-making is interactive since it involves communication and exchange of intentions. By offering a discount (Chang & Lai, 2004; Doerr & Necker, 2021) or discussing the risk of detection (Lohse & Simon, 2021), parties can convince each other of evasion. Moreover, the behavior and acceptance of others impact joint decision-making (Abraham et al., 2017), suggesting that we should examine social norms more specifically.

Our paper examines two mechanisms that coordinate decisions towards collaborative tax evasion: empirical evasion expectations as a subtype of social norms and intention signals. Regarding the first coordination mechanism, norms have been found to significantly affect collaborative tax evasion (Abraham et al., 2017). However, studies on tax evasion focus on compliance norms instead of settings where non-compliance is considered common or acceptable (see Luttmer & Singhal, 2014, for an overview). Social norms are often understood as only normative expectations, that is *what individuals believe others approve or disapprove of* (Bicchieri, 2006; Bicchieri & Dimant, 2019).[1] Empirical expectations that depict *what individuals believe others do* have rarely been studied, although according to Bicchieri & Dimant (2019), a social norm only exists when empirical and normative expectations are aligned.[2]

As for our second coordination mechanism, a pair's decision to evade hinges upon intentions that are signaled prior to the transaction (Doerr & Necker, 2021; Balafoutas et al., 2015). When partners discuss the declaration of a transaction, they reveal their

[1] Social psychologists often distinguish descriptive and injunctive norms (Cialdini et al., 1991). In their understanding, empirical expectations would be descriptive norms and normative expectations are referred to as injunctive norms.

[2] Hallsworth et al. (2017) point to the importance of empirical compliance expectations for the propensity to declare taxes. In the literature on lying, the significance of empirical expectations as opposed to normative expectations in shaping behavior is more empirically established (Bicchieri et al., 2020; Bicchieri, Dimant, Gächter, & Nosenzo, 2021; Bicchieri, Dimant, & Xiao, 2021; Danilov et al., 2021; Danilov & Sliwka, 2017).

intentions to each other (Balafoutas et al., 2015). As Doerr & Necker (2021) show, the signal of an evasion intention significantly increases the probability of evasion. However, with the exception of Balafoutas et al. (2015) who examine the effect of evasion intentions on credence goods provision and Doerr & Necker (2021) who vary households' evasion signals in the field, there is no causal evidence on how signaled intentions generally impact the joint decision to evade.

We implement a collaborative tax evasion game (TEG) that models the interaction between a household and a service provider.[3] Players receive a fixed endowment, are randomly matched into pairs and assigned the role of either a household or a service provider. We individually elicit whether players intend to evade or declare the transaction. After a chat stage, where they may communicate about their decision, the service provider sends an offer, which the household can accept or reject. Final transactions are subject to random audits. If caught evading, both parties have to pay a penalty.

We implement our experiment in an online labor market (MTurk) and include three treatments and a control group in a 2-by-2 between-subjects design. Along the first treatment dimension, we prime subjects with an empirical evasion expectation prior to the interaction. Along the second dimension, we vary whether households receive service providers' intentions to evade or declare the transaction before they start chatting. Our third treatment combines both dimensions. The control treatment neither includes expectation priming nor intention signal. The main outcome variable is the rate of evaded transactions. Moreover, we analyze chat protocols to explore whether specific arguments drive the propensity to evade.

We find that the prime with an empirical evasion expectation significantly increases the rate of evaded transactions by 19 percentage points. Signaled intentions only have a small and insignificant positive effect on the rate of evaded transactions. This may be due to a higher fraction of rejected offers in the intention signal treatment. We can further show that when the first proposal in the chat was evasion, the fraction of evaded transactions significantly increases by 56 percentage points. This indicates that there is a signal effect that our treatment might have been too weak to manipulate. The chat analysis shows that arguments about risk are exchanged the most frequently over all treatments and honesty arguments significantly decrease the fraction of evaded transactions.

This study contributes to our understanding of the prevalence of collaborative tax evasion. First, we show that empirical evasion expectations significantly increase evaded transactions, which expands our comprehension of how social norms affect tax compliance in general (see Luttmer & Singhal, 2014, for an overview) and the role of empirical expectations in particular (Romaniuc et al., 2021; Hallsworth et al., 2017; Bicchieri et al., 2020; Bobek et al., 2013). Second, we extend the limited understanding of the role

[3]For a recent meta-analysis of tax evasion games, see Alm & Malézieux (2020).

of revealed and signaled intentions in tax evasion decisions (Doerr & Necker, 2021; Balafoutas et al., 2015). Third, we contribute to the growing literature on collaborative tax evasion in the lab (Fochmann et al., 2021; Lohse & Simon, 2021; Abraham et al., 2017; Balafoutas et al., 2015; Kotakorpi et al., 2021; Dörrenberg & Duncan, 2019) and in the field (Doerr & Necker, 2021; Bjørneby et al., 2021) by implementing the first interactive tax evasion game with non-standard subjects in an online labor market.

The remainder of this paper proceeds as follows. In Section 2, we describe the experimental design, hypotheses and implementation. Section 3 presents the results. We discuss our findings in Section 4. Section 5 concludes.

2 Experiment

We conduct a one-shot experiment, in which subjects decide on the declaration of a household service in pairs of two. The experiment only includes one round because we aim to avoid that the initial expectation priming is neglected if the game is played over multiple rounds. Moreover, our objective was to keep the experiment as short as possible as participants' attention spans are lower in online experiments (Chandler et al., 2014). We use a tax-related framing with terms such as tax rate, audit rate or penalty to explicitly place our experiment in the tax context that we want to investigate.[4]

2.1 Treatments

We implement a 2x2 between-subjects design (see Table 1). The first dimension varies the priming with an empirical expectation to evade. By this, we identify the effect of information about the majority's evasion behavior on collaborative decisions to evade taxes. The second dimension varies whether we show the service provider's intention to the household. The intention may either be to evade or to declare the transaction. This allows us to identify the effect of signaling of one party's intention on the final decision of a pair.

[4]The code and all screens of the experiment are available upon request.

1st Dimension \ 2nd Dimension	*No Signal*	*Signal*
No Expectation Priming	*ControlT*	*SignalT*
	$N = 138$	$N = 144$
Empirical Evasion Expectation	*ExpectationT*	*ExpectationSignalT*
	$N = 132$	$N = 146$

Table 1: Treatment overview

2.2 Detailed Procedure

The set-up of our collaborative tax evasion game is as follows. When entering the study, subjects first complete a captcha-test and then proceed through the instructions, control questions and an attention check (see selected screens in Appendix B). Upon completion of the control questions, subjects enter the main experiment. Our experiment comprises of six or seven stages, depending on the treatment condition (see Figure 1).

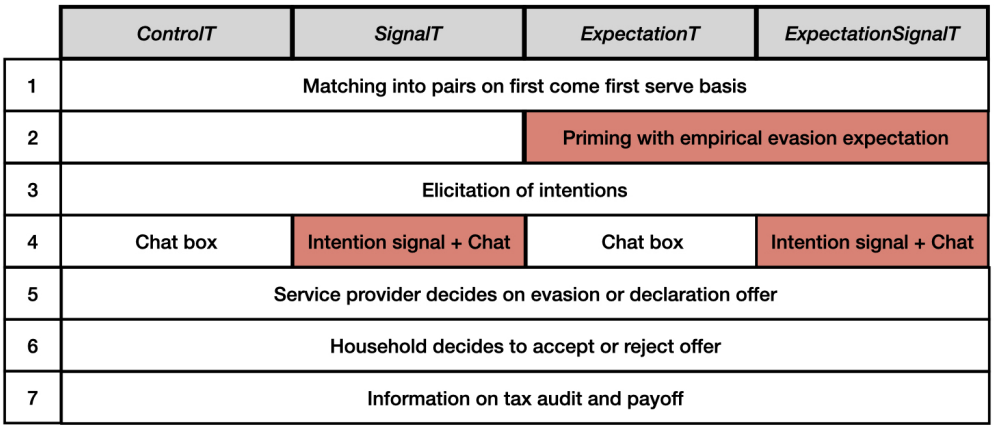

Figure 1: Experimental design

All subjects enter a lobby stage on which they are matched into pairs on a first come first serve basis. Once they are matched to a partner, they receive further information on their role and a fixed endowment (400 ECU). Next, there is a separate stage for subjects in *ExpectationT* and *ExpectationSignalT*. On this stage, they are primed with an empirical evasion expectation. We give information about participants' behavior in similar studies ("In a similar study, the majority of participants did not declare the transaction."). Subjects in *ControlT* and *SignalT* are not primed.

On the next stage, we elicit subjects' intention to evade or declare the transaction on a likert scale. Following this elicitation of their preferences, subjects enter the chatting

stage. Subjects that are assigned the role of the household in *SignalT* and *ExpectationSignalT* receive information about their service provider's willingness to declare or evade the transaction, which is displayed above the chat-box. Service providers as well as all subjects in *ControlT* and *ExpectationT* receive no such information. In the chat-box, partners can communicate with each other and discuss whether to declare the transaction or not for up to 2.5 minutes.

After chatting, the service provider chooses between a declaration and an evasion offer. The offer is then sent to the household, who accepts or rejects the offer. On the final stage, transactions are audited at a random probability of 15 % and information about payoff and audit is displayed. For simplification reasons, there is no redistribution of the tax payment. Subjects are informed about the tax rates and payoffs in the instructions.

If households reject the offer, payoffs from the study correspond to the initial endowment (400 ECU). If they agree on the offer, households' payoffs increase by the value of the service (600 ECU) minus the price of the service (390 ECU if declared, 300 ECU if undeclared). Service providers' payoffs increase by the price of the service (390 ECU if declared, 300 ECU if undeclared). In case of detected evasion, payoffs decrease by the fine of twice the evaded tax payment (180 ECU), which both parties have to pay (see Table 2). During the experiment, the monetary value of transactions and payoffs is indicated in Experimental Currency Units (ECU) and converted to US Dollars at an exchange rate of 0.003 only at the end of the experiment.

