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Abstract

We study the causal effects of household tax credits on the willingness to demand legally provided services using a survey experiment among 670 German home owners. Participants are randomly assigned to a scenario 1) without a tax credit, 2) a tax credit the household can claim through the annual tax return, i.e., in the following year, 3) a tax credit granted by the seller at source, i.e., as an immediate price reduction. We find that tax credits increase the probability that a household selects an offer with invoice by 13 (via tax return) and 11 (granted at source) percentage points. The willingness to pay a premium for an invoice increases by 11 and 6 percentage points, respectively, which is about one third of the change expected when the financial advantage of the tax credit would be fully factored in. The treatment effects are not significantly different between the two tax credits, suggesting that the incomplete take-up cannot be explained by the timing of tax credits or the actions related to obtaining them. Yet, individuals seem to have compliance costs of about two thirds of the tax credits' rate that seem to be independent of the tax credits' implementation.

Keywords: Tax credit, Financial rewards for compliance, Tax evasion, Tax compliance, Third-Party Reporting, Survey experiment, Discrete Choice Experiment
JEL Codes: H26; C93; E26; J22; O17

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1 Introduction

Improving tax compliance is an important policy goal in most economies. Previous research shows that taxes are less likely to be evaded if governments are able to observe transactions (e.g., Alm et al., 2009; Kleven et al., 2011, 2016; Pomeranz, 2015; Naritomi, 2019). Thus, withholding taxes and verifiable documents have been established as central instruments of tax collection. However, the incentives to report transactions to tax authorities are often weak when consumers demand products or services. While the value added tax (VAT) provides an incentive for firms to insist on an invoice in business-to-business transactions, this "self-enforcement property" does not exist in business-to-consumer transactions. To introduce incentives for third-party reporting in transactions involving households, several countries have introduced monetary incentives for consumers that demand legally provided services (Williams and Nadin, 2014).[1]

Since the lower price is an important determinant of the decision to demand undeclared goods or services (e.g., European Commission, 2014), the goal of these policies is to reduce the price premium for declaration. However, systematic evidence on the effect of such incentives on consumers' willingness to declare and pay a premium for this is rare. The survey by Feld et al. (2012) suggests that the household tax credit in Germany is mainly used by those who would have declared anyway. Using register data, Harju et al. (2021) find that household tax credits in Finland and Sweden have no meaningful effect on consumers' tax evasion. In contrast, using administrative data, Naritomi (2019) shows that an anti tax evasion program in Brazil that includes monetary rewards for consumers has a positive effect on firms' compliance.[2]

The goal of our study is to examine the effect of monetary incentives on consumers' willingness to demand legally provided services and the premium they are willing to pay for this using a survey experiment. We focus on tax credits that offer favourable tax treatment to consumer of services, as granted in several European countries (OECD, 2021).[3] Tax credits take different forms, which may influence their effectiveness. In most countries, e.g., Germany, Italy, Belgium, and France, tax credits are claimed with the annual tax return, which requires consumers to pay the full price upfront. However, it has been acknowledged that this implementation may lead to a low consumption among households with lower incomes, who cannot afford the higher price of declared services (OECD, 2021). In addition, the procedure to obtain the tax credit may be too burdensome for some households. Therefore, Sweden has shifted to a system in which tax credits are granted at source, i.e., as a reduced price at the time of service consumption.

To examine the effect of these the two types of tax credits, we implement an experiment in a survey of 670 German individuals. We assign participants to one of the three policy scenarios in a between-subject design. The No Tax Credit treatment serves as the baseline scenario. We implement two tax credit treatments in which we vary the actions that the household has to take to obtain the credit and the timing of awarding tax credits. In the Tax Credit Via Tax

[1] The amounts spend on these incentives are large. For instance, in Germany the household tax credit is with an estimated volume of about 2 billion Euro and 11.6 million cases one of the 20 largest subsidies (BMF, 2021).

[2] At a more abstract level, laboratory experiments show that different types of financial rewards can decrease income tax evasion (Alm et al., 1992; Kastlunger et al., 2011; Bazart and Pickhardt, 2011).

[3] A tax credit decreases the amount of tax owed by an individual, while a tax deduction lowers an individual's overall taxable income. Hence, the benefit of a tax credit for a household can more easily be calculated.

Return scenario, the household has to claim the credit in the annual tax return and receives the refund as reduced tax payment in the subsequent year. In the Tax Credit At Source treatment, the household has to inform the seller about using the tax credit, who then reduces the price.

In each policy scenario, participants have to make choices in a discrete choice experiment. Subjects are asked to put themselves in a situation in which the household wants to have a service, such as painting walls, carried out in the household for money. We present them seven sets of two offers. Each offer has four attributes: if the seller was recommended, the seller's availability and, most importantly, the price of the offer and whether the offer includes an invoice. The participants are asked to state which offer they would choose. We estimate households' preferences for the different attributes and their willingness to pay for these attributes from the choices. By comparing choices across treatments, we identify the effect of the two tax credits on the probability that an offer with invoice is chosen and the willingness to pay (WTP) for it.

We find that the existence of tax credits significantly affects behavior. Without a tax credit, consumers are willing to pay on average a 27% higher price when the offer includes an invoice. The WTP increases to 38% when a tax credit is provided via tax return, and to 35% if the tax credit is granted at source. Although this increase is statistically significantly different from zero, it is only about one third of the change expected when the tax credit would be fully factored in. The tax credits also affect the probability to choose an offer with invoice. The increase is 13 percentage points (ppt) with regard to the tax credit claimed via the tax return and 11 ppt with regard to the tax credit granted at source. Neither with regard to the price premium or the willingness to demand an invoice we find significant differences across the two tax credits.

The lack of a difference between the two tax credits suggests that the incomplete take-up of the tax credits cannot be explained by the timing of tax credits or the actions related to obtaining them. In contrast to expectations, households do not consider the tax credit granted at source to be superior. In line with this conclusion, a post-experimental survey shows that the perceived financial attractiveness of offers without invoice decreases by a similar extent under both types of tax credits. A large fraction reports that their behavior would not change if the tax credit would be modified from via tax return to at source, or vice versa. Yet, individuals seem to have compliance costs of about two thirds of the tax credits' rate that seem to be independent of the the tax credits' implementation. Some people seem to be hesistant to use them; about a quarter report that their behavior would be unaffected by tax credits. While we do not know the reasons for this, we find that some people have a strong preference for offers without invoice.

Our survey also shows that the tax credits do not affect the justifiability of choosing an offer without invoice. Note that our experiment abstracts from several reasons why households may not use tax credits. For instance, it is possible that households are not informed about the tax credit (Feld et al., 2012) or the household is not eligible (e.g., as they do not owe taxes Grönberg and Rauhanen, 2015). Considering that these factors may further prevent households' use of tax credits, we conclude that their effectiveness as an instrument to prevent tax evasion is limited.

Our paper is structured as follows. In Section 2, we describe the experimental design and our hypotheses. Section 3 describes our results. In Section 4, we discuss our findings and conclude.

2 Experimental design

2.1 Sample and procedure of survey

Our sample was recruited through the provider of a German research panel (Consumerfieldwork). To increase the reliability of participants' choices, our goal was to invite a subject pool that is likely to face the situation of hiring a seller of household services. Owners of a flat or house are more likely to require household services such as renovation work than renters (Feld et al., 2012). In addition, in several countries (e.g., Sweden, Italy) households must own the unit where the work is carried out to receive the tax credit. Thus, we only allowed subjects to participate that responded in earlier surveys that they live in an owned flat or house. The data collection took place in December 2021. Participants completing the survey receive 1 Euro from the research panel. We use the platform Qualtrics to program and administer our questionnaire.

The flow of the questionnaire is as follows. On the welcome screen we explain that the goal of the study is to inquire how households make decisions when they demand household services, such as renovation work, for money (see Appendix A.1 for the wording of the questionnaire). Subjects are informed that the survey should take around 10 minutes and deals with their decision-making, their experiences, and their life situation.[4] We ask them to complete the entire survey honestly and state that their responses are valuable to us even if they do not have experience with demanding household services. We ensure we will treat answers anonymously.

The survey itself consists of four parts: First, we inquire socio-demographic characteristics, namely gender, age, state of residence and type of housing. Before subjects enter the second part, we include an attention check (following, e.g., Berinsky et al., 2014). Participants that do not pass the attention check are redirected to the end of the survey.[5] The second part consists of the discrete choice experiment, explained in Section 2.2. In this part, subjects are assigned to different treatments, consisting of the different policy scenarios, described in Section 2.3. In each treatment, participants are confronted with the exact same discrete choice experiment. The choice experiment is followed by treatment-specific follow-up questions which aim to assess the motivation of participants' choices and have the goal to disentangle the mechanisms if and why tax credits are effective. The third part asks participants about their experience with demanding household services and the tax credit in Germany. Last, we inquire information about the household (income, decision-making within the household), the subject's time preference and risk aversion (taken from Falk et al., 2018) and attitude towards taxation (Haerpfer et al., 2020).

2.2 Discrete choice experiment

To assess households' willingness to demand an invoice and to pay a premium for this, running a discrete choice experiment has several advantages. First, it has been shown that multidimen-

[4] Dropping nine individuals that took more than an hour to respond, the actual average time is 9.6 minutes.

[5] The first sentences of our screener question suggest that participants are asked about how they are feeling. We then explain that we would like to know if participants actually take time to read the instructions and ask them to ignore the question how they are feeling and instead check only a certain option as their answer. Sixteen participants do not pass the attention checked and are redirected to the end.

sional, hypothetical choices made by survey respondents match choices in real-world situations (e.g., Hainmueller et al., 2014). The situation we design mimicks the situation that households face when they get offers for a job that needs to be done in the household. Second, choice experiments have been shown to reduce social desirability bias (e.g., Horiuchi et al., 2020). Since the choice scenarios consider multiple attributes, it is difficult for participants to infer what the goal of the study is and what researchers may want to hear. This is particularly important for our research question, as we inquire households' willingness to engage in illegal behavior.

In our discrete choice experiment, subjects are asked to put themself in a situation in which they want to have a renovation service, such as painting walls, carried out in the household for money. We tell them that we would like to know how they would choose between offers. A pilot study showed that subjects did not know how to choose between offers when the job was unspecified. For instance, households are less likely to choose an offer without invoice for a complex job which costs a large amount of money and for which having a guarantee is important. Since evasion is more likely to occur with small-scale services (e.g., European Commission, 2014), we choose to frame the discrete choice experiment with the example of painting walls. Our results thus are likely to apply to simple, small-scale jobs (see also Doerr and Necker, 2021).

In the instructions, we inform subjects that they have to make seven choices between two offers and that offers differ in four attributes. We selected four attributes that are central in determining the decision between offers, according to discussions with individuals that have experience with hiring sellers. We ask subjects to assume that the offers are the same in all dimensions not specifically stated in the DCE.[6] We show them an example of a choice set.

