The Effects of Tax Salience and Tax Experience on Individual Work Efforts in a Framed Field Experiment

Martin Fochmann and Joachim Weimann*

Received 8 May 2013; in revised form 21 June 2013; accepted 25 June 2013

We present a simple model with tax biases that shows that tax perception depends on (1) the tax rate, (2) tax salience, and (3) tax experience. To test our model predictions, we first draw on the results of Fochmann et al. (2013) and show that tax misperceptions are lower with a higher tax rate. Second, we conduct a framed field experiment with 118 employees (no students) as subjects and a tax levied on the subjects' income from working in a real-effort experiment. In four treatments employing a direct and an indirect progressive tax scale, we show that a higher tax salience and tax experience level lead to lower tax misperception. Interestingly, the tax-experience effect does not play a role in simple cases with a proportional income tax.

Keywords: tax perception, tax salience, tax experience, real-effort experiment, behavioral public economics

JEL classification: C 91, D 14, H 24

1. Introduction

Behavioral considerations do not play a prominent role in the economics literature on taxation. The theory of optimal taxation, for example, assumes that taxpayers rationally adapt to a given tax scale by maximizing their utility. It should be taken into account, however, that there is empirical evidence that a fundamental assumption about the effects of taxation may be violated in reality – namely, the assumption that taxpayers correctly perceive the way the tax has been implemented by the government.

* Fochmann: University of Hannover, Königsworther Platz 1, 30167 Hannover, Germany (fochmann@steuern.uni-hannover.de); Weimann: University of Magdeburg, Postbox 4120, 39106 Magdeburg, Germany (weimann@ovgu.de). We would like to thank Wolfram Richter, Lisa Bruttel, Benedikt Mihm, and the participants in the 2011 ESA Conference in Kuala Lumpur, the 2011 ESA Conference in Chicago, the 2011 FiWi Workshop in Berlin, the 2011 GfeW Conference in Nürnberg, the 2012 VHB Conference in Bolzano, and the 2012 Verein für Socialpolitik Conference in Göttingen for helpful comments and suggestions. We gratefully acknowledge funding by the German Federal Ministry of Finance and by the Land Sachsen-Anhalt through the Otto von Guericke University of Magdeburg.

There is a variety of papers showing that subjects often reveal a perception of tax effects that is at odds with standard theory. For example, Gensemer et al. (1965), Morgan et al. (1977), Lewis (1978), and Rupert and Fischer (1995) find in their surveys that taxpayers misestimate their marginal tax rates. In two archival studies, König et al. (1995) and Arrazola et al. (2000) found evidence that individuals base their labor supply decisions on an incorrect integration of taxes. More recently, Chetty et al. (2009) and Feldman and Ruffle (2012) have found in different experiments that subjects do not consider taxes correctly when they decide on their consumption of goods. Using a laboratory experiment, de Bartolome (1995) finds that most of the subjects underestimate their tax burden in investment decisions because they consider the average tax rate instead of the marginal rate. Fochmann et al. (2012a, 2012b) find evidence that participants have an overoptimistic perception of the positive effect of loss deduction on payoffs and, as a consequence, display an unexpected increase in their willingness to take risks. In contrast, Ackermann et al. (2013) observe in a portfolio choice setting that the subjects' willingness to take risks decreases significantly when a tax has to be paid or when a subsidy is paid. Blumkin et al. (2008) observe that the (negative) effect of taxes on labor supply is much higher in a setting with an income tax than in a setting with a consumption tax, although the two taxes are equivalent.

Given these observations, the question arises: why is tax perception biased, or, considering it the other way around, what are the necessary conditions for correct perception of taxes? Answering this question is not only important for governments trying to create tax systems that produce correctly perceived taxes, but also for the economic analysis of taxes. For example, if taxes are misperceived, this affects the welfare analysis of taxation, because the excess burden of taxes becomes smaller or greater due to the perception bias. In an assortment of studies, the salience of a tax – the degree of tax visibility – is identified as the main determinant of tax perception.[1] In a laboratory experiment, Rupert and Wright (1998) use four different presentation forms of a tax scale that differ in the visibility of the marginal tax rates, and find that the quality of investment decisions increases with the visibility. Sausgruber and Tyran (2005, 2011) find in two studies that subjects are much more aware

1 In addition to tax salience, the complexity of a tax system plays an important role in tax perception. There is clear evidence that higher tax complexity leads to greater tax misperceptions and, therefore, to greater deviations of observed from predicted behavior (see, for example, de Bartolome, 1995; Rupert and Wright, 1998; Rupert et al., 2003; Boylan and Frischmann, 2006; Blaufus and Ortlieb, 2009). Furthermore, individual characteristics like education, age, and income also affects tax perception. Most studies reveal a positive relationship between each of these characteristics and the accuracy of the tax-effect estimation (see, for example, Gensemer et al., 1965; Morgan et al., 1977; Lewis, 1978; Fujii and Hawley, 1988; König et al., 1995; Rupert and Fischer, 1995).

of taxes if they have to pay the tax bill than if the other market side has to pay. Chetty et al. (2009) observe in their field experiment that an explicit tax posting on price tags induces consumers to pay more attention to taxes. In the same manner, Finkelstein (2009) finds that the awareness of tolls is much lower when individuals pay the toll automatically by using an electronic toll collection system than when paying in cash. All of these studies reveal that the higher the salience of a tax, the higher the tax perception.