	Transaction			No Transaction
	Declared	Evaded w/o audit	Evaded w/ audit	Rejection
ECU	610	700	520	400
Dollar ($)	1.83	2.10	1.56	1.20

Table 2: Payoffs

2.3 Hypotheses

The payoff structure is such that the expected payoff is the highest if a pair decides on evasion. Therefore, compliance decisions must be motivated by non-pecuniary factors, such as an intrinsic motivation to behave honestly. As our treatments do not change the monetary payoff, treatment differences in behavior will be interpreted as an effect of the treatment manipulations: The priming with an empirical evasion expectation and signaled intentions.

Priming with an empirical evasion expectation may trigger various effects. First, it draws attention to a prevalent dishonesty standard, forming taxpayers' perception of what is normal (Bicchieri, Dimant, Gächter, & Nosenzo, 2021). Second, it affects how taxpayers justify their own behavior. Knowing that others evade too, gives scope for self-serving justification of their own dishonest behavior (Bicchieri et al., 2020). Third,

expectation priming affects the priors that individuals have when engaging with their partners. When an empirical evasion expectation is prevalent, individuals perceive evasion as the majority behavior, increasing the probability that partners are willing to evade (Abraham et al., 2017). Assuming that the partner is willing to evade reduces the barrier to propose evasion, for example through reduction of the fear of reputation loss (Besley et al., 2019; Bénabou & Tirole, 2011).

Hypothesis 1: *Priming with an empirical evasion expectation increases the fraction of evaded transactions.*

Furthermore, we assume that receiving a signal about the partner's intention in an interaction affects an individual's behavior through reinforcing their intentions to evade or through persuading undecided or indifferent individuals of evasion (Doerr & Necker, 2021; Boadway et al., 2002). In individual tax evasion, tax morale is adapted among socially or geographically close individuals (Di Gioacchino & Fichera, 2020; Traxler, 2010). Note that intention signals include declaration as well as evasion signals. As long as the baseline evasion intention is unknown, we cannot predict the direction of the effect of *SignalT*. However, if we assume equally distributed evasion intentions and that evasion signals are more contagious Blaufus et al. (2017), the fraction of evaded transactions should increase.

Hypothesis 2: *Signaling of the partner's intention increases the fraction of evaded transactions.*

In addition to our two main hypotheses, we explore the combined effect of an evasion expectation and signaling of intentions. As we expect the fraction of evasion intentions to increase as a response to priming with an evasion expectation, households observe more evasion signals in *ExpectationSignalT* than in *SignalT*. This breaks the overall empirical expectation down to the individual, transaction-specific level, which may reinforce the evasion expectation and increase the fraction of evaded transactions. Bicchieri, Dimant, Gächter, & Nosenzo (2021) make a similar argument stating that the observability of non-compliance to a norm leads to an erosion of the norm itself. However, as Gino et al. (2009) show, observing unethical behavior may also lead individuals to aim to compensate for certain partners' behaviors. Therefore, the current state of the literature does not allow us to state an explicit hypothesis for *ExpectationSignalT*.

2.4 Implementation

The experiment was programmed with *LIONESS Lab*, an online platform developed specifically for conducting interactive experiments (Giamattei et al., 2020).[5] We ran our experiment in an online labor market (MTurk) and used CloudResearch to recruit highest-ranked workers that provide high-quality data (Litman et al., 2017). Each experimental session was administered as a Human Intelligence Task (HIT) on MTurk. For each treatment we ran multiple sessions.

Compared to using a sample of students in a supervised laboratory, conducting the experiment online creates a trade-off between the reduced level of control on the one hand and a more diverse and experienced subject pool on the other hand. As is standard in the literature (see Arechar et al., 2018; Peer et al., 2014), we restrict our sample to participants that are US citizens, with a geographical location in the US, and only allow workers with an approval rate of 95% and above 500 completed HITs. We choose US citizens because they make up the largest share of workers on MTurk, facilitating our matching procedure with the two partners (Difallah et al., 2018).The non-observability of subjects may result in the inclusion of bots or less attentive subjects in the experiment. We control for the former with a captcha-test that stops non-human subjects from entering the experiment. Using a quiz with control questions and an attention check, we additionally screen subjects for their understanding of the experiment and their attention. Subjects that failed to successfully complete the control questions or the attention check in two attempts are excluded from the experiment. We also block duplicate participation as participants that take part in the study more than once may seriously affect the validity of our results.

3 Results

We structure the results as follows. First, we describe our sample. Second, we explain our main outcome variable. Third, we analyze whether the fraction of evaded transactions varies between our main treatments *ExpectationT* and *SignalT*. We conduct non-parametric comparisons and multivariate analyses to test our hypotheses. Moreover, we examine the expectations we enquired after the experiment and their interaction with the treatments and decisions. Last, we explore how subjects communicated in the chat.

[5] A LIONESS demo experiment can be found here https://lioness.uni-passau.de/bin/demo.php.

3.1 Sample

Of the 1.193 individuals who clicked on the link to enter our experiment, 470 dropped out of the experiment before being matched into pairs (32.6 %).[6] 215 participants terminated the experiment on their own before being matched to another participant or during the matching process. An attrition analysis shows a small but significant correlation of age and experience with MTurk with the probability to drop out of the experiment before being matched with a partner (see Appendix C). Moreover, 163 subjects dropped out after being matched with a partner. Note that once one of the partners drops out of the experiment, the other is terminated as well since we cannot observe a joint decision for this pair.[7] Comparing the dropout rate in our experiment to that of other online experiments, we observe a similarly high rate (Keith et al., 2017). The number of total dropouts did not vary significantly between treatments.

In total, we collected valid data from 560 subjects across the four treatments (see Table 1 for an overview of the allocation of subjects into treatments). On average, subjects completed the experiment in 8 minutes.[8] The average earning was $2.29, which is equivalent to an hourly wage of $17.17. Participants received a fixed show-up fee of $0.50 and an additional bonus payment between $1.20 and $2.10 depending on their decision. Subjects were paid within three days after completing the HIT.

3.2 Descriptive statistics

The mean age in our sample is 40.8 years and 47.2 % of subjects are female. 69.9 % of our sample have at least a bachelor's degree and 62.1 % are full-time employed. Moreover, 57.0 % have submitted their own tax declaration before and 14.9 % have experience with household employees. See Appendix C for the distribution of socio-demographic characteristics over treatment groups and Table 3 for an overview of all variables and means in the experiment.

[6] Of the 470 dropouts, 134 did not complete the captcha-test and 121 were excluded because they failed the quiz twice. 32 % of 121 did not pass the attention check. So, in total, 255 observations were dropped because of bots, insufficient understanding or inattention.

[7] In those cases, participants only earned the show-up fee of $0.50, which is less than expected and may damage the experimenter's reputation. However, alternative approaches such as implementing computer-generated decisions would have serious consequences for internal validity and may imply deception if participants are not informed in advance (Arechar et al., 2018; Giamattei et al., 2020). Note that participants who dropped out before or on the chat stage spent around 5.6 minutes in the experiment, which is equivalent to an hourly payoff of $5.35.

[8] Note that we cannot account for the waiting time of the matching of two participants as LIONESS does not collect the time spent on this particular stage. However, only 33 subjects in the total sample waited longer than 3 minutes to be matched to a partner.

Variable	Description	Mean
Intention	Evasion intention = 1; declaration intention = 0	
Rejection	Offer accepted = 1; offer rejected = 0	
Evader	Transaction evaded = 1; transaction declared = 0	
Pre-experimental questionnaire		
Female	Female = 1; male = 0	47.2 %
Age	In years (18 to 100)	40.8
Bachelor	At least bachelor's degree = 1; elsewise = 0	69.9 %
Fulltime	Works fulltime = 1; elsewise = 0	62.1 %
Low Income	0 - $19.999 = 1; elsewise = 0	12.1 %
Experience MTurk	Weekly hours worked on MTurk	18.4
Post-experimental questionnaire		
Empirical Expectation	Evasion common = 1; compliance common = 10	5.0
Normative Expectation	Evasion expected by others = 1; compliance expected by others = 10	5.5
Personal Normative Belief	Evasion justifiable= 10; evasion not justifiable= 1	3.8
Experience Tax Declaration	Own tax declaration filed = 1; elsewise = 0	57.0 %
Household Experience	Experience with household employees = 1; elsewise = 0	14.9 %
Loss Income	Lost income due to Covid19 = 1; elsewise = 0	37.9 %
Risk Aversion	Risk-averse=1; risk-loving=0	58.7 %

Table 3: Overview of variables

Notes: This table provides an overview of the individual characteristics and main outcome variables of the 560 participants.

3.3 Main outcome variable

Pairs can reach three outcomes. They may decide to jointly evade, declare or, if they fail to coordinate towards the same decision, the household may reject the service provider's offer. The main outcome variable, the fraction of evaded transactions, can be defined in two different ways: First, as the fraction of evaded transactions relative to all possible transactions and, second, as the fraction of evaded transactions relative to all successful transactions. The two definitions differ with regard to rejections. In total, 9 % of offers are rejected. Evasion offers are rejected more frequently than declaration offers, with 60 % of rejected offers being evasion offers. Rejections occur most frequently in *SignalT*, were 17 % of all offers are rejected. Our main aim is to identify mechanisms that determine whether a successful transaction is evaded or declared. We therefore follow

the second definition for our main analysis.[9]

3.4 Non-parametric comparisons

We compare the fraction of evaded transactions across treatments. Evasion rates vary significantly over treatments. While in *ControlT* 26 % of pairs jointly decide to evade, this fraction amounts to 28 % in *SignalT*, 45 % in *ExpectationT* and 41 % in *ExpectationSignalT* (see Figure 2b).