The first attribute is whether or not the seller was recommended by an acquaintance, see Table 1. The typical way of finding a seller is to ask friends and family for their recommendation (USP Marketing Consultancy, 2019)). Since sellers work in the house, a certain amount of trust required. A recommendation may also serve as a proxy for good quality. Yet, a recommendation may not always be available, for example, when the household hires a seller through an online platform, which have become increasingly important (e.g., Initiative D21, 2021).

The second attribute is the availability of a seller. Given our framing of the situation, we expect that households consider in their decisions if the seller is available "as desired" or if the offer involves "waiting time" (see Table 1). Although the Covid-19 crisis has led to a decrease of demand, the capacity utilization was at an all-time high before the crisis and is still very high. On average, customers have to wait 9.1 weeks until a firm is available (Zentralverband des Deutschen Handwerks, 2021). Due to these difficulties in finding an available firm, households' willingness to hire an informal seller may increase, expecting that they are available earlier.[7]

The third attribute is the type of offer, which takes the values "with invoice (incl. VAT)" and

[6] To examine the extent to which subjects think that offers with and without invoice differ, we ask them to report if offers without invoice are better, the same, or worse than offers with invoice with regard to five dimensions, see Table A.3. While offers without invoice are considered better with regard to the price, offers with invoice are considered better with regard to the seller's willingness to make improvements in the case of defects. Most respondents think that the quality, availability of the seller, and reliability of the seller are the same.

[7] While 21% of participants rate the availability of offers without invoice to be better than the one of offers with invoice, only 8% think that the availability of offers without invoice is worse, see Table A.3. However, the majority think that it is either the same (45%) or they do not know (26%).

"without invoice." We intentionally stress that an offer with invoice is "incl. VAT", to express that only this type of offer is declared to public authorities. In interactions between sellers and buyers, the wording "without invoice" is frequently used to refer to an offer that is undeclared (e.g., Doerr and Necker, 2021). The advantage is that it avoids stating that the offer is illegal, which may deter some households from choosing such an offer. The disadvantage is that we do not know how households interpret the term. To be able to assess households' interpretation, we include a question in the follow-up survey. It shows that 75% of the sample are aware (or willing to admit) that in an offer without invoice due taxes are not paid.

The fourth attribute is the price of the offer. The range of prices, from 300€to 500€, is motivated by the prices observed in Doerr and Necker (2021), who advertised jobs for painting and laying a floor in two/four rooms. Prices increase in steps of 20€, which implies that the attribute has 11 values. The third and the fourth attribute are central for our experiment, as it allows us to estimate subjects' willingness to pay for services with invoice (see Section 2.5).

Table 1: Attributes and Levels

Attributes	**Levels**
Recommendation of seller by acquaintance	Yes No
Availability of the seller	As desired With waiting time
Type of offer	Without invoice With invoice incl. VAT
Price of offer	300€ 320€ 340€ 360€ 380€ 400€ 420€ 440€ 460€ 480€ 500€

Due to the different attributes and their levels, it is impossible to administer a full factorial design. We use the sofware NGene to create an unlabeled, d-efficient experimental design. For this purpose, we define priors about the direction of the effects. We assume that households prefer a recommendation ("Yes"), availability of the seller "as desired", and offers "with invoice (incl. VAT)." Furthermore, we expect that higher prices are less likely to be selected.

For the generation of the choice sets, we add several constraints. First, we restrict prices of offers without invoice to range between 225€and 330€, and prices of offers with invoice to range between 270€and 375€. We introduce this constraint as prices with invoice are generally higher than prices without invoice. However, introducing the restriction that the price of offers with invoice is necessarily higher than the price without invoice would have been unrealistic. In addition, it would have been impossible to derive independent estimates for the attributes price and type of offer. Second, we exclude combinations in which one offer is clearly dominated. Given our expectation with regard to households' preferences regarding the four attributes, an offer is dominated when the seller has been recommended and is available as desired, when the offer is with invoice and the price is lower than the alternative. It is also dominated if only one dimension is better and the remaining dimensions are equal in both offers. Third, in combinations where both offers are with or without invoice respectively, we require that at least one of the attributes recommendation and availability is different.

The generation of our design resulted in ten blocks of seven choice tasks, i.e., 70 choice tasks in total. In each choice task, subjects have to choose one of two offers. They cannot accept or reject both. Each participant was randomly assigned one block of seven pairs. Previous literature shows that respondents can complete even more choice tasks before the response quality decreases (e.g., Bansak et al., 2018). Note that subjects read our treatment texts between the instructions and before they enter their choices in the discrete choice experiment. This implies that we run the same discrete choice experiment in each treatment, which allows us to compare the willingness to accept an offer with invoice and to pay a premium for an invoice across the different treatments, i.e. policy scenarios (see Section 2.5 for details of the analysis).

2.3 Tax credit schemes (Treatments)

We randomly assign participants to one of three treatments in a between-subjects design. Each treatment consists of a description of one of three different policy scenarios. The policy scenarios represent different implementations of tax credits that aim to incentivize households to demand legally provided services. The information about the specific tax credit is provided on a separate screen after the instructions and before participants enter the decision stage of the discrete choice experiment. To ensure that they consider the tax credit scheme in their decisions, a short description is additionally displayed above every choice set. Thus, we minimize the chance that lack of information is a possible reason for the ineffectiveness of the policy scenarios.

In our *No Tax Credit treatment*, there is no tax credit for the use of household services. Since some participants may be aware of the German tax credit scheme, we explicitly stress *"Please assume that there is no government support when you demand services in the household."*

In our tax credit treatments, we vary the timing of awarding tax credits and the actions that the household has to take to obtain the credit. Tax credits usually only apply to labor costs, include a maximum amount that can be claimed, can only be obtained when the payment is made via bank transfer, and are only available to households that pay taxes (e.g., OECD, 2021; Harju et al., 2021). We decided to abstract from these and other features of tax credits.

In the *Tax credit Via Tax Return* treatment, we design a tax credit that is granted to households via their annual income tax declaration, as implemented, e.g., in Belgium, France, Germany, and Italy. The information briefly summarizes the main features of the scheme: *"Please assume that there is government support when you commission services in the household. You can get a refund of 20 percent of the offer price if you choose an offer with invoice. For this purpose, you have to declare the service in your income tax declaration. Your tax payment then decreases by 20 percent of the price of the offer. You receive the refund as reduced tax payment usually in the following year."* We choose a reduction of 20 percent, which is the same rate as in Germany. The rate is higher in several countries (e.g., 50%), however, assuming that participants have also other features of the German tax system in mind when making their choices (e.g., that the tax credit relates to the value added tax, which is 19% in Germany), we decided to focus on the German rate. Note that in both treatments with tax credits, as in reality, participants have to compute the price including the tax credit on their own. To obtain the tax

credit granted via the tax return, households need to claim the service in their tax declaration, i.e., they have to remember to report the amounts. An important feature is that the tax credit entails a time lag between the payment of the service and the receipt of the refund. Households that declare their taxes in the following year (which they have to according to law, except when they ask for an extension or employ a tax advisor), will receive the refund after the tax authority has assessed the tax declaration, which should in most cases also be the following year.

In the *Tax Credit At Source* treatment, we design a tax credit that is granted to households "at source" , i.e., at the time of service consumption. Such a tax credit exists, e.g., in Sweden. The text of the treatment is as follows: *"Please assume that there is government support when you commission services in the household. You can get a refund of 20 percent of the offer price if you choose an offer with invoice. For this purpose, you have to inform the seller that you want to use the government support. The seller then decreases the price of the offer by 20 percent and handles the settlement with the tax authority. You will receive the refund immediately as a reduced price."* The seller deducts the amount of the tax credit from the consumer's bill and claims the corresponding amount from the tax authority. In reality, households have to ensure that they have not yet used the maximum amount and their tax payment is high enough. However, we abstract from these details and focus on the action the household has to take to obtain the tax credit, namely informing the supplier that they want to use the subsidy.

2.4 Hypotheses

We examine the impact of the two tax credits on consumers' decisions to choose an offer with invoice. We focus on two outcomes: the probability to choose an offer with invoice and the premium households are willing to pay for offers with invoice. For this purpose, we compare behavior in the two tax credit treatments to the treatment without tax credit and to each other.

When an offer includes an invoice it is usually more expensive than an offer without invoice, i.a., as due taxes have to be paid (mainly the VAT but also, e.g., seller's income tax or social security contributions). However, offers without an invoice are related, e.g., to the possibility of detection and sanctioning, may cause lying costs, and prevent households to obtain a guarantee. Thus, holding other attributes of the offer constant, we expect that consumers are willing to pay a price premium for the declaration. We define this premium as the ratio of the price with (p_I) and without (p_{NI}) invoice $\Delta p = p_I/p_{NI}$. In a scenario without tax credit (no t.c.), we expect consumers to prefer an offer with invoice as long as the willingness to pay a premium for an invoice (WTP_i) exceeds the price premium that sellers demand for issuing an invoice,

$$P(I = 1) = Pr(WTP_{\text{no t.c.}} > \frac{p_I}{p_{NI}}). \tag{1}$$

We expect that the probability of choosing an offer with invoice increases when a tax credit exists. The tax credit reduces the final price of a service with invoice by r=20% such that $p_{IT} = p_I*(1–0.2)$. In other words, the price of an offer with invoice can be 25% higher (1/(1–0.2)) to be even with the price of an offer without invoice. Yet, it is possible that households consider hassle costs h from itemizing the deduction (Benzarti, 2020), costs related to the timing d, or

perceive other costs related to obtaining the credit ω.[8] This could imply that the perceived price reduction $\tilde{r}(r, h, d, \omega)$ is less than the rate r, with $\frac{\delta\tilde{r}}{\delta r} > 1$ and $\frac{\delta\tilde{r}}{\delta h}, \frac{\delta\tilde{r}}{\delta d}, \frac{\delta\tilde{r}}{\delta\omega} < 1$. However, it is also possible that taxpayers perceive the tax credit as a signal from the government that it disapproves the non-declaration of services (e.g., Swedish Tax Agency, 2011; Doerr and Necker, 2021). This could increase lying costs l and we would have $\tilde{r}(r, h, d, \omega, l)$ with $\frac{\delta\tilde{r}}{\delta l} > 1$. We expect that consumers prefer an offer with invoice as long as the premium for an invoice is smaller than the willingness to pay without tax credit $WTP_{\text{no t.c.}}$ times the perceived price reduction,

$$P(I = 1) = Pr(WTP_{\text{no t.c.}} * \frac{1}{(1 - \tilde{r})} > \frac{p_I}{p_{NI}}) = Pr(WTP_{\text{with t.c.}} > \frac{p_I}{p_{NI}}). \quad (2)$$

If households ignore costs related to obtaining the tax credit (and $l = 0$), i.e., $\tilde{r} = r$, in our setting, the WTP should increase by the factor 1.25 due to the tax credits.[9] This also implies that the probability that a consumer chooses an offer with invoice increases - the magnitude of the increase depends on the probability distribution. Yet, if households consider costs of obtaining the tax credit, we have $\tilde{r} < r$ and the WTP should increase by less than 1.25. On the other hand, if the tax credits increase lying costs, the WTP could increase by more than 1.25.