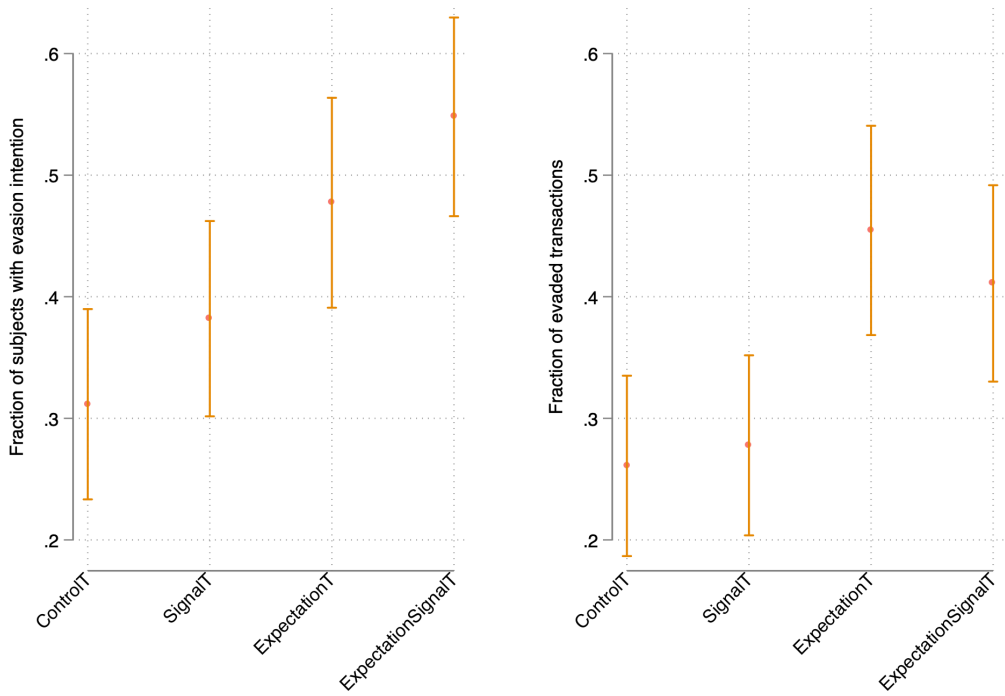

Figure 2: Intentions to evade (a) and evaded transactions (b) by treatment

We summarize our results with respect to our hypotheses. We first hypothesized that priming subjects with an empirical evasion expectation increases the fraction of evaded transactions compared to the control treatment where no expectation is primed. We find that the fraction of evaded transactions increases significantly when subjects are primed with an empirical evasion expectation. Comparing the fraction of evaded transactions in *ControlT* with *ExpectationT* renders a 19 percentage point increase when subjects are primed (Mann-Whitney test, p = 0.0009). This difference in evasion rates is observable in intentions diverging between treatments as well. We observe a 17 percentage point increase in evasion intentions in *ExpectationT*, indicating that knowledge of evasion expectations drives the final decision to evade through individuals' changed intentions

[9]We deviate from our pre-registration in this respect. However, our results are robust to the use of the fraction of evaded transactions relative to all possible transactions, as we show in Section 4.

(Mann-Whitney test, p = 0.0054, see Figure 2a). The difference in intention to evade between *SignalT* and *ExpectationSignalT* is also highly significant at 17 percentage points (Mann-Whitney test, p = 0.0047), indicating a robust effect of expectation priming on intentions.

Result 1: *Priming with an empirical evasion expectation significantly increases the fraction of evaded transactions by 19 percentage points.*

Second, we hypothesized that receiving a signal about the partner's intention would increase the fraction of evaded transactions. Our results show that pairs in *SignalT* agree more frequently on evasion than in *ControlT*. More specifically, knowledge of the partner's intention increases tax dishonesty by 2 percentage points (see Figure 2b). However, this effect is small and not statistically significant (Mann-Whitney test, p = 0.7495). While subjects in *SignalT* intend to evade slightly more frequently and while evasion offers are more common, neither of the treatment differences is statistically meaningful (Mann-Whitney test, p = 0.2157 and p = 0.1301).

Result 2: *We cannot reject the null hypothesis that signaling of a partner's intention does not increase the fraction of evaded transactions.*

We explore whether evasion or declaration signals are more contagious. Service providers signal their intention to evade in 47 % of pairs in *SignalT* (see Figure 3). *SignalT* significantly increases the fraction of pairs in which the service provider has an intention to evade by 17 percentage points compared to *ControlT* (Mann-Whitney test, p = 0.0039). One possible interpretation is that when service providers know about their signaling power, they decide to abbreviate the communication and bargaining process by signaling their intention to evade beforehand. Neither evasion nor declaration signals, however, change the fraction of evaded or declared transactions meaningfully between treatments (Mann-Whitney test, p = 0.6941 and p = 0.5892).

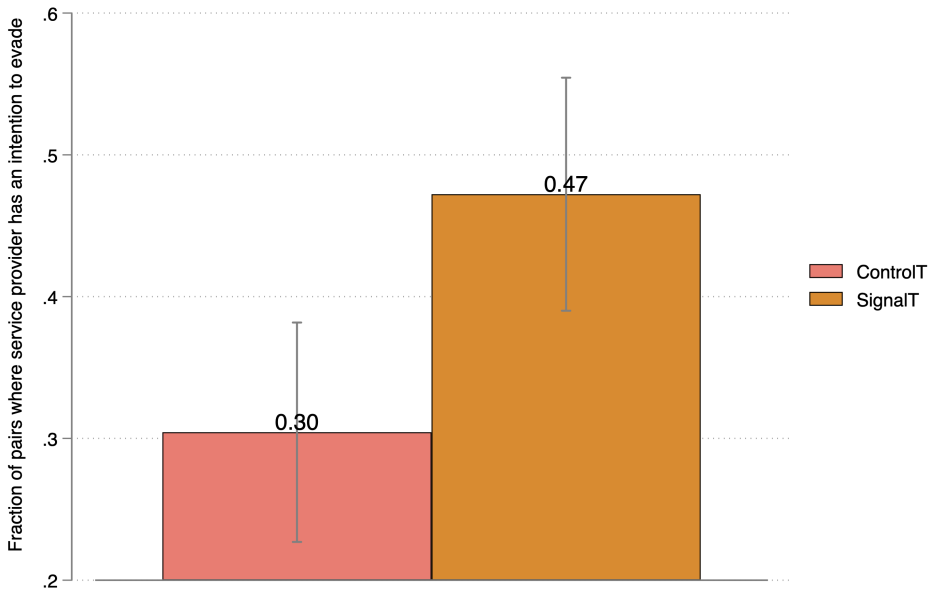

Figure 3: Service providers' evasion intentions by treatment

The question remains, why intention signaling does not significantly increase the fraction of evaded transactions, if there are significantly more pairs in which service providers have an intention to evade. First, rejections are more frequent in *SignalT* than in other treatments. There is a significant 10 percentage point increase in rejections from *ControlT* to *SignalT* (Mann-Whitney test, 0.0153). This is driven by rejections of evasion offers, which occur significantly more often in *SignalT* (Mann-Whitney test, p = 0.0536). Rejections also happen particularly often in pairs with mixed intentions. Second, communication between service providers and households may override the first intention that is signaled. We will further elaborate on this in Section 3.7 when we analyze chat protocols.

We examine whether empirical evasion expectations and intention signals enhance each other in *ExpectationSignalT*. Pairs in *ExpectationSignalT* are primed with an empirical evasion expectation and households receive an intention signal by the service provider to explore their combined effect. We cannot find evidence of an enhancement effect between empirical evasion expectation and intention signals. Comparing the fraction of evaded transactions shows a significant 15 percentage point increase in evasion from *ControlT* to *ExpectationSignalT* (Mann-Whitney test, p = 0.0076).

3.5 Parametric regressions

Using a parametric regression model we explore whether our non-parametric results hold to the inclusion of control variables and robust clustered standard errors. We estimate the following model:

$$Evader_i = \alpha + \beta \cdot Treat_g + \theta \cdot X_{ig} + \epsilon_{ig}$$

where subscripts indicate a subject i in group $g = 1, 2, 3, 4$ (with $g = 1$: ControlT, $g = 2$: SignalT, $g = 3$: ExpectationT, $g = 4$: ExpectationSignalT). The main decision of our experiment is taken jointly, and thereby observed on the pair level. However, we record the decision for each individual, allowing us to connect joint decisions to individual socio-economic characteristics. The dependent variable evader is a binary variable indicating whether a transaction is evaded as defined above. $Treat_g$ is a categorical variable indicating a subject's treatment and β is the coefficient of interest. We add robust clustered standard errors on the pair level in Models (2) - (4) as well as socio-economic controls (X_{ig}) in Models (3) - (4) to the regression.

The regression results confirm the sign and significance of our main treatment effects. *ExpectationT* increases the probability that a transaction is evaded by 19 percentage points. This effect size is robust over all specifications and significant at the p<0.01 level without controls and p<0.05 level with controls. *SignalT* does not have a significant effect on the probability that a transaction is evaded as suggested by the non-parametric comparison. *ExpectationSignalT* increases the probability of an evaded transaction by 14 percentage points at the p<0.1 level. Regarding our control variables, we find that being female, having experience with tax declarations and risk aversion reduce the probability of evasion, whereas experience on MTurk increases the probability of evasion.

3.6 Analysis of stated expectations

We investigate the effect of treatments and behavior on reported empirical and normative expectations. In the post-experimental questionnaire, we ask subjects about their empirical and normative expectations as well as their personal normative beliefs. We enquire subjects' personal normative beliefs by asking them whether they find it justifiable to "cheat on taxes, when [they] have a chance".[10] The question on empirical expectations is "Please indicate whether you think that the other participants in this study declared the transaction". For normative expectations, we ask whether participants think "it is justifiable not to declare the transaction in this study". We code this information as dummy variables, where 0 indicates a declaration expectation/ belief and 1 an evasion expectation/ belief.

First, we observe whether our treatment manipulation changes subjects' perceived

[10] This is the common tax morale question from the World Value Survey.

	Probit (ME) – Evaded Transaction			
	(1)	(2)	(3)	(4)
SignalT	0.017	0.017	0.034	0.018
	(0.053)	(0.075)	(0.076)	(0.077)
ExpectationT	0.194***	0.194**	0.204**	0.182**
	(0.057)	(0.081)	(0.081)	(0.082)
Age			-0.000	0.000
			(0.002)	(0.002)
Female			-0.098*	-0.104**
			(0.051)	(0.043)
Bachelor			-0.030	-0.005
			(0.045)	(0.039)
Fulltime			-0.006	0.064
			(0.056)	(0.048)
Low Income			0.013	-0.003
			(0.081)	(0.067)
Experience MTurk			0.002	0.003**
			(0.002)	(0.002)
Loss Income			-0.050	-0.037
			(0.048)	(0.042)
Experience Household			-0.043	-0.027
			(0.071)	(0.058)
Experience Tax Declaration			-0.056	-0.111***
			(0.049)	(0.041)
Risk Aversion			-0.103**	-0.128***
			(0.048)	(0.041)
ExpectationSignalT				0.140*
				(0.078)
Observations	414	414	384	525
Cluster	NO	207	197	270
Pseudo R^2	0.026	0.026	0.067	0.077
Controls	NO	NO	YES	YES

Table 4: Multivariate analysis of evaded transaction

Notes: The table presents marginal effects of probit specifications with evaded transaction (binary variable) as the dependent variable. *ExpectationT*, *SignalT*, *ExpectationSignalT* are treatment dummies. The reference group is *ControlT* without a signal or expectation. See Table 3 for an overview and description of the control variables. Robust standard errors in models (2)-(4) clustered on pair level in parentheses. *** p<0.01, ** p<0.05, * p<0.10.

expectation. To do so, we collapse treatments *ControlT* and *SignalT* as well as *ExpectationT* and *ExpectationSignalT* with and without priming of expectations respectively. We find that while the fraction of subjects with empirical and normative evasion expectations is significantly higher in treatments with priming, this is not the case for personal normative beliefs (see Figure 4). Priming seems to directly translate into expectations about others' behavior and beliefs, while the personal belief of what is justifiable does not change.

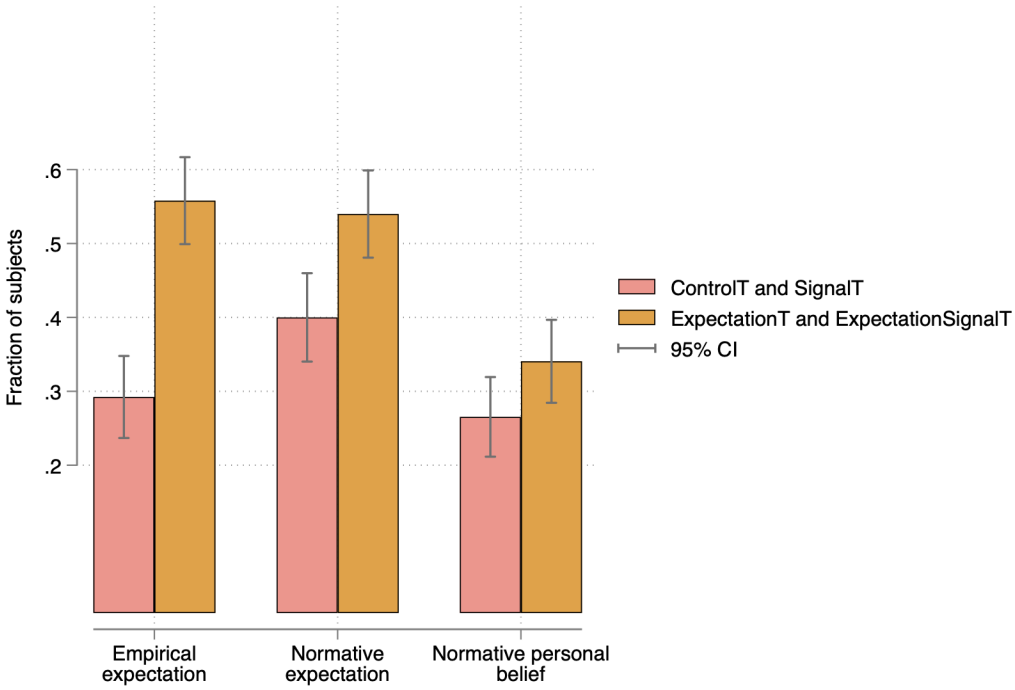

Figure 4: Expectations over treatments

Besides the treatment manipulation, stated empirical and normative expectation may also be affected by own behavior. While this effect is not causal, it gives us insight into how behavior is related to expectations. To disentangle this effect, we compare declarers and evaders (see Figure 5). We find differences in stated expectations between individuals that declare and individuals that evade the transaction. For stated empirical expectations in treatments without priming, this difference amounts to 62 percentage points (Mann-Whitney test, p=0.0000). When expectations are primed, this difference is still 59 percentage points (Mann-Whitney test, p=0.0000). For normative evasion expectations, we find smaller but also highly significant differences.

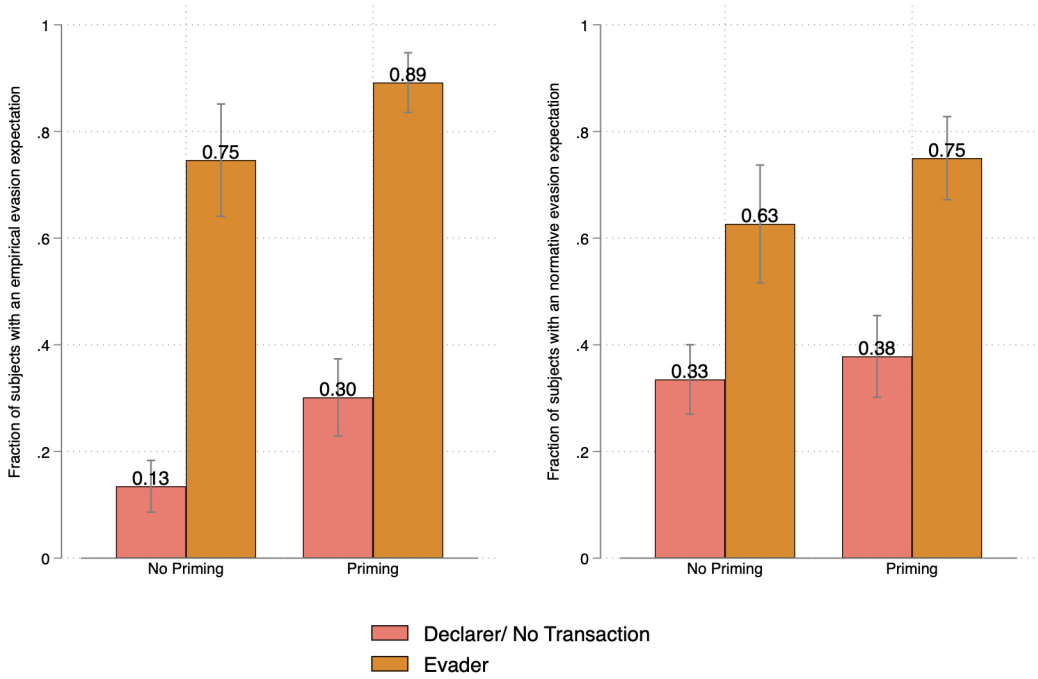

Figure 5: Empirical and normative evasion expectations by final decision and treatment

3.7 Chat analysis

An analysis of the chat protocols provides further explanation for participants' decisions in our treatments.[11] Overall, 93.0 % of participants used the chat. In 13.9 % of pairs, only one participant wrote messages, however. On average, pairs exchanged 4 messages and average duration of the chatting stage was 1.5 minutes.[12]

We categorize arguments in the chat protocols into "Risk", "Honesty", "Money", "Others" and "Rules".[13] Pairs discussed risk most frequently. This category covers statements about risk attitudes and the chance of being detected. Honesty refers to self-image, moral concerns or personal normative beliefs, whereas money arguments address the experimental payoff or the monetary consequences of a decision. Others' behavior and experimental rules were hardly discussed in the chats in our experiment. This overall picture is similar to Lohse & Simon (2021), who found that subjects mentioned risk the

[11] We use a similar chat coding as Lohse & Simon (2021) and Kocher et al. (2018) to be able to compare the results. Chat coding was done independently by three research assistants according to a pre-defined codebook (see Appendix B). For each conversation, we calculate the median evaluation of coders. There might be zero, one or several arguments per chat, so that frequencies do not add up to 1.

[12] This duration is considerably lower than the maximum possible time to chat of 2.5 minutes.

[13] Lohse & Simon (2021) also include "Previous Audits", but since our experiment is one-shot, previous audits did not occur and are not part of the conversation.

most and others' behavior or adherence to rules the least.