In our experiment, we vary the timing of awarding tax credits and the actions that the household has to take to obtain the credits. These details may cause differences in the effects of the two tax credits and allow us to assess the importance of costs related to obtaining the tax credits. For two reasons, we hypothesize that the tax credit granted at source is perceived as more valuable than the tax credit claimed via the tax return, i.e., $\tilde{r}_{at\ source} > \tilde{r}_{tax\ return}$.

First, the tax credit claimed via the tax return should be related to a lower $\tilde{r}$ due to the time delay with which the refund is received. Liquidity constraint individuals may not be able to afford the higher prices of offers with invoice (e.g., OECD, 2021). Individuals without liquidity constraints may discount the legal price reduction when the tax credit is granted via the tax return. Since the price reduction is immediately received under the tax credit granted at source, we expect that $d_{at\ source} < d_{tax\ return}$.

Second, when the tax credit is obtained via the tax return, households have to remember to report the amounts, keep the invoice, and enter the information in their tax declaration. Although the procedure is intentionally kept simple (e.g., German households do not even have to submit invoices), it may cause hassle costs from itemizing. Previous literature shows that the compliance costs of taxation are large and taxpayers frequently leave "money on the table" (e.g., Benzarti, 2020). Since obtaining the tax credit granted at source is less demanding, as the seller handles the settlement with the tax authority, we expect that $h_{at\ source} < h_{tax\ return}$.

[8] Other costs could arise, e.g., due to the need to calculate the difference, as discussed in Section 4.

[9] Note that it is impossible to obtain the increase of the WTP in percent ($\frac{WTP_{\text{with t.c.}} - WTP_{\text{no t.c.}}}{WTP_{\text{no t.c.}}}$) by subtracting one from the ratio, as the base= $WTP_{\text{no t.c.}}$ has to be considered. For example, those who were not willing to pay a premium at all without tax credit ($WTP_{\text{no t.c.}=1}$), should be willing to pay a premium of 25% with tax credit ($WTP_{\text{with t.c.}} = 1.25$). However, those who were willing to pay a premium of 25% without a tax credit ($WTP_{\text{no t.c.}} = 1.25$) should be willing to pay a premium of 56,25% with tax credit ($WTP_{\text{with t.c.}} = 1.5625$).

2.5 Econometric framework

We estimate the WTP and the probability of choosing an offer with invoice with a discrete choice experiment. Discrete choice experiments draw their theoretical foundation from random utility theory (McFadden, 1986), which allows us to estimate individuals' utility from offers j and the attributes they are composed of. The utility individual n obtains from choosing alternative j is given by $U_{nj} = v(x_{nj}) + \epsilon_{nj}$, where v_{nj} is a function of observable attributes x_nj, and ϵ_{nj} is unknown and treated as random. Individuals choose the alternative j from choice set t that gives them the highest utility. The probability that individual n prefers alternative j over all alternatives i in choice set t is described by

$$P_{ni} = Pr(\epsilon_{nj} - \epsilon_{ni} < v_{ni} - v_{nj}) \forall j \neq i. \tag{3}$$

We estimate the probability that individual n chooses offer i with a mixed logit model. This model has been developed to analyze choices individuals make when they face multiple different choice situations. Standard models (e.g., conditional logit) assume homogeneous preferences of decision-makers. However, individuals' preferences affect all seven choices that they make, wherefore their single choices cannot be treated as independent observations. Mixed logit models allow coefficients, i.e. preferences, to vary across individuals thereby incorporating unique preferences and unobservable characteristics that determine their choice behaviour. It therefore accounts for the panel structure of our data that we obtain by individuals making several decisions in the discrete choice experiment (Hole, 2007). The mixed logit choice probability that individual n chooses alternative i over alternative j is

$$P_{ni} = \int \frac{exp(x'_{ni}\beta)}{\sum_{j=1}^{J} exp(x'_{nj}\beta)} f(\beta|\theta)d\beta \tag{4}$$

where the coeffiecients, or preferences, for each attribute x_{ni} vary over individuals with the density funtion $f(\beta|\theta)d\beta$ and θ descibes the assumed to be normal distribution of the mean and variance of individuals' coefficients. This feature deliniates the mixed logit model from other logit models that assume that β is the same for all individuals.

Observing individuals making choices in multiple choice situations T between various offers J, the probability of a particular sequence of choices is given by

$$S_n = \int \prod_{t=1}^{T} \prod_{j=1}^{J} \left[\frac{exp(x'_{njt}\beta)}{\sum_{j=1}^{J} exp(x'_{njt}\beta)} \right]^{y_{njt}} f(\beta|\theta)d\beta, \tag{5}$$

with $y_{njt} = 1$ if the individual choses alternative j in choice situation t and 0 otherwise.[10] The parameters β can be estimated using a standard maximum likelihood model. The ratio between the parameter estimates of two attributes yields the marginal rate of substitution (MRS) between them. As we include the price of the service as one attribute x_p, the marginal rate of substitution

[10] Note, that in our case, the individuals make choices in seven choice situation (T=7) and they choose between two alternatives (J=2).

between the attribute k and the coefficient on the price (entered as a linear variable into the model) gives the willingness to pay for attribute k,

$$MRS = WTP_k = \frac{\delta U/\delta x_k}{\delta U/\delta x_p} = \beta_k/\beta_p. \tag{6}$$

Furthermore, we use the estimated parameters to calculate the marginal effects. Thereby, we predict by how much the probability that individual n chooses alternative i changes when the level of attribute x_k switches from 0 to 1. For the invoice attribute, the marginal effect gives the probability that alternative i is chosen when it is an offer with invoice. Using Bayes Law, we can translate this marginal effect into the probability that a selected alternative is with invoice. We estimate treatment effects by computing the differences of the WTPs and probabilities between the different treatment groups in absolute and relative terms. The inference is based on the standard errors of the estimated treatment effects obtained by nonparametric bootstrapping (sampling individual observations with replacement) with 499 replications.

2.6 Sample characteristics

Our experimental sample consists of 670 individuals. To assess the representativeness of our sample with regard to the population of home-owners in Germany, we compare the characteristics of respondents in our sample to the ones in the most recent wave of the German Socio-Economic Panel (SOEP), as shown in Table 2. Table A.1 in the Appendix shows that the characteristics of our sample are largely balanced across treatments.

Table 2: Summary statistics of the experimental sample and representativeness

	Experimental sample		German home-owner	
	Mean (1)	SD (2)	Mean (3)	SD (4)
Age in years	54.24	(12.68)	54.68	(17.628)
Female	0.528	(0.500)	0.501	(0.500)
East-Germany	0.136	(0.343)	0.147	(0.364)
Education				
Secondary schooling	0.301	(0.459)	0.109	(0.313)
Post-secondary training	0.503	(0.500)	0.613	(0.487)
Academic degree	0.196	(0.397)	0.260	(0.439)
Household income (net)				
<= 2,000 €	0.221	(0.400)	0.249	(0.432)
2,001 € – 3,000 €	0.289	(0.439)	0.246	(0.431)
3,001 € – 4,000 €	0.244	(0.415)	0.216	(0.412)
4,001 € – 5,000 €	0.150	(0.343)	0.145	(0.349)
>= 5,001 €	0.096	(0.386)	0.148	(0.355)
Num. of observations	670		16.661	

Note: Columns (3) - (4) are based on the SOEP from 2019 (v36), home-owners are identified with the respective SOEP question, we include all adult individuals living in Germany. Estimates are computed using weights to adjust for non-response in the SOEP. 9.6% of subjects did not answer the income question in our sample, this fraction amounts to 6.64% in the SOEP homeowner sample.

In our sample, 53% of respondents are female. Subjects are 54 years old on average. The share of respondents living in East Germany is 14%. Regarding their educational background we find that half of our sample did a post-secondary training within the German apprenticeship system; 30% of respondents are relatively low-educated holding an elementary- or secondary-schooling degree. The remaining 20% hold an academic degree. With regard to the net household income, 22% report that they earned less than 2,000 Euro, 29% between 2,001 and 3,000 Euro, 24% between 3,001 and 4,000 Euro, 15% between 4,001 and 5000 Euro and 10% that they earned more than 5,001 Euro per month. Our sample is very similar to the SOEP home-owner sample of 2019 in terms of age, and regional composition. The distribution of incomes also largely resembles the distribution in the sample of German home owners. However, we find non-negligible differences in the distribution of educational degrees. Respondents with a low education are overrepresented in our sample, implying that the other categories are underrepresented.

Our questionnaire also shows that a large fraction of our participants has experience with decisions and tasks relevant for our study. About two-thirds report that they have consumed household services in the last three years. Four of five participants are aware of the German household tax credit, 70% of which say that they have used it in the past (see Table A.2). Almost all subjects are fully (34%) or partially (63%) responsible for the decisions in the household. While 46% make their tax declaration independently, 12% do it jointly with someone else.

3 Results

3.1 Average preferences and willingness to pay

We start analyzing the choice experiment using mixed logistic regressions. We regress the four attributes of each offer in a choice set on a dummy variable indicating if the respective offer was selected. Three of the four attributes are dummy variables. The fourth attribute, the price, is included as logarithm, which allows us to interpret the willingness to pay in percent and compare it to the rate of the tax credit.[11] As each policy scenario (treatment) is administered as an own discrete choice experiment, we run separate regressions for each treatment group and derive treatment-specific coefficients, marginal effects, and willingness to pay for each attribute.

We present the results of these models in Table 3. The coefficients can be interpreted as preference weights indicating the relative contribution of each attribute to the overall evaluation of an alternative. While absolute values do not have a meaningful interpretation, they may be compared with other preference weights of the same model or across models (Hauber et al., 2016). The marginal effects (ME) of the variables indicate by how much the probability of choosing an offer changes if the attribute level changes from zero to one for the binary attributes. For the price attribute it indicates by how much the probability of choosing an offer changes if the price increases by one percent. Note that the marginal effects of the invoice attribute can be interpreted as the change in the probability that an offer with invoice is chosen.[12] The

[11] The results are unchanged when we run models in which we include the price in Euro.