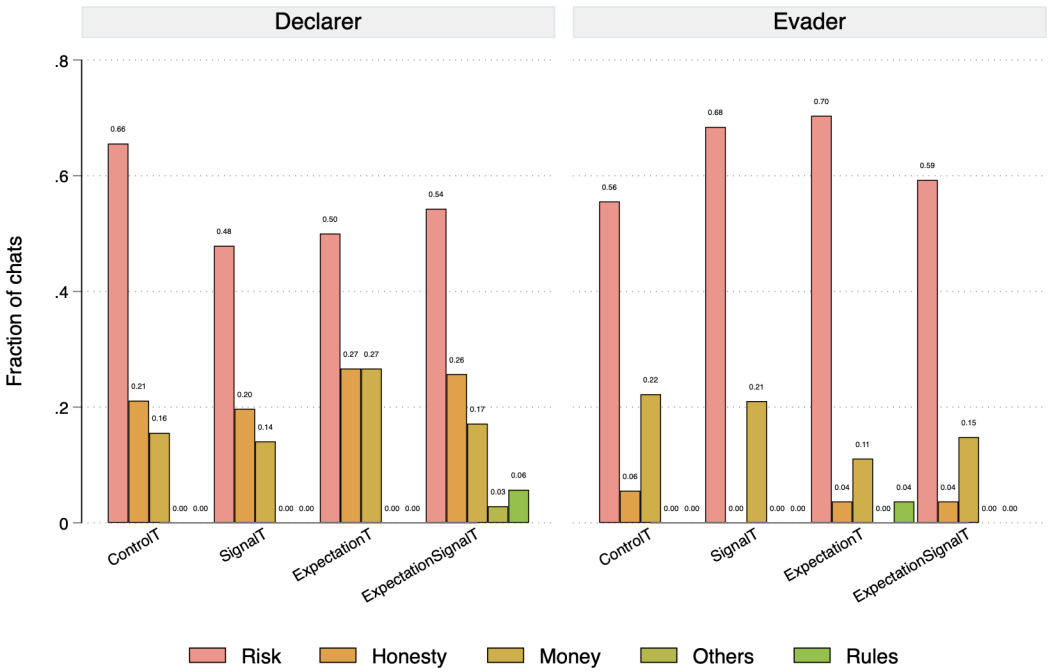

Figure 6: Exchanged arguments in the chat by treatment and final decision

When examining arguments by treatment and compliance decision, differences in addressing risk, honesty and money appear (see Figure 6). Risk is discussed in all treatments to the most extent. It appears that subjects are conscious about the risk of their decision and knowingly take it into account. A closer analysis of risk arguments shows that evading pairs in our experiment talk about the audit and penalty rate more frequently than pairs who declare. Honesty plays a bigger role in communication that leads to declaration decisions than to evasion decisions.

Models (1) and (2) in Table 5 regress the probability of an evaded transaction on arguments of risk, honesty, money, and rules that were exchanged in the chat. Model (1) shows that honesty arguments have a significantly negative effect on the probability of evading the transaction, even if we include socio-economic controls. They reduce the probability of evasion by 40 percentage points. In addition, model (2) includes dummy variables for the treatments. This does not change the significance or size of the negative effect of honesty arguments. *ExpectationT* and *ExpectationSignalT* still significantly increase the rate of evaded transactions in comparison to *ControlT*.

We use the chat protocols to analyze an additional channel for communicating an intention signal. We examine whether pairs' final decisions are in line with the first argument presented in the chat. Hence, we coded the type of first argument as a binary variable with evasion being 1. If the type of the first argument has a significant effect

	Probit (ME) – Evaded Transaction	
	(1)	(2)
Risk	0.090	0.091*
	(0.054)	(0.053)
Honesty	-0.406***	-0.401***
	(0.098)	(0.093)
Money	-0.056	-0.048
	(0.072)	(0.073)
Rules	-0.032	-0.108
	(0.269)	(0.260)
SignalT		0.024
		(0.074)
ExpectationT		0.194**
		(0.079)
ExpectationSignalT		0.162**
		(0.077)
Observations	523	523
Cluster	269	269
Pseudo R^2	0.102	0.128
Controls	YES	YES

Table 5: Evaded transactions and arguments used in chat

Notes: The table presents marginal effects (ME) of a probit specification with evaded transactions (binary variable) as the dependent variable. "Risk", "Honesty", "Money" and "Rules" are the categories we used for the chat coding. The category "Others" is omitted due to collinearity. *ExpectationT*, *SignalT* and *ExpectationSignalT* are treatment dummies. The reference group is *ControlT* without a signal or priming. "Female" is significantly negatively and "Experience on Mturk" significantly positively related to the probability of an evaded transaction. Socio-economic controls are included. Robust standard errors clustered on pair level in parentheses. *** p<0.01, ** p<0.05, * p<0.10.

on the fraction of evaded transactions, it provides evidence that first signals in a conversation shape final decisions. This was the aim of *SignalT*, which might have been too weak to represent an exchange of intentions.

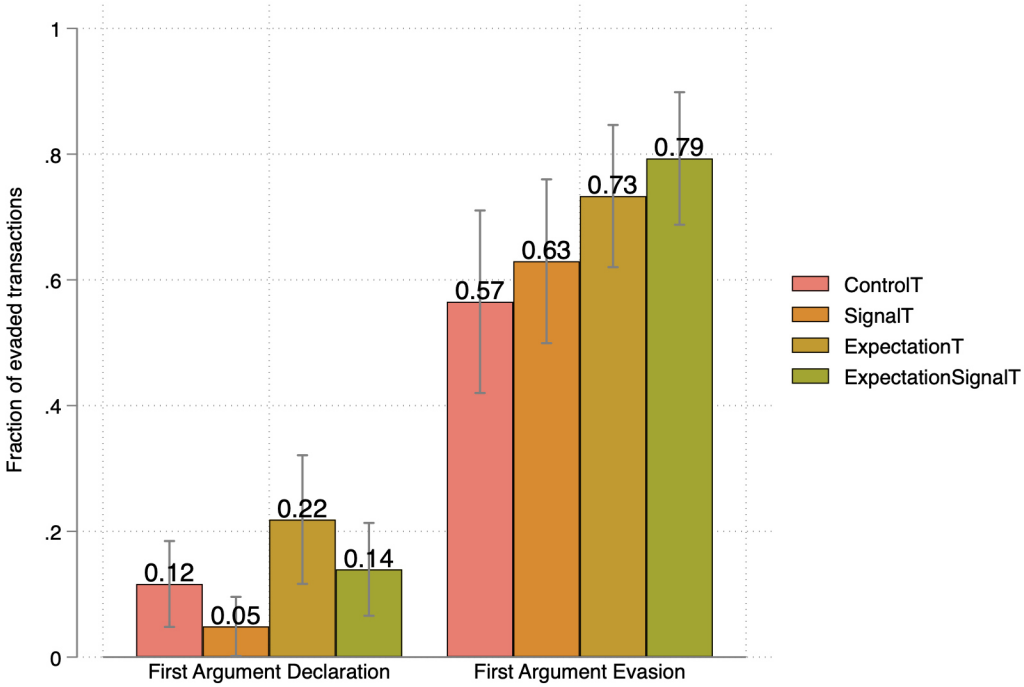

Figure 7: Fraction of evaded transactions by type of first argument and treatment

We find a mixed picture regarding the direction and effect of first arguments. The fraction of first evasion arguments is significantly different in *ExpectationT* compared to *ControlT* (Mann-Whitney test, p= 0.0283). Nevertheless, first arguments that are directed towards evasion significantly increase the fraction of evaded transaction compared to first arguments towards declaration (Mann-Whitney test, p=0.0000) (see Figure 7). This implies that when evasion is mentioned first in the chat, the probability that the transaction is evaded is significantly higher.

	Probit (ME) – Evaded Transaction		
	(1)	(2)	(3)
First Argument	0.423***	0.416***	0.407***
	(0.020)	(0.020)	(0.021)
SignalT		-0.007	-0.015
		(0.066)	(0.065)
ExpectationT		0.140*	0.124*
		(0.072)	(0.073)
ExpectationSignalT		0.118*	0.109*
		(0.064)	(0.064)
Risk Aversion			-0.081***
			(0.030)
Observations	501	501	501
Cluster	258	258	258
Pseudo R^2	0.310	0.334	0.343
Controls	YES	YES	YES

Table 6: Multivariate analysis of first arguments in chats

Notes: The table presents marginal effects (ME) of a probit specification with evaded transaction (binary variable) as the dependent variable. "First Argument" is a dummy variable that refers to the first argument in the chat being an argument for evasion. *SignalT*, *ExpectationT* and *ExpectationSignalT* are treatment dummies. The reference group is *ControlT* without a signal or priming. Socio-economic controls are included. Robust standard errors clustered on pair level in parentheses. *** p<0.01, ** p<0.05, * p<0.10.

We estimate a probit model to examine whether the effect of the first argument holds when controlling for socio-economic characteristics, experience and risk aversion (see Table 6). Model (1) regresses a dummy for the first argument in the chat mentioning evasion on the probability of an evaded transaction. First arguments that refer to evasion remain a highly significant predictor for evaded transactions when control variables are added. They increase the probability of an evaded transaction by around 42 percentage points. In model (2), we add treatment dummies. While the effect of the first evasion argument remains stable at 41 percentage points, *ExpectationT* and *ExpectationSignalT* remain only weakly significant with an 14 and 11 percentage point increase in the probability of evasion, respectively. Adding a highly significant dummy for risk aversion in model (3) reduces the effect sizes of the treatments further.

4 Discussion

In our experiment, we model collaborative tax evasion with a coordination stage including a chat-box to communicate, followed by an offer by the service provider that is accepted or rejected by the household. Hence, coordination is implemented in two ways: First, by enabling communication in the chat, second, by sequential decision-making in which the household knows about the partner's preference.

In our design, both declaration or evasion are only established if both partners agree. The transaction could also be declared by default in case of disagreement (see Lohse & Simon, 2021). However, finding an alternative service provider that offers the aspired conditions may involve additional search costs in real life. In the meantime, a household needs to provide the service on its own and loses the value of the service provision. This is why in our design, if partners do not come to an agreement, households can reject the offer, leaving them and the service provider with only the initial endowment.

While we claim that the sequential nature of our game reflects coordination about collaborative tax evasion outside the laboratory more accurately, we may over-emphasize the role of the service provider. Service providers are the first movers and households accept or reject their offer, which could be interpreted as silent approval to evasion if households intended something else in the beginning and feel forced to accept the offer. We asked subjects in the role of households to what extent they felt pressurized to take the offer in the post-experimental questionnaire. A majority of 75.6 % responded that they do not feel obliged to take it. Reported pressure is not significantly different between treatments. Ideally, we would vary the first mover position between households and service providers. However, since pressure does not seem to impact households' decisions and incentives are the same for both roles, we believe that this does not systematically influence our results.

Unlike Doerr & Necker (2021) or Naritomi (2019), we cannot interpret evasion rents as we have simplified the decision to a discrete choice between a fixed evasion price and a fixed declaration price. This implies that we can only interpret evasion decisions on the extensive margin, that is the probability of evasion. Our aim was to investigate treatment effects given fixed monetary incentives. However, more flexible price negotiations should be examined in follow-up studies, as we might underestimate evasion behavior due to this simplification. If prices were more flexible, service providers could have tried to persuade households by offering lower prices for an evaded transaction.

5 Conclusion

When businesses directly transact with consumers, tax evasion has been found to be particularly pronounced because the incentives to evade taxes are stronger than the incentives to report the transaction (Doerr & Necker, 2021; Naritomi, 2019; Kleven et al.,

2011; Pomeranz, 2015). This is very common in private households (Doerr & Necker, 2021; OECD, 2021). However, the literature on collaboration between households and service providers or, more generally, between sellers and buyers is scarce. Only a handful of studies experimentally examine collaborative tax evasion (Lohse & Simon, 2021; Kotakorpi et al., 2021; Abraham et al., 2017; Bjørneby et al., 2021; Doerr & Necker, 2021). Our experiment aims to contribute to this literature.

In this study, we investigate the compliance decision of pairs in an interactive tax evasion game in an online labor market. We vary the priming with an empirical evasion expectation and intention signals in a 2x2 between-subjects design and examine the fraction of evaded transactions. We find that priming with an empirical evasion expectation significantly increases the fraction of evaded transactions by 19 percentage points. This implies that enforcement of tax compliance should consider empirical evasion expectations, especially in areas with low detection (e.g., private households). Signaling of partners' intentions does not significantly affect the joint decision to evade taxes. We show that this finding may be due to a weak manipulation of signals rather than a non-existence of the effect of signaled intentions.

Future research may explore the causal effect of signaled intentions on the decision to collaboratively evade taxes further. Moreover, tax evasion research in various settings may profit from a more nuanced view on social norms that incorporates empirical and normative expectations. This would contribute to the understanding of how tax evasion is coordinated and help designing effective policy measures to combat it.

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A Selected Experimental Screens and Questionnaires