[12] Following Bayes Law, we multiply the marginal effect with the probability that an offer is with invoice (which is the case in 49% of the offers) and divide it by the probability that an offer is chosen (which is exactly 50%

Table 3: Mixed logit estimates, marginal effects, and willingness to pay

	No tax credit			Tax credit via tax return			Tax credit at source		
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
	Coeff.	ME	WTP	Coeff.	ME	WTP	Coeff.	ME	WTP
With invoice	2.959	0.343	0.265	4.278	0.477	0.377	4.234	0.454	0.346
	(0.329)	(0.055)	(0.041)	(0.374)	(0.069)	(0.051)	(0.405)	(0.068)	(0.049)
Recommended	0.775	0.072	0.069	1.232	0.110	0.108	0.482	0.042	0.039
	(0.174)	(0.020)	(0.021)	(0.190)	(0.024)	(0.023)	(0.152)	(0.017)	(0.015)
Available	1.352	0.129	0.121	0.792	0.073	0.070	1.119	0.098	0.091
	(0.172)	(0.023)	(0.021)	(0.145)	(0.018)	(0.017)	(0.161)	(0.022)	(0.018)
Log Price	-11.159	-0.010	–	-11.359	-0.009	–	-12.239	-0.009	–
	(0.935)	–	–	(0.926)	–	–	(1.018)	–	–
Offers		3,136			3,150			3,094	
Decisions		1,568			1,575			1,547	
Respondents		224			225			221	

Note: Estimates from mixed logit models for each treatment. Omitted categories are "no recommendation", "Available with waiting time", and offer "without invoice" respectively. The price is included as log. Marginal effects (ME) are calculated as the difference in the probability that an offer is chosen if the attributes value changes from 0 to 1 for the binary coded attributes. The willingness to pay (WTP) is the marginal rate of substitution between the binary attributes and the price. It is calculates by dividing the coefficient of each attribute by the coefficient of the log price. Since the price enters the model as logarithm, the WTP can be interpreted in percent.

willingness to pay (WTP) is calculated by dividing the coefficient of the respective attribute with the coefficient of the price attribute. The WTP indicates the relative increase in the price a household is willing to pay for that attribute.

All coefficients are highly significant in all treatment groups, and the signs of the coefficients are consistent with our expectations. An invoice, a recommendation by an acquaintance, and the availability of the seller as desired have significant and positive effects on the evaluation of offers. As expected, the coefficients on the price are negative as consumers prefer lower prices holding the other attributes constant. Compared to the other binary attributes, whether or not the offer includes an invoice is the most important determinant of respondents' decisions.

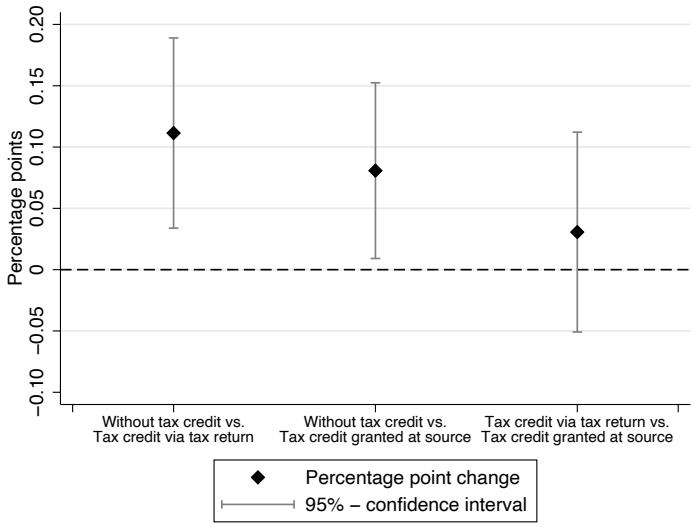
We use these estimates to compare behavior across our three policy scenarios. In a setting without tax credit, consumers are willing to pay a premium of up to 27% if the service is delivered with invoice. When a tax credit is available the WTP increases to 38% when it is granted via the tax return and to 35% when it is granted at source. We observe the same pattern for the probability of choosing an invoice. Without a tax credit, the probability that a consumer chooses an offer increases by 34 percentage points when it includes an invoice. This effect is 48 (via tax return) and 45 (granted at source) percentage points when consumers have the possibility to claim a tax credit for the service. For the remaining attributes, the effects and WTP tend to be lower with a tax credit, but do not systematically vary across treatments.

To examine if the WTP and probability of choosing an invoice significantly vary across treatments, we calculate the differences of the marginal effects and the WTPs across treatments. As shown in Figure 1a, compared to the scenario without a tax credit, a tax credit via tax return

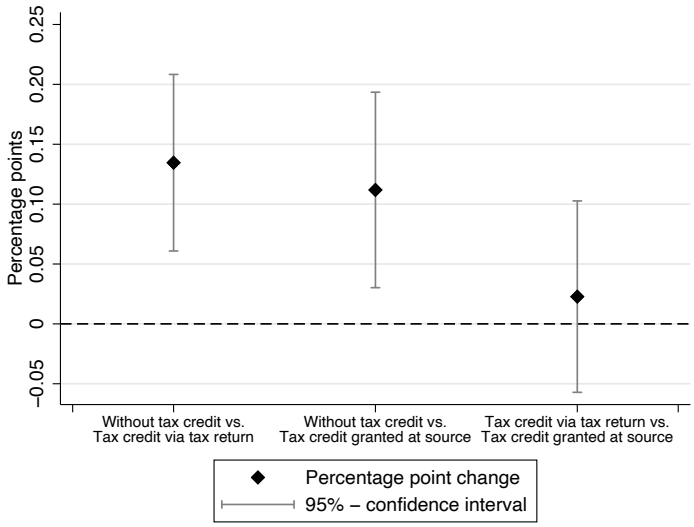
in our experiment). Since both probabilities are (almost) 50% the marginal effects are equal to the probability that the consumer choose an offer with invoice.

Figure 1: Differences across treatments

(a) WTP for an invoice



(b) Probability of choosing invoice



Note – The points show the treatment effects calculated as difference between the probabilities to choose an invoice offer and the WTPs for an invoice between the treatment groups with tax credits and the baseline scenario as well between the two tax credits. The treatment effects are shown in percentage points. Standard errors are obtained by bootstrapping with 499 replications.

increases the WTP by 11 percentage points, while this increase amounts to 8 percentage points for a tax credit granted at source. Both differences are significant. As outlined in Section 2.5, we would expect that the WTP increases by the factor 1.25 if individuals ignore costs related to obtaining the tax credit and the tax credit is not perceived as a governmental signal for compliance. Since the WTP in the baseline treatment without tax credit is 27% this would imply that individuals would be willing to pay a premium of 58% when a tax credit exists (increase by 31.6 percentage points). Hence, the observed increases are about or even less than one third of what one would expect if individuals would fully factor in the tax credit. There is no significant difference in the WTP between the two types of tax credit, suggesting that the timing of the refund and the effort to claim it do not influence behavior towards tax credits.

The changes in the WTP are reflected in changes of the probability to choose an offer with invoice (see Figure 1b). The probability that an offer with invoice is chosen increases by 13 percentage points when the tax credit is reimbursed via tax return and by 11 percentage points when the tax credit is granted at source. Considering that in our experiment in the treatment without tax credit an offer with invoice was selected in 54% of choices, a tax credit increases this rate by more than 20%. We do not find a significant difference between the two tax credits.

3.2 Probability of choosing an invoice across price premiums

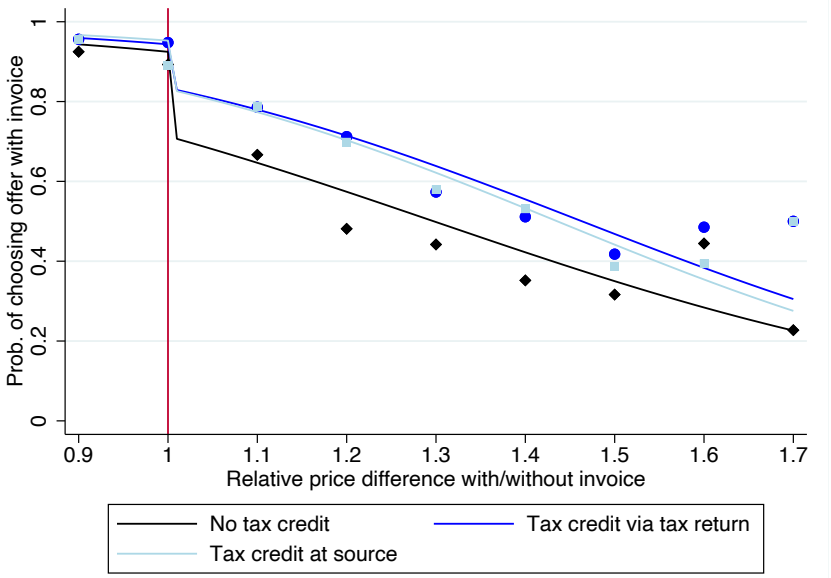
In Section 3.1, we present the results averaged over all price differences between the two offers of a choice set. However, the effects of the tax credits might vary with the price premium the consumer has to pay for an invoice. To analyze the effects over the distribution of price premiums, we collapse the data to one observation per choice set. We restrict our analysis to choice sets where participants needed to select between one offer with invoice and one offer without invoice.[13] For each choice set, we construct a dummy variable indicating if the selected offer includes an invoice and one variable reflecting the price ratio between the offers.

In Figure 2, we provide a nonparametric and parametric summary of the data over different price premiums. First, we plot the raw fraction of choice sets in which respondents choose the offer with invoice against the price ratio p_I/p_{NI} of the offer with and without invoice for each treatment group. Second, we add the logit maximum likelihood fits for each treatment group. We include a dummy for choice tasks in which the relative price difference is smaller or equal to one to account for the shift in probabilities in the raw data in this region. These curves can be interpreted as the cumulative density functions of the treatment-specific WTP distributions.

In all policy scenarios, we find a clear negative relationship between the price premium for an offer with invoice and the probability that this kind of offer is chosen. Interestingly, when the price with and without invoice is equal, as indicated by a price ratio of one, the share of choice sets in which respondents chose the offer with invoice is close to but slightly lower than one. Without tax credit, in 9% of the decisions, respondents choose an offer without invoice although the price with invoice is lower. With a tax credit the corresponding numbers are 5% (via tax return) and 8% (granted at source). An explanation for this finding is that also the

[13] I.e., 6 of the 70 choice sets (9% of sample) with two invoice offers or two offers without invoice.

Figure 2: Probability of choosing an offer with invoice over distribution of price premiums



Note: The points show the fraction of choices in which the respondents chose the service offer with invoice at each price premium for an invoice offer by treatment group. It is based on 4,290 choices made by the respondents (1,434 choices in the baseline scenario, 1,440 choices in the scenario with tax credit via tax return, and 1,416 choices in the scenario with a tax credit granted at source). The price premiums are calculated as ratios between offer with invoice and offer without invoice. The maximum likelihood fits are estimated with logistic regression on the choice task level for each treatment group.