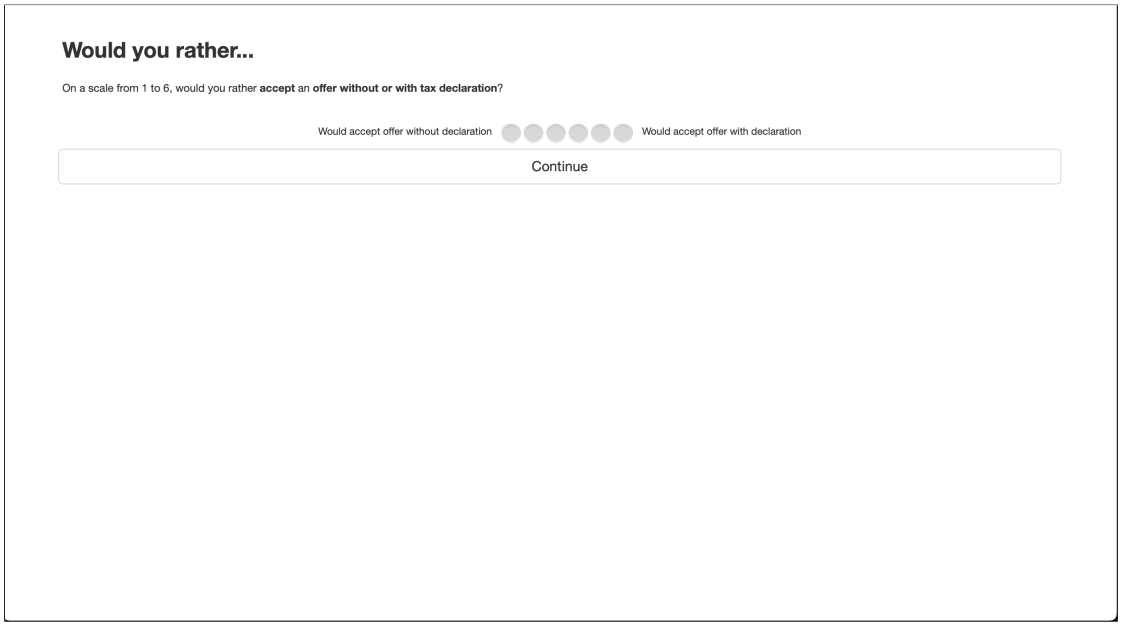


Figure 8: Elicitation of intention

Figure 9: Priming with evasion expectation

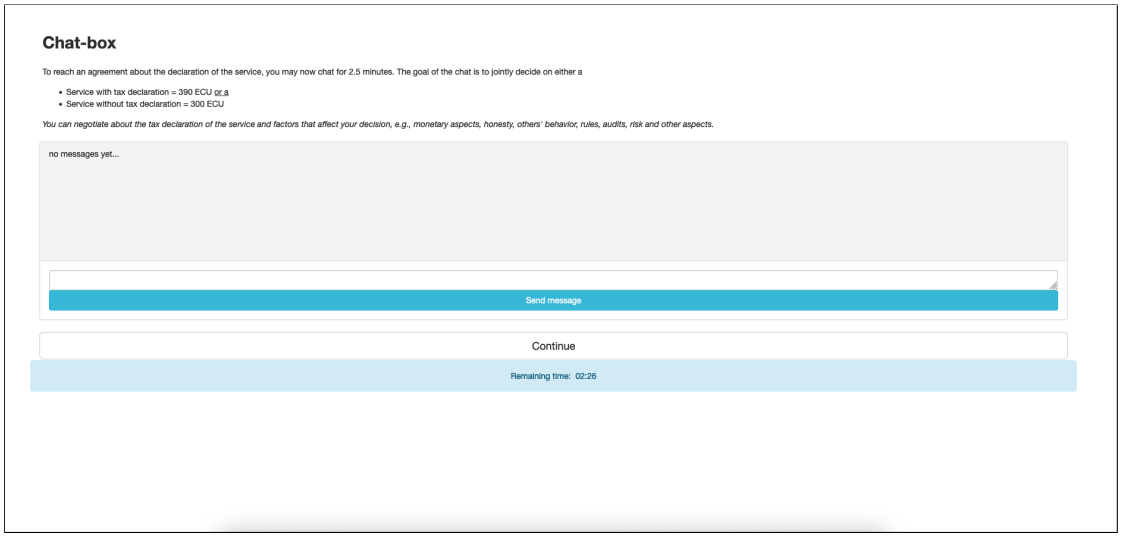


Figure 10: Chat-box in ControlT

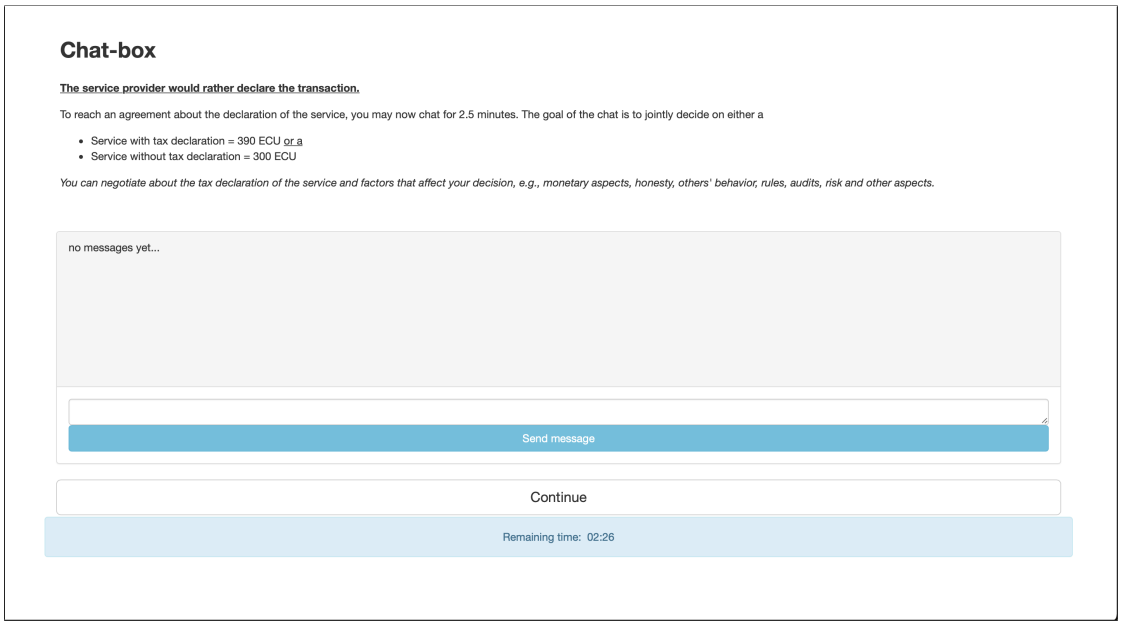


Figure 11: Chat-box in SignalT including the service provider's intention

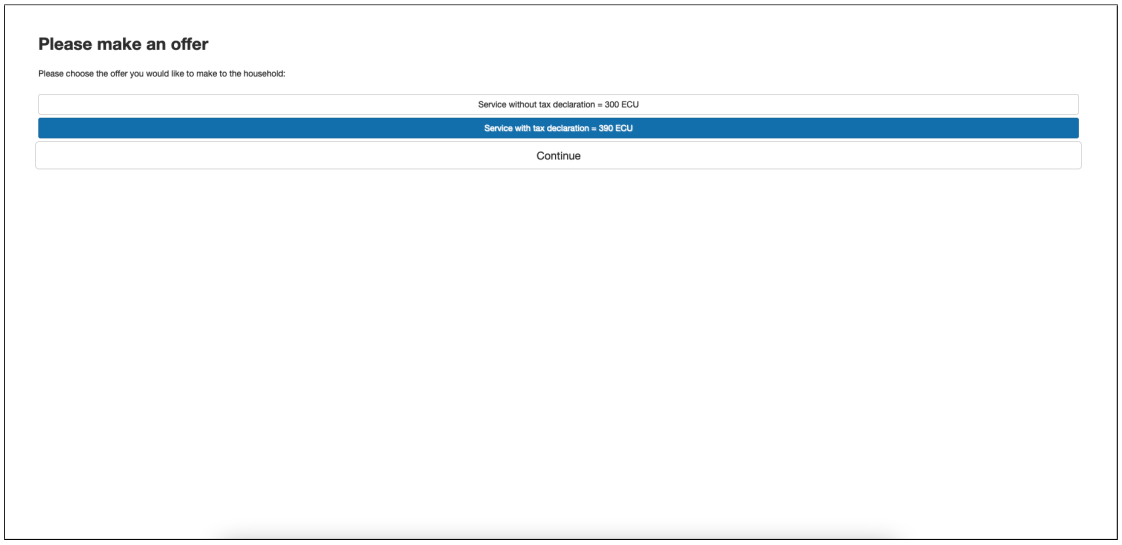


Figure 12: Service providers' offer stage

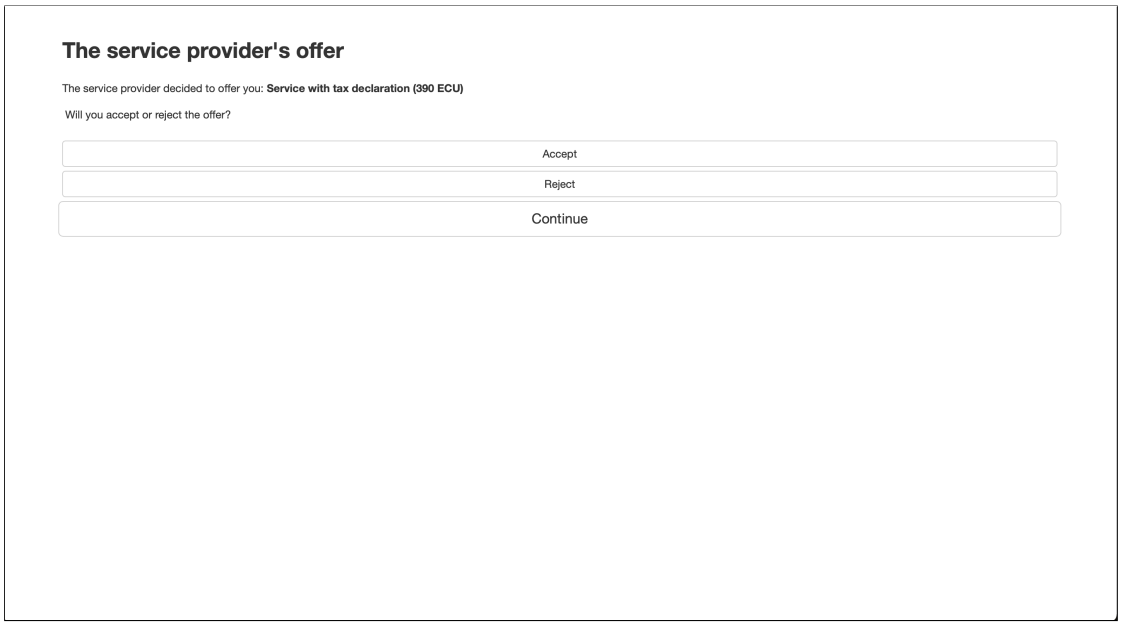


Figure 13: Households' reaction

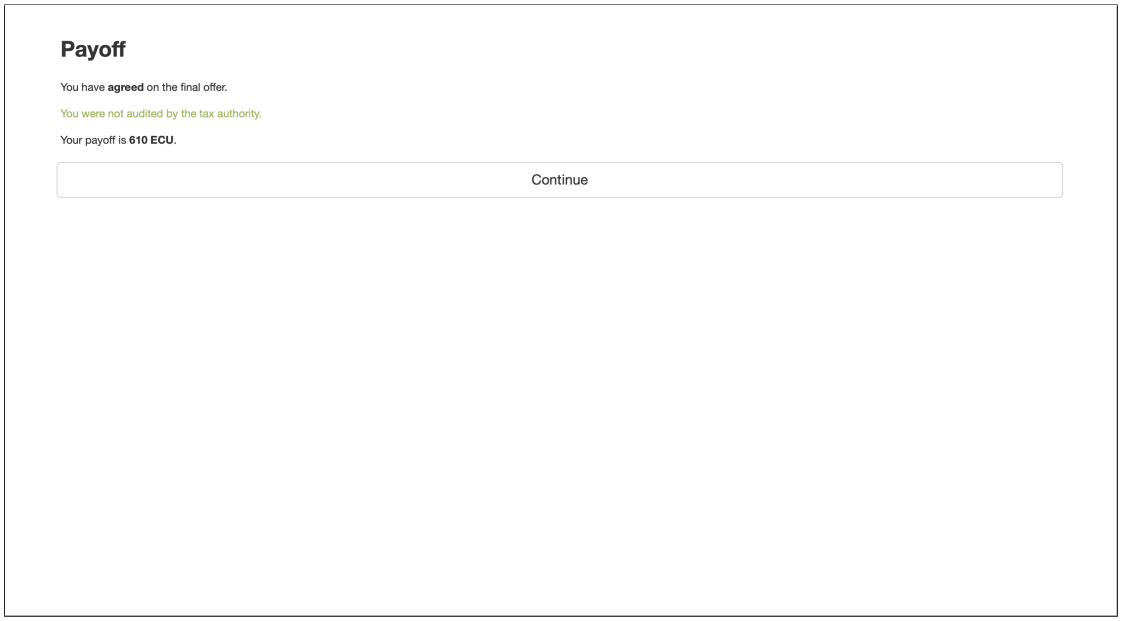


Figure 14: Information on transaction and audit

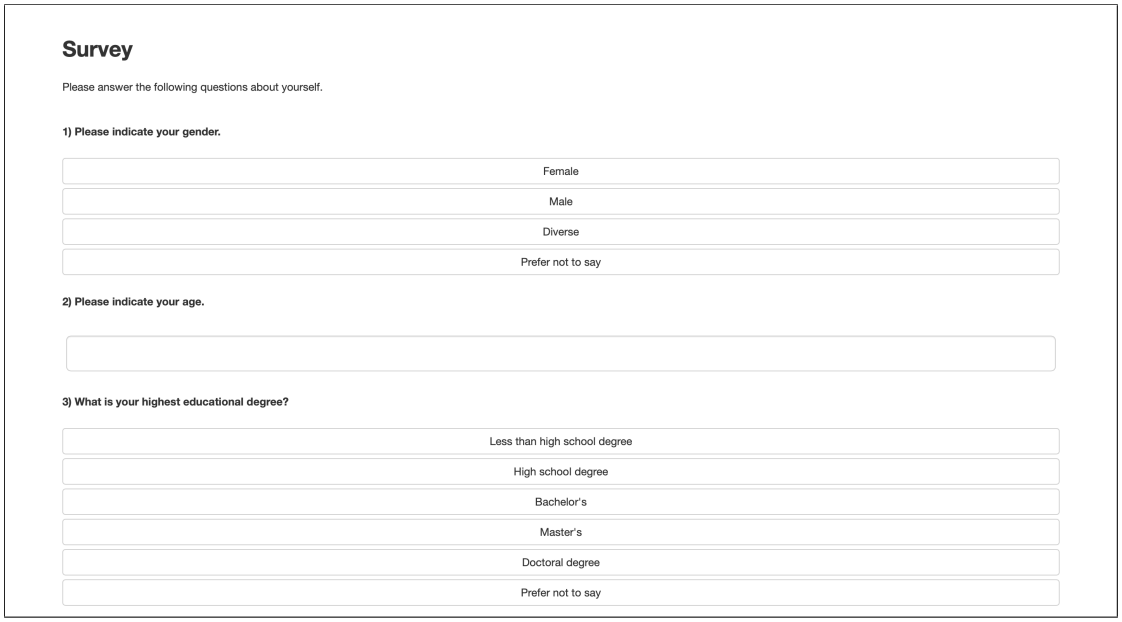


Figure 15: Pre-experimental survey

4) What is your current employment status?

- Full-time employee
- Part-time employee
- Self-employed or business owner
- Out of work, or seeking work
- Student
- Not in labor force (e.g., retired, full-time parent)
- Prefer not to say

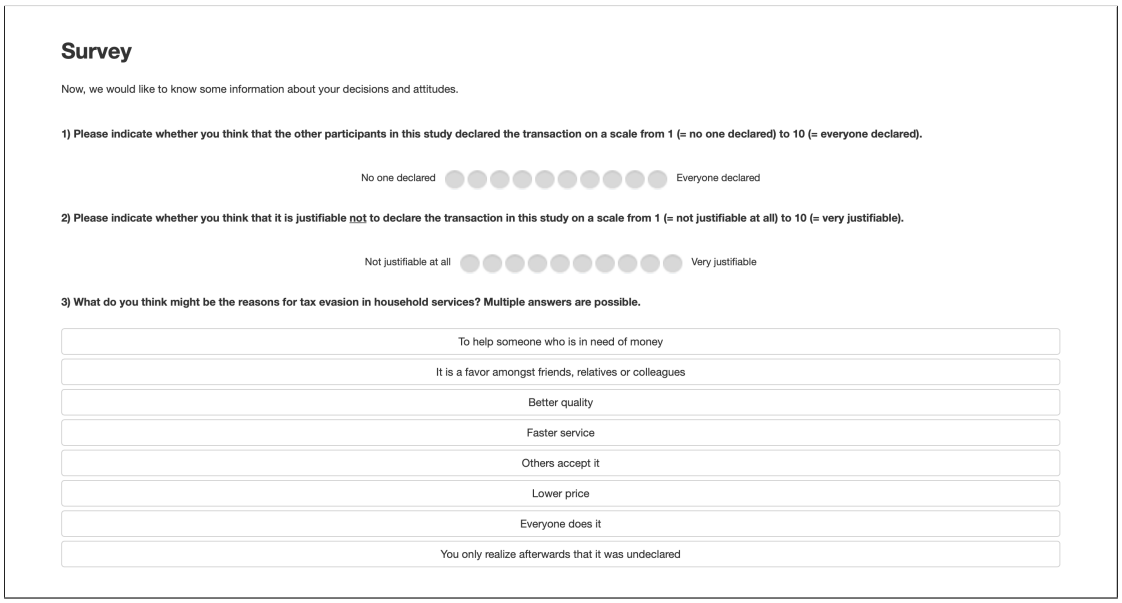
5) How high was your total household income, before taxes, last year (2020)?