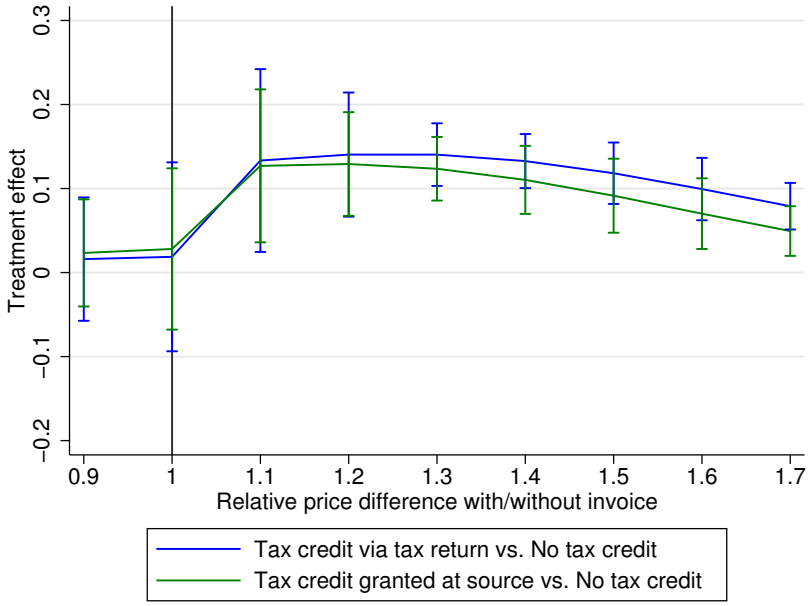
other attributes of the offer matter for participants' choices (see Table 3). It is also possible that some participants prefer offers without invoice for reasons not captured by our experiment.

To examine the differences across policy scenarios, we calculate the differences in the cumulative density functions across baseline and each of the two tax credits. As shown in Figure 3, when the price premium for an offer with invoice is positive, both types of tax credits significantly increase the probability that consumers choose the offer with invoice. The treatment effects amounts to 12-14 percentage points for price premiums between 10% and 30%. For higher price premiums the treatment effects decrease, but remain significantly positive in both types of tax credits. The decreasing pattern at higher price premiums is plausible as the share of the premium that is compensated by the tax credit decreases with the price difference. The treatment effects of a tax credit via tax return are significantly higher in the region of medium and large price premiums compared to the effects of the tax credit at source. Interestingly, the tax credit does not shift the behavior of those who choose an offer without invoice when the price ratio is less than or equal to one. They seem to have a strong preference for without invoice.

3.3 Heterogeneity in willingness to pay

To learn more about the reasons for the established effects, we examine how the WTP varies with individual characteristics. We find similiar patterns of behavior when we observe WTP by income and education. The same holds for analyses by self-reported patience, risk aversion

Figure 3: Treatment effects over distribution of price premiums



Note: The blue line shows the difference in the probability to choose an offer with invoice between the treatment group without tax credit and the group that was assigned to the scenario of a tax credit via tax return. It is based on 4,290 choices made by the respondents (1,434 choices in the baseline scenario, 1,440 choices in the scenario with tax credit via tax return, and 1,416 choices in the scenario with a tax credit granted at source). The green line shows the difference between the no tax credit treatment and the tax credit granted at source. Both differences are calculated as difference in the cumulative distributions of the treatment groups at different price premiums. The vertical lines present the 95% confidence interval at different price premiums. The standard errors used to calculated the confidence intervals are bootstrapped with 499 replications (sampling with replacement).

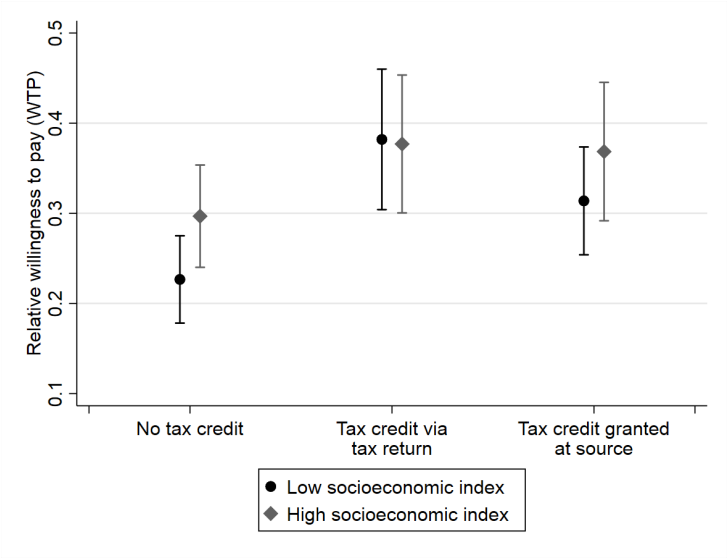
and tax morale. We combine the information of these variables into two indices using principal component analyses. First, we create an index of the socio-economic status using income and education. Individuals with a high socio-economic index value (high status) tend to have higher educational degrees and higher incomes compared to individuals with low socio-economic index values (low status). Second, we create an indicator of subjects' prudence using self-reported risk aversion, tax morale, and patience. Individuals with high prudence tend to be more patient, have higher tax morale, and are more risk averse than individuals with low prudence (see Figure A.1 in the Appendix for the distribution of the variables over the two indices).[14]

To study if the effect of the tax credits varies with the socio-economic status and prudence, we estimate the WTP for each group in each treatment (see Figure 4). Figure 4a shows that individuals with a high socio-economic status have a higher WTP for offers with invoice when no tax credit is in place. Their WTP increases by about 8 percentage points for both types of tax credits. In contrast, individuals with a low socio-economic status react differently to the two tax credits. The increase in the WTP is stronger when the tax credit is claimed via the tax return (considering the lower baseline WTP). While the tax credit via tax return increases their

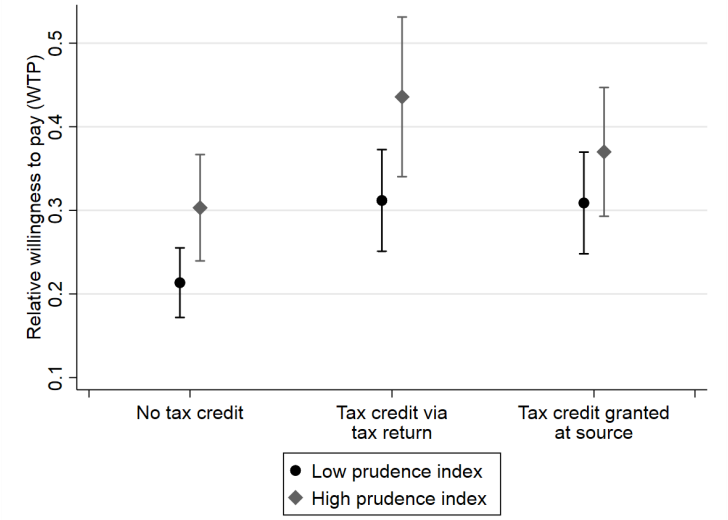
[14] We classify individuals as having "low" or "high" values of the respective variable when they indicate a value below or above the mean value of that variable respectively.

Figure 4: WTP by socio-economic status and prudence

(a) By socio-economic status



(b) By prudence



Note: The points show the relative WTP in the treatments by values on the socio-economic and prudence indices. Standard errors are obtained by bootstrapping with 499 replications.

WTP by 15 percentage points, the increase of WTP when the tax credit is granted at source is only 9 percentage points. This suggests that the finding that the effect of the tax credit via tax return is slightly but insignificantly higher is driven by individuals with low socio-economic status. The pattern is the same for income and eduction (see Figure x in the Appendix). To the extent that low income and eduction represent liquidity-constraints, this result conflicts with our expectation that these individuals should prefer the tax credit granted at source.

Figure 4b shows that individuals with high prudence have a higher WTP for offers with invoice in all policy scenarios. This result is plausible as high risk aversion and tax morale should prevent individuals from demanding illegally provided services. With regard to the effect of tax credits, while individuals with low prudence do not seem to differentiate between the two tax credits, highly prudent individuals value the tax credit via tax return higher than the tax credit at source. The latter group's WTP for an offer with invoice increases by 13 percentage points when the tax credit is granted via the tax return, and by 7 percentage points when it is granted at source. In Figure A.2, we report the results separately for risk aversion, tax morale, and patience. We find similar patterns for all three variables. A possible explanation is that highly prudent individuals perceive a loss of control when the tax credit is granted at source.

One could argue that our results are affected by participants' familiarity with the German tax credit. We examine if participants reporting to know the German tax credit (80%) behave differently than those who say that say they do not know it, see Figure A.3a. We find that those who know the German tax credit have a higher WTP in the scenario without tax credit, suggesting that knowledge of the tax credit reflects higher tax morale (selection effects). The pattern that the tax credit granted at source is slightly prefered over the tax credit claimed via the tax return is mainly observed among those who do not know the tax credit, suggesting that this pattern cannot be explained by familiarity with the German tax system. As described in Section 2.2, we find that only 75% of the sample are aware (or willing to admit) that in an offer without invoice due taxes are not paid. We examine if behavior varies with this perception. Figure A.3b shows the those who do not understand that offers without invoice are illegal have a lower WTP, suggesting that this variable is potentially endogenous, as those who choose offers without invoice have an incentive to claim that this behavior is legal. Interestingly, we find that this group reacts more strongly to the tax credits. The pattern that the tax credit granted at source tends to be less effective seems to be driven primarily by this group.

3.4 Possible mechanisms

To disentangle the mechanisms behind subjects' behavior towards tax credits, we inquire to what extent the existence of tax credits changes the perception of the financial attractiveness of offers without invoice relative to offers with invoice and the justifiability to accept an offer without an invoice. We ask participants in all three policy scenarios to think about the situation in which they just made decisions and to assess their agreement with two statements inquiring financial attractiveness and justifiability on a scale from "fully disagree" to "fully agree."

Figure 5 (a) shows that both types of tax credits lead to a decrease of the financial attractive-

ness of offers without invoice. Whereas 72% agree that offers without invoice are more attractive than offers with invoice in the scenario without tax credit, this fraction decreases to 48% when the tax credit is claimed via the tax return and 45% when the tax credit is granted at source. According to Kolmogorov-Smirnov tests, the distribution is statistically different between the treatments with and without tax credit but not across the treatments with tax credits. In contrast, Figure 5 (b) shows that tax credits do not affect the justifiability of accepting an offer without invoice (no differences according to Kolmogorov-Smirnov tests). Interestingly, across all three policy scenarios with about 45% the largest fraction thinks that in the decision-making situation we sketch in the experiment it is justifiable to accept an offer without invoice.

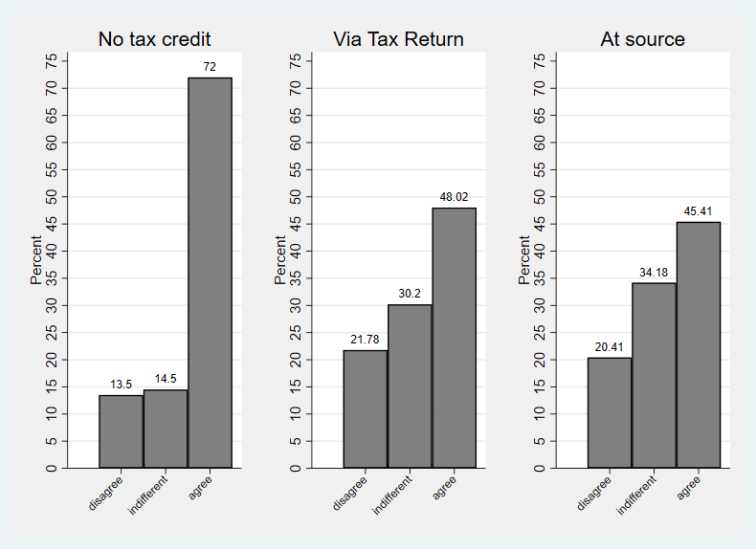
To examine to what extent the two dimensions - 1) timing of awarding tax credits, 2) the actions households have to take - influence differences across the two types of tax credits, we ask participants in hypothetical scenarios how their behavior would change if one of the dimensions would change. We ask half of the subjects assigned to the tax credit via tax return treatment how their behavior would change if they received the government funding not as reduced tax payment but as a price reduction immediately. As shown in Figure 6 (a), 31% report that this would not change their behavior, 64% say that their willingness to choose an offer with invoice would increase. The other half of subjects are asked how their behavior would change if they did not have to report the transaction in their tax return but have to ask the seller. While 44% are indifferent to this change, 50% report that this would increase their willingness to choose an offer with invoice. About 5% each say that the changes would decrease their willingness to choose an offer with invoice. Hence, the tax credit granted at source tends to be perceived as more attractive, in particular, as the price reduction is received earlier.

Half of the subjects in the tax credit granted at source are asked what they would do if the government funding would not be paid as a price reduction immediately but as reduced tax payment in the subsequent year. As shown in Figure 6 (b), 47% report that this would not change their willingness to choose an offer with invoice, while 36% report that this would decrease their willingness. Surprisingly, 17% say that this would increase their willingness to choose an offer with invoice. The other 50% of subjects are asked about the effect of a change from having to ask the seller to having to report in the tax return. While 42% say that this would not affect their choices, 38% say that this would increase the attractiveness of offers with invoice. However, again a remarkable fraction of 20% reports that for them the attractiveness of offers with invoice increases. It seems that for some unexpected reasons the features of the tax credit granted at source are inferior to a non-negligible fraction of our sample.

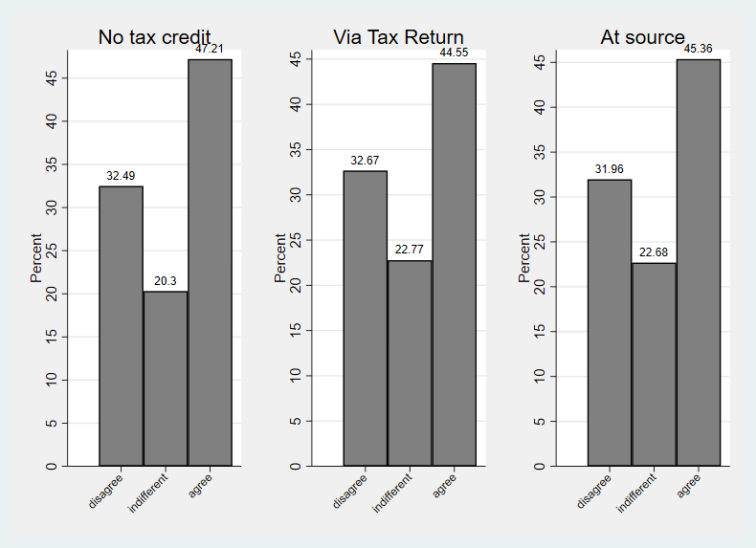
Finally, we ask participants in the no tax credit treatment to assess their change of behavior when the government would introduce a tax credit claimed via tax return or granted at source (participants randomly assigned to one condition). As shown in Figure 7, in both conditions, about a quarter say that this would not affect their willingness to choose an offer with invoice. The fraction reporting that their willingness would increase is similar in both conditions.

Figure 5: Financial attractiveness vs. justifiability

(a) Offer without invoice financially more attractive?



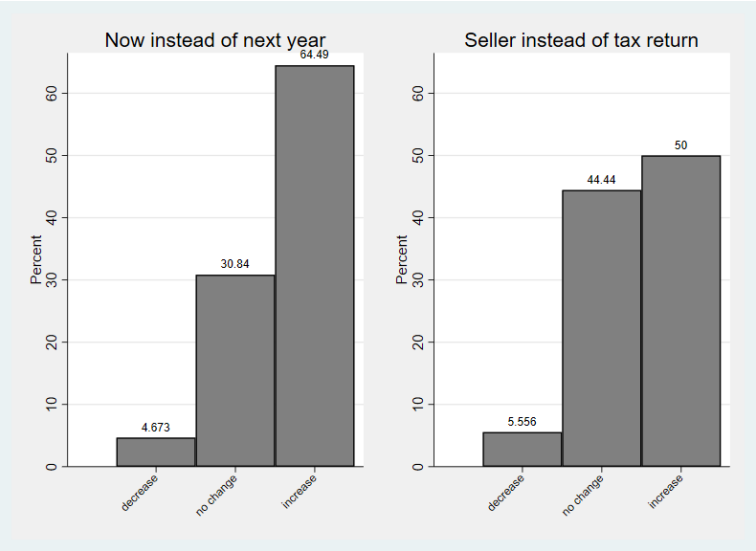
(b) Accepting offer without invoice justifiable?



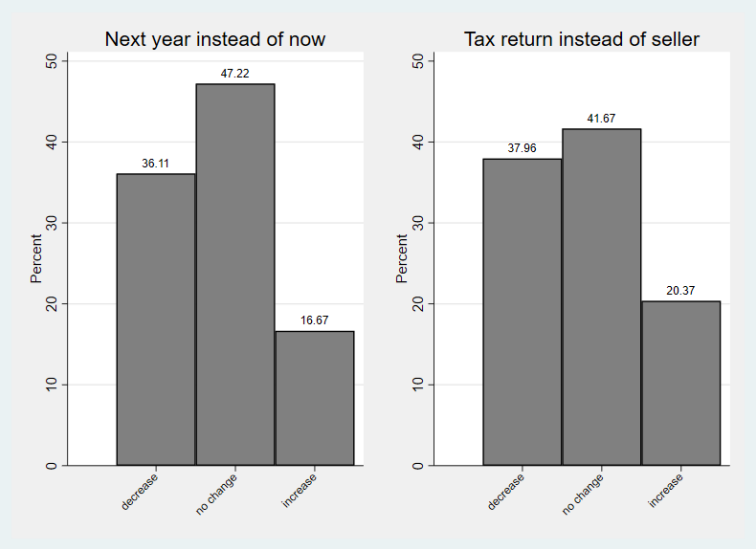
Note: Justifiability based on 593, attractiveness based on 598 observations (64 subjects participating after the launch of the experiment received a slightly different wording which seems to have caused confusion, 1-2% report that they "Do not know." To simplify the exposition, we report the fractions of those who agree (values 1-3), are indifferent (value 4), and disagree (values 5-7).

Figure 6: Timing vs. actions

(a) From via tax return to at source

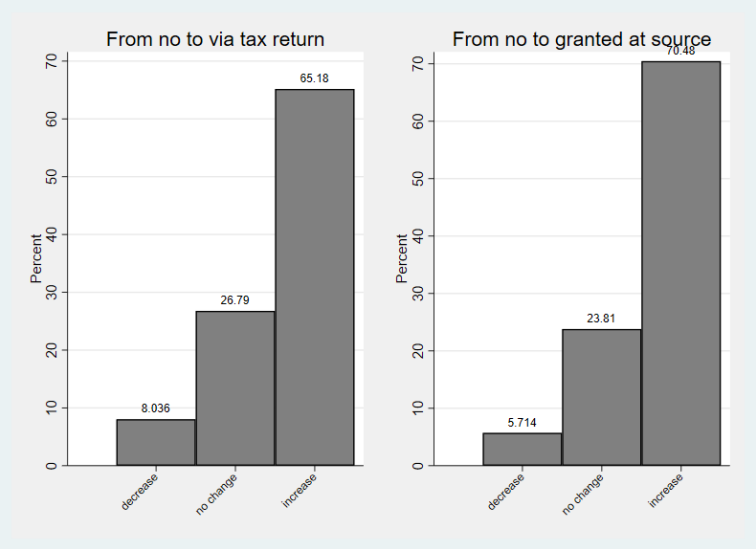


(b) From at source to via tax return



Note: Subfigure a based on 107 and 108 obs, subfigure b on 110 and 111 obs. Percentages calculated ignoring 2-5% reporting that they "Do not know." To simplify the exposition, we report the fractions of those who agree (values 1-3), are indifferent (value 4), and disagree (values 5-7).

Figure 7: From no tax credit to tax credit



Note: Reported are answers to the question "How would this change your willingness to choose an offer with invoice?" To simplify the exposition, we report the fractions of those who agree (values 1-3), are indifferent (value 4), and disagree (values 5-7). Based on 112 and 105 obs. Percentages calculated ignoring 3-4% reporting that they "Do not know."

4 Discussion and conclusion

Several countries aim to increase the likelihood that household services are declared to public authorities by introducing monetary incentives for consumers. It is important to understand if and when these instruments are effective in combating tax evasion. We focus on household tax credits and examine if they are able to induce households to demand legally provided services.

We find that the tax credit granted at source and the tax credit claimed via the annual tax return increase the likelihood that households choose an offer with invoice and their willingness to pay a premium to receive an invoice. In contrast to our expectations, we do not find significant differences between the two tax credits. Supporting this finding, our follow-up survey shows that the perceived increase in the financial attractiveness of offers with invoice is the same under both tax credits, compared to a scenario without tax credit. Although participants slightly prefer the tax credit granted at source when asked directly, we also find that a large fraction is indifferent towards the implementation of the tax credit when asked directly.[15] Our results are in line with Harju et al. (2021) who find that the Swedish reform of 2009 that switched the credit-claiming responsibility from customers to firms does not show a clear change in behavior.

A potential concern is that participants of our experiment are indifferent towards the timing of awarding refunds, as the price to be paid and the refund are hypothetical. However, previous literature shows that non-incentivized investigations of time preferences perform equally well as incentivized ones (e.g., Brañas-Garza et al., 2020). One could also argue that our results

[15] A possible explanation for this discrepancy is that answers to direct questions about reforms are influenced by status quo bias. This bias should be absent in the between-subject design of our discrete choice experiment.

are affected by participants' familiarity with the German tax credit. If Germans familiar with the tax credit claimed via the tax return favor this implementation, we would overestimate the effectiveness of this tax credit. However, we can rule out that familiarity with the German system causes participants to favor the tax credit claimed via the tax return. Another possible objection to our results is that in the treatment in which the tax credit is granted at source, participants mistakenly assume that the prices shown already contain the price reduction. However, the finding that the financial attractiveness of offers without invoice is similar in both tax credit treatments suggest that misunderstanding is not an issue. In addition, if participants would think that the price includes the price reduction in the at source treatment, we should not find a difference in behavior between the no tax credit and the tax credit at source treatment.