- $0 - $19,999
- $20,000 - $74,999
- $75,000 +
- Prefer not to say

6) How many hours per week do you spend working online on MTurk or similar platforms?

Continue

Figure 16: Pre-experimental survey



Survey

Now, we would like to know some information about your decisions and attitudes.

1) Please indicate whether you think that the other participants in this study declared the transaction on a scale from 1 (= no one declared) to 10 (= everyone declared).

No one declared — Everyone declared

2) Please indicate whether you think that it is justifiable not to declare the transaction in this study on a scale from 1 (= not justifiable at all) to 10 (= very justifiable).

Not justifiable at all — Very justifiable

3) What do you think might be the reasons for tax evasion in household services? Multiple answers are possible.

- To help someone who is in need of money
- It is a favor amongst friends, relatives or colleagues
- Better quality
- Faster service
- Others accept it
- Lower price
- Everyone does it
- You only realize afterwards that it was undeclared

Figure 17: Post-experimental survey

4) How distracted were you during the experiment?

Not distracted at all — Very distracted

And, how pressurized did you feel to accept the offer?

Not pressurized at all — Very pressurized

5) Have you ever submitted a tax declaration?

- Yes
- No

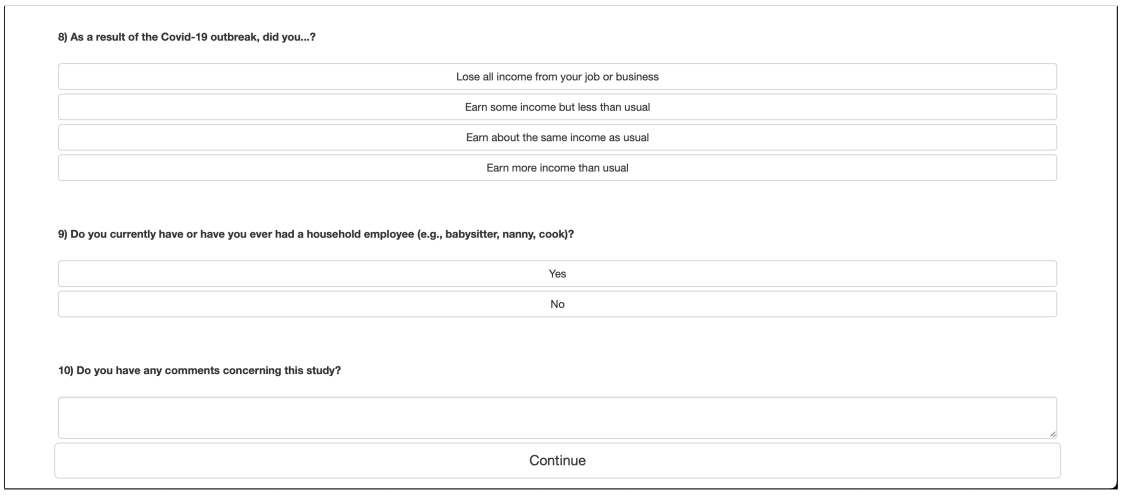
6) Please indicate whether you think it can always be justified, never be justified, or something in between on a scale from 1 (= never justifiable) to 10 (= always justifiable) to cheat on taxes if you have the chance.

Never justifiable — Always justifiable

7) Please indicate, in general, how willing or unwilling you are to take risks on a scale from 1 (= completely unwilling to take risks) to 10 (= very willing to take risks).

Completely unwilling to take risks — Very willing to take risk

Figure 18: Post-experimental survey



8) As a result of the Covid-19 outbreak, did you...?

- Lose all income from your job or business
- Earn some income but less than usual
- Earn about the same income as usual
- Earn more income than usual

9) Do you currently have or have you ever had a household employee (e.g., babysitter, nanny, cook)?

- Yes
- No

10) Do you have any comments concerning this study?

Continue

Figure 19: Post-experimental survey

B Codebook Chat Analysis

Codebook: Variables for the chat analysis

This Appendix includes the codebook that was used by our coders for the KaLi experiment.

1) Chat in general

- **UsedChat**: binary variable (0= no messages; 1= chat was used)
- **NumberChat**: overall number of messages exchanged
- **DifficultChat**: binary variable (0= no difficulties encoding the messages; 1= some difficulties concerning the coding of the chat)
  Example for a difficulty: blurred lines between arguments used → coding depends on the interpretation of the coder (observer effect)
- **OnlyOnePerson**: binary variable (0= both people used the chat; 1 = only one person used the chat)

2) Content of the chat

Which arguments are being made to make in the joint decision-making progress about whether to declare the service or to evade the taxes. All variables are binary and they only take on the value 1 if the argument is explicitly mentioned as a relevant aspect for the final decision.

- **Chat_Honesty**: reasoning based on one's personal norm of being honest
  Example: A: Let's declare B: I'm the same way, I like just being honest. A: Better to be safe than sorry.
  or
  I think we should be honest and do service with tax declaration.
- **Chat_Money**: arguing with regard to the payoff
  Example: My payoff only increases slightly if we don't declare the taxes so I think it's better to play it safe.
- **Chat_Rules**: reference to the instructions of the experiment
  Example: A: Do you think it's actually 10 percent? B: Researchers are justified to lie and say whatever they want in these experiments for science.
- **Chat_AuditFine**: explicit mentioning of the audit rate/probability or the amount of the fine/penalty
  Example: A: We have a chance of losing more than if we just declare, though. B: how much. A: We get fined twice the amount each.
  or
  Probability of getting caught is 15 percent, odds say don't declare.
- **Chat_Risk**: messages about the participant's attitude towards taking risks
  Example: A: I'd rather go without tax declaration. B: The chances are low. A: Alright, I'll take risk.
  or
  A: The audit rate is only 10 %. B: I would rather have 100 % chance of making money though.
- **Chat_Others**: reference to the behaviors of others outside the partnership

The following two variables refer to the discussion in general and are both binary. Most of the chats will take on the value 1 for either of these variables. However, if no real interaction or exchange of meaningful takes place both variables stay at 0.

- **Chat_Agree**: If the partners agree from the beginning, this variable becomes 1. This means the partners only exchange their views but do not try to convince the other person since they already have the same intent.

Example: A: Hey there, I think we should declare tax because I don't want the penalty of getting audited B: Agreed. Then we're already on the same page!

- **Chat_Convincing**: If the partners have different intents in the beginning and one person achieves to convince their partner to go along with their intended decision, this variable becomes 1.
  Example: A: What choice would you prefer? I would like to declare. B: I'd rather go without tax declaration. A: The chances are low. B: Alright, I'll take risk.
- **Chat_FirstArgument**: Does the first argument used in the chat lean towards a decision for declaration or evasion?
  1 = Declaration, 2 = Evasion, 3 = Other
- **Chat_FirstMover:** Who makes this first argument that leans towards evasion or declaration?
  1=Household, 2= Service Provider

C Additional Analyses

	ControlT	SignalT	ExpectationT	ExpectationSignalT	Total
Age	41.04	40.12	38.46	41.01	40.19
	(13.49)	(11.29)	(10.58)	(11.88)	(11.88)
Female	0.45	0.49	0.47	0.43	0.46
	(0.50)	(0.50)	(0.50)	(0.50)	(0.50)
Bachelor	0.54	0.50	0.58	0.54	0.54
	(0.50)	(0.50)	(0.49)	(0.50)	(0.50)
Fulltime	0.56	0.66	0.70	0.59	0.63
	(0.50)	(0.48)	(0.46)	(0.49)	(0.48)
Low Income	0.14	0.12	0.07	0.12	0.11
	(0.35)	(0.33)	(0.25)	(0.33)	(0.32)
Experience MTurk	18.01	16.76	17.93	17.32	17.49
	(12.15)	(11.91)	(11.59)	(11.90)	(11.87)
Loss Income	0.41	0.35	0.33	0.42	0.38
	(0.49)	(0.48)	(0.47)	(0.50)	(0.49)
Experience Household	0.13	0.17	0.15	0.14	0.15
	(0.33)	(0.38)	(0.36)	(0.35)	(0.36)
Experience Tax Declaration	0.64	0.58	0.57	0.49	0.57
	(0.48)	(0.50)	(0.50)	(0.50)	(0.50)

Table 7: Socio-demographic characteristics over treatments

Notes: This table provides an overview of the socio-demographic characteristics over the four treatment groups. The variables *Age* and *Experience MTurk* are reported in absolute values, all remaining variables are recoded as dummy variables. *Bachelor* indicates that an individual possesses at least a bachelor's degree.

Female	0.0123
	(0.0320)
Age	0.00261**
	(0.00130)
Bachelor	-0.0338
	(0.0320)
Fulltime	0.0482
	(0.0369)
Low Income	0.0345
	(0.0513)
MTurk Experience	0.00302**
	(0.00128)
Observations 1,004	
$\chi^2 = 11.14$	
p-value = 0.0840	

Table 8: Attrition analysis

Notes: Results of an attrition analysis, where a dummy for dropout was regressed on the socio-demographic characteristics surveyed before the experiment. Coefficients are marginal effects. Standard errors in parentheses.

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