Our findings suggest that the actions related to obtaining the tax credit via the tax return and the time lag between the consumption of the service and receiving the refund are not an obstacle to taking up the tax credit.[16] However, it could also be that households also perceive costs when claiming the tax credit at source. Having to ask the seller might be related, e.g., to social stigma, which has been found deter the take-up of social benefits (e.g., Currie, 2004). However, it is unlikely that this can explain the lack of a difference, as the costs associated with both types of tax credits would have to be the same. Examining the possible costs related to obtaining a tax credit granted at source is an interesting avenue for future research.

Importantly, the effects of the tax credits are much lower than what would be expected if households would fully factor in the tax credit. It seems that factors beyond the timing and the actions households have to take influence households' behavior towards tax credits. Those compliance costs seem to be as high as two thirds of the rate of the tax credit. Note that our experiment abstracts from several reasons why households may not use tax credits. Assuming that participants read our treatment texts (shown before every decision), we eliminated, e.g., lack of information (Feld et al., 2012) or of eligibility to use the subsidy (e.g., as households do not owe taxes, Grönberg and Rauhanen, 2015) as possible reasons for the ineffectiveness. By telling individuals they can receive government support for 20% of the price of the offer, we also disregarded that tax credits usually only apply to labor costs and include a maximum amount.

In the treatment without tax credit, we find that about a quarter report that their willingness to choose an offer with invoice would be unaffected by the introduction of a tax credit. An important question is why these individuals are hesitant to use the tax credit.[17] Our choice experiment suggests that some individuals have a strong preference for offers without invoice. We find that about 10% prefer the offer without invoice even when the price of the offer with invoice is lower. Considering that offers with and without invoice differ in multiple dimensions, these households seem to value certain features of offers without invoice. A related explanation is that households need to calculate the price reduction they will receive through the tax credit. To avoid this calculation and possible errors, households may refrain from using the tax credit. Another reason for their ineffectiveness is that tax credits do not seem to decrease the justifiability of

[16] Our post-experimental survey shows that only 13.5% who know the German tax credut but have not used it report that the deduction is too burdensome and 6% say that the refund is received too late, see Table A.2.

[17] These individuals have a lower tax morale and patience than those reporting that their willingness to ask for an invoice would increase, suggesting that they prefer offers without invoice even when a tax credit exists.

evasion, which has been discussed as another motivation for the introduction of tax credits.

Previous studies conclude that household tax credits affect tax evasion very little, partly due to lack of information (Feld et al., 2012; Harju et al., 2021). We find that tax credits are also only partially effective when households are informed about them. Considering that lack of information and other factors may further prevent households' use of tax credits, we also conclude that their effectiveness as an instrument to prevent tax evasion is limited.

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Appendix

A.1 Questionnaire

What gender are you?
O Female O Male O Diverse O Do not know / No answer

How old are you?
.....

What is your highest educational background?
O None O Primary school O Secondary school O Highschool O Apprenticeship O College degree O Master O Post-graduate degree O Do not know / No answer

What kind of housing do you live in?
O Sublet apartment O Rented flat O Rented house O Own flat O Own house O Caravan O Other O Do not know / No answer

What state do you live in?
O Bavaria O Baden-Wuerttemberg O Berlin O Brandenburg O Bremen O Hamburg O Hessen O Meckelburg-Western Pomerania O Lower Saxony O Northrine-Westfalia O Rhineland-Palatinate O Saarland O Saxony O Saxony-Anhalt O Schleswig-Holstein O Thuringa O No answer

Recent research shows that decision-making processes depend on the circumstances. Specifically, we are interested in whether you take the time to read this question; if you do not, the results may not tell us very much about actual behavior. To show that you have read this question, please click "None of the above".
O Interested O Desperate O Excited O Angry O Strong O Guilty O Fearful O Aggressive O Enthusiastic O Proud O Irritable O Alert O Ashamed O Inspired O Nervous O Determined O Attentive O Hectic O Active O Worried O None of the above

Part 1: Your decision-making behavior
Please put yourself in a situation in which you want to have a service done in your household, such as painting walls. We would like to know how you would choose between several offers. We will now show you seven decision-making situations in which you can each choose between two offers. Please look at the offers carefully and choose the one you would prefer.

The offers vary in four characteristics:

Recommended by acquaintance: Yes, No

Availability of seller: As requested, at a later time
Condition of offer: Without invoice, with invoice including VAT
Price of offer: 300€, 320€, 340€, 360€, 380€, 400€, 420€, 440€, 460€, 480€, 500€

Please assume that all characteristics not described are the same in all offers.
This is an example of a decision situation:

	Offer A	Offer B
Recommended by acquaintance	No	Yes
Availability of provider	At a later time	As requested
Condition of offer	With invoice incl. VAT	Without invoice
Price of offer	500 €	420 €

	Offer A	Offer B
Which offer would you choose?	○	○

[Displayed to participants in *No tax credit* treatment]

Important note:
Please assume that there is no government support if you commission household services.

[Displayed to participants in *Tax credit via tax return* treatment]

Important note:
Please assume that there is government support when you commission services in the household. You can get a refund of 20 percent of the offer price if you choose an offer with invoice.
For this purpose, you have to declare the service in your income tax declaration. Your tax payment then decreases by 20 percent of the price of the offer. You receive the refund as reduced tax payment usually in the following year.

[Displayed to participants in *Tax credit at source* treatment]

Important note:
Please assume that there is government support when you commission services in the household. You can get a refund of 20 percent of the offer price if you choose an offer with invoice.
For this purpose, you have to inform the seller that you want to use the government support. The seller then decreases the price of the offer by 20 percent and handles the settlement with the tax authority. You will receive the refund immediately as a reduced price.

****

[DISCRETE CHOICE EXPERIMENT]

****

Please think of the decision-making situations you have just been in.

Please indicate how strongly you agree with the following two statements.

Offers without invoice are financially more attractive than offers with invoice.
O Fully disagree O Disagree O Rather disagree O Neither agree nor disagree O Rather agree O Agree O Fully agree O Do not know / No answer

It is justifiable to accept an offer without invoice.
O Fully disagree O Disagree O Rather disagree O Neither agree nor disagree O Rather agree O Agree O Fully agree O Do not know / No answer

[Displayed to participants in *tax credit via tax return* and *tax credit at source* treatments]
Have you considered the possibility of receiving the tax credit when making your decisions?
O Yes O No

[Displayed to participants in *No tax credit* treatment – Group One]
Please assume that there is a tax credit when you demand services in the household. You can receive 20 percent of the price of the offer when you choose an offer with invoice. For this, you have to declare the service in your income tax declaration. Your tax payment then decreases by 20 percent of the price of the offer. You receive the reimbursement as reduced tax payment in most cases in the following year.
How would this change your willingness to choose an offer with invoice in the decision-making situation? Your willingness would ...
O Decrease sharply O Decrease O Rather decrease O Remain unchanged
O Rather increase O Increase O Increase sharply
O Don't know / No answer

[Displayed to participants in *No tax credit* treatment – Group Two]

Please assume that there is a tax credit when you demand services in the household. You can receive 20 percent of the price of the offer when you choose an offer with invoice. For this, you have to inform the supplier that you want to use the tax credit. The supplier then decreases the price of the offer by 20 percent and

handles the billing with the tax authority. You receive the tax credit as a reduced price immediately.
How would this change your willingness to choose an offer with an invoice in the decision-making situation? Your willingness would ...
O Decrease sharply O Decrease O Rather decrease O Remain unchanged
O Rather increase O Increase O Increase sharply
O Don't know / No answer

[Displayed to participants in *Tax credit via tax return* treatment – Group One]

Assume that the tax credit is different. You do not receive the tax credit as a reduced tax payment in most cases in the following year, but immediately as a price reduction.
How would this change your willingness to choose an offer with invoice in decision-making situations? Your willingness would...
O Decrease sharply O Decrease O Rather decrease O Remain unchanged
O Rather increase O Increase O Increase sharply
O Don't know / No answer

[Displayed to participants in *Tax credit via tax return* treatment – Group Two]
Assume that the tax credit is different. To claim it, you do not have to declare the service in your income tax return, but simply inform the seller that you are claiming it. The seller then handles the billing with the tax authority.
How would this change your willingness to choose an offer with invoice in the decision-making situations? Your willingness would...
O Decrease sharply O Decrease O Rather decrease O Remain unchanged
O Rather increase O Increase O Increase sharply
O Don't know / No answer

[Displayed to participants in *Tax credit at source* treatment – Group One]

Assume that the tax credit is different.You do not receive the tax credit as a price reduction immediately but as a reduced tax payment via your income tax return, in most cases in the following year.
How would this change your willingness to choose an offer with invoice in the decision-making situations? Your willingness would...
O Decrease sharply O Decrease O Rather decrease O Remain unchanged
O Rather increase O Increase O Increase sharply
O Don't know / No answer

[Displayed to participants in *Tax credit at source* treatment – Group Two]

Assume that the tax credit is different.You do not receive the tax credit as a price reduction immediately but as a reduced tax payment via your income tax return, in most cases in the following year. In order to claim it, you do not have to inform the seller who handles the billing with the tax authority that you are claiming the tax credit, but instead declare this yourself on your income tax return.
How would this change your willingness to choose an offer with invoice in the decision-making situations? Your willingness would...
O Decrease sharply O Decrease O Rather decrease O Remain unchanged
O Rather increase O Increase O Increase sharply
O Don't know / No answer

Part 2: Your Experience

Which of the following services have you paid for in your household in the past three years?
Please indicate any services that were not performed by a member of the household. You can choose multiple answers.
O No service used O Renovation, maintenance or modernization of the house O Repair of household items O Gardening O IT services (e.g. Computer / smartphone) O Housekeeping (e.g. Cleaning, washing, shopping) O Childcare ("babysitter", not daycare) O Tutoring O Other, namely: ..... O Don't know / No answer

In Germany, since 2006 it is possible to deduct household services and services for renovation, maintenance or modernization measures from the income tax (Section 35a EStG). Are you informed about this possibility?
O Yes O No O Don't know / No answer

[Displayed to participants that indicated "Yes" in the previous question]

Have you ever used the option of deducting household services and services for renovation, maintenance or modernization measures from income tax?
O Yes O No O Don't know / No answer

[Displayed to participants that indicated "No" in the previous question]

Why have you not yet used the option of deducting household services and services for renovation, maintenance or modernization measures from income tax? You can

choose multiple answers.
O Requested services are not deductible O Income tax due too low to deduct services O It is too much effort to claim it in the tax return O Reimbursement via tax return is too late for me O Requested services without invoice O Other, namely: ..... O Don't know / No answer

We would like to know which properties you would assign to offers without invoice versus offers with invoice in general.
In the case of offers without an invoice, the availability of the seller is generally ...
O Better O Equally good O Worse O Don't know / No answer

The price of services without invoice is generally ...
O Lower O Equally high O Higher O Don't know / No answer

The quality of services without invoice is generally ...
O Better O Equally good O Worse O Don't know / No answer

The willingness of the seller to provide a warranty for services without invoice is generally ...
O Higher O Equally high O Lower O Don't know / No answer

The reliability of the seller for services without invoice is generally ...
O Better O Equally good O Worse O Don't know / No answer

A service is performed without invoice. Please indicate which of the following statements you think are correct. You can choose from several possible answers.
O The seller has less administrative effort O The seller requires a cash payment O The seller does not pay any sales tax to the tax authority O The seller does not pay any other taxes and social security contributions O Don't know / No answer

Part 3: Your life situation

If you add up all income: What is the monthly net household income of all household members?
Please enter the monthly net amount, i.e. after deducting taxes and social security contributions. Please include regular payments such as pensions, housing benefit, child benefit, BaföG, alimony payments, etc.!
If not exactly known: Please estimate the monthly amount.
O Less than 1,000 € O 1,001 € to 2,000 € O 2,001 € to 3,000 € O 3,001 € to 4,000 € O 4,001 € to 5,000 € O 5,001 € to 7,000 € O 7,001 € to 9,000 € O More than 9,000 € O Don't know / No answer

Who usually makes the financial decisions in your household?
O You alone O You and another person in your household together O Another person in your household O Don't know / No answer

Who does your tax return?
O You alone O You and someone else O Someone else for you (e.g., partner, tax advisor) O Don't know / No answer

In general, are you a risk-taking person or are you trying to avoid risk?
Please rate this on a scale from 0 to 10, on which the value 0 means "not at all willing to take risks" and the value 10 means "very willing to take risks".
O 0 Not at all willing to take risks O 1 O 2 O 3 O 4 O 5 O 6 O 7 O 8 O 9 O 10 Very willing to take risks

How do you feel about the following statement: It is a civil duty to pay taxes.
Please rate this on a scale from 0 to 10, on which the value 0 means "Fully disagree" and the value 10 means "Fully agree".
O 0 Fully disagree O 1 O 2 O 3 O 4 O 5 O 6 O 7 O 8 O 9 O 10 Fully agree

A.2 Additional results

Table A.1: Balancing of respondents' characteristics

	Treatment groups Mean values			Test for equality p-values	
	No tax credit	Via tax return	At source	Via tax return	At source
Age in years	53.70	54.05	54.98	0.772	0.284
Female	0.540	0.533	0.511	0.885	0.543
East-Germany	0.125	0.138	0.145	0.689	0.542
Education					
Secondary schooling	0.314	0.317	0.271	0.945	0.327
Post-secondary training	0.484	0.496	0.529	0.813	0.343
Academic degree	0.202	0.188	0.199	0.703	0.944
Household income (net)					
<= 2,000 €	0.161	0.240	0.199	0.036	0.293
2,001 € – 3,000 €	0.268	0.249	0.267	0.647	0.983
3,001 € – 4,000 €	0.196	0.222	0.244	0.503	0.224
4,001 € – 5,000 €	0.174	0.120	0.113	0.106	0.067
>= 5,001 €	0.080	0.107	0.072	0.340	0.753
No income information	0.121	0.062	0.104	0.032	0.583
Num. of observations	224	225	221	449	445

Note: Test for equality against No tax credit treatment.

Table A.2: Experience with services and tax credits

	Percent Yes
Has demanded services in past 3 yrs.	65.5
Reports to know §35a EStG	80.5
If knows §35a EStG:	
Has used §35a EStG in the past	70.5
Reasons for not having used §35a EStG	
Service demanded not deductible	14.2
Income tax too low	34.5
Deduction too burdensome	13.5
Refund too late	6.1
Service without invoice demanded	8.7
Don't know	11.5

Table A.3: Characteristics of offers with vs. without invoice

In the case of offers without an invoice...				
the availability of the provider is generally...	Better	Equal	Worse	Don't know
	21.19	44.63	7.76	26.42
the price of the service is in generally...	Higher	Equal	Lower	Don't know
	79.25	8.96	3.58	8.21
the quality of the service is generally...	Better	Equal	Worse	Don't know
	1.64	63.88	11.79	22.69
the seller's willingness to make improvements in the event of defects is generally...	Higher	Equal	Lower	Don't know
	2.99	19.25	59.55	18.21
the reliability of the seller is generally...	Better	Equal	Worse	Don't know
	2.99	49.1	28.21	19.7

Note: Assessment of characteristics of offers with invoice versus without invoice based on 670 observations. Shares of individuals in percent.

Figure A.1: Distribution of variable values over indices

(a) Distribution of education and income over the socio-economic index

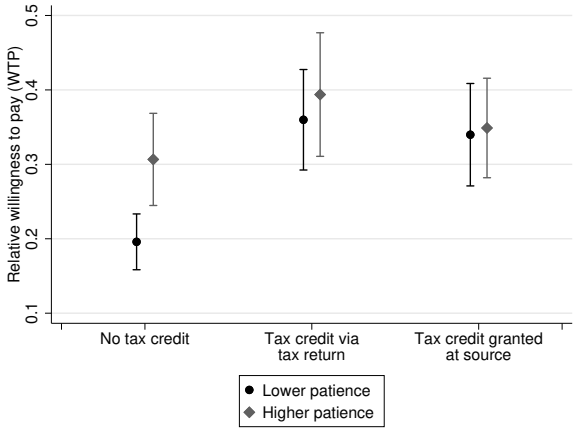
	Low socioeconomic Index	High socioeconomic Index
Educational Degree		
Only schooling degree	0.675	0.129
Apprenticeship	0.325	0.528
Academic degree	0.000	0.344
Income group		
Max. 2000€ HH Income	0.606	0.060
2000€ - 4000€ HH Income	0.394	0.548
Min. 4000€ HH Income	0.000	0.391

(b) Distribution of time discounting, risk affinity and tax morale over the prudence index

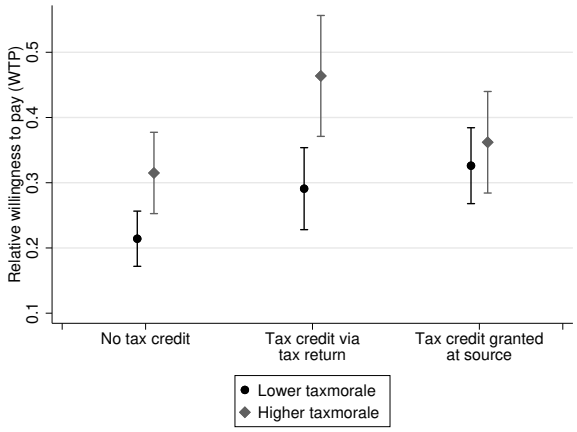
	Low preference Index	High preference Index
Patience	5.895	8.754
Risk affinity	4.007	4.953
Tax morale	6.783	9.601

Figure A.2: WTP over prudence variables

(a) WTP by patience



(b) WTP by tax morale



(c) WTP by risk aversion

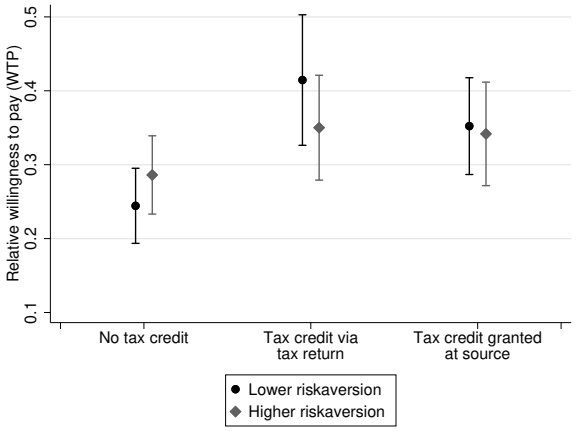
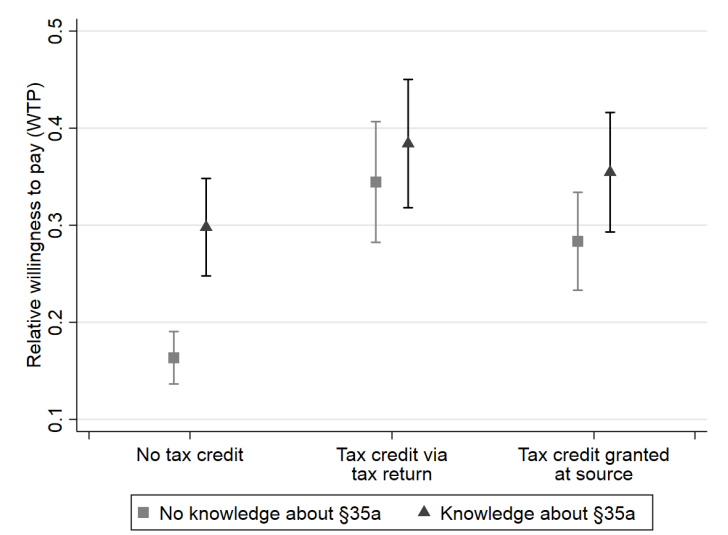
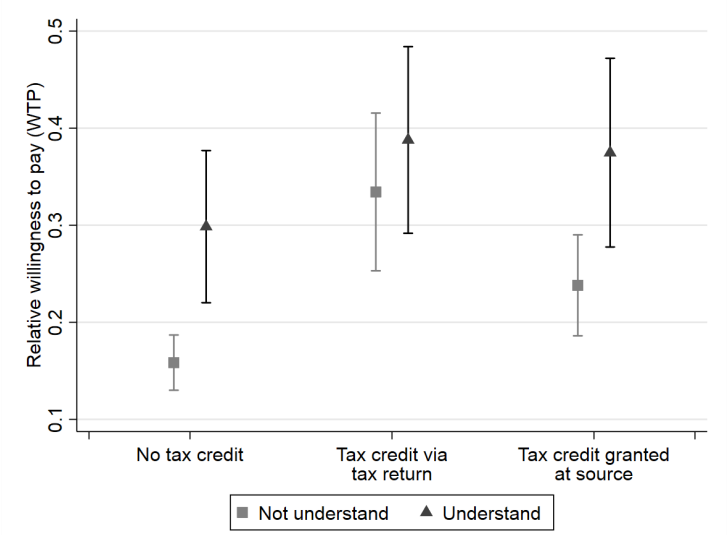


Figure A.3: Heterogeneity

(a) By knowledge of German tax credit



(b) By understanding of "without invoice"



Note: .