In this paper, we provide more insights into the understanding of tax biases. In contrast to previous studies, we analyze different determinants of tax perception simultaneously, focusing on both proportional and progressive income taxes, and conduct a framed field experiment with a real-effort task in which subjects (employees, no students) have to make a real work–leisure decision. Our motivation for this study is the observation in some recently published papers that a flat income tax leads to an unexpected increase in labor supply. In particular, the willingness to work is significantly higher if individuals have to pay a tax on their gross income than if there is no tax, even though the net wage is identical in both situations (see Gamage et al., 2010; Djanali and Sheehan-Connor, 2012; Fochmann et al., 2013).

We draw on the results of Fochmann et al. (2013) and extend their study to examine the determinants of tax perception by employing the same experimental design. We focus on that paper because it achieves a much higher external validity than the other two studies. For example, in Gamage et al. (2010) the "leisure activity" is watching YouTube videos, whereas in Djanali and Sheehan-Connor (2012) it is doing nothing but waiting for the experiment's continuation. The working task is either to alphabetize words or to shade circles with a pen. Since both the task and the leisure alternative are very artificial in these studies, the implied work–leisure setting is quite different from the real work–leisure trade-off people typically face when making labor supply decisions. Furthermore, the subjects who participated in the two experiments were mainly undergraduate students who presumably had little or no tax experience. In contrast to these two studies, Fochmann et al. (2013) use employees as subjects (no students), conduct a real-effort experiment (subjects have to fold letters), and require subjects to make a real work–leisure decision in that they decide not only on their work effort but also on their working time (no time restriction). The taxes raised are not redistributed to the subjects, because in reality the quantity of public goods taxpayers consume is independent of the taxes they personally pay.

In the next section, we are going to present a simple model with tax biases that shows that tax perception depends on (1) the tax rate, (2) tax salience, and (3) tax experience. To test our conjectures concerning the specification of the model, we first draw on the results observed by Fochmann et al. (2013).

We show that subjects underestimate tax effects and that a higher tax rate leads to a lower level of tax misperception. In the experimental part of our study we conduct a real-effort experiment with employees as subjects. We look at progressive tax systems and focus on tax-salience and tax-experience effects. We apply two complex tax scales: an indirect progressive tax and a direct progressive tax. These complex scales are presented in a more or less transparent way (either only verbally or with a graphical illustration). We conjecture (and observe) that tax perception increases with a more transparent tax presentation. Surprisingly, it turns out that the transparency effect is much stronger with the simple tax scale than with the complex direct progressive tax scale. Furthermore, we conjecture that the experience subjects have with the taxation of earned labor income affects tax perception: the higher the tax experience of a subject, the smaller the tax misperception will be. Interestingly, it turns out that for the tax-experience effect it is the other way around than for the transparency effect: experience does not play a role in the simple cases with proportional income taxation, but does in the more complex cases with progressive income taxation.

The reminder of this paper is organized as follows: In section 2, we present our model. In section 3, we draw on the results observed by Fochmann et al. (2013) and present the experimental design and hypotheses of our experiment. The results are reported in section 4 and discussed in the final section 5.

2. Simple Model with Tax Biases

Suppose that an individual is asked to produce a good in a real-effort task without any time restriction. The total number of goods produced by subject i is x_i, and the subject earns the gross wage w for each unit of x_i. Income is subject to an income tax, and the total tax burden of an individual is $\tau(x_i)$. The total net-of-tax income equals $wx_i - \tau(x_i)$. The production costs c (subject's disutility of labor) depend on the output level, and we assume that $\frac{\partial c(x_i)}{\partial x_i} > 0$ and $\frac{\partial^2 c(x_i)}{\partial^2 x_i} > 0$. Since each subject decides on the working time individually, the output level x_i depends on both the time t_i a subject spends in the laboratory and the effort level e_i. The latter is defined as output quantity per time unit and approximately measures the productivity of a participant. The output level is then determined by $x_i = e_i t_i$ and results in the following payoff function:

$$\pi_i(e_i t_i) = we_i t_i - \tau(e_i t_i) - c(e_i t_i)\,. \tag{1}$$

To consider a tax bias in our model, we introduce the parameter $\hat{\tau}$, which represents the perceived tax burden. In the case of an underestimation (overestimation) of the tax effect, the perceived tax burden $\hat{\tau}$ is lower (higher)

than the true tax burden τ. The difference between the perceived and the true value – the tax-burden bias – is denoted as $\Delta\tau = \hat{\tau} - \tau$. Since individuals base their labor supply decisions on their perceived (expected) payoff, subjects are assumed to maximize

$$\pi_i(e_i t_i) = we_i t_i - \hat{\tau}(e_i t_i) - c(e_i t_i) = we_i t_i - \tau(e_i t_i) - \Delta\tau(e_i t_i) - c(e_i t_i)\,. \quad (2)$$

If we normalize the time spent in the laboratory ($t_i = 1$), we get the necessary condition for the payoff-maximizing work effort:

$$\frac{\partial c(e_i)}{\partial e_i} = w - \frac{\partial \hat{\tau}}{\partial e_i}\,. \quad (3)$$

In the optimum, the (perceived) marginal net wage rate equals the marginal effort costs. Given the assumptions made for the cost function, the optimal effort will increase if the gross wage w increases. The reaction to an increase in the real (marginal) tax rate obviously depends on how $\hat{\tau}$ depends on τ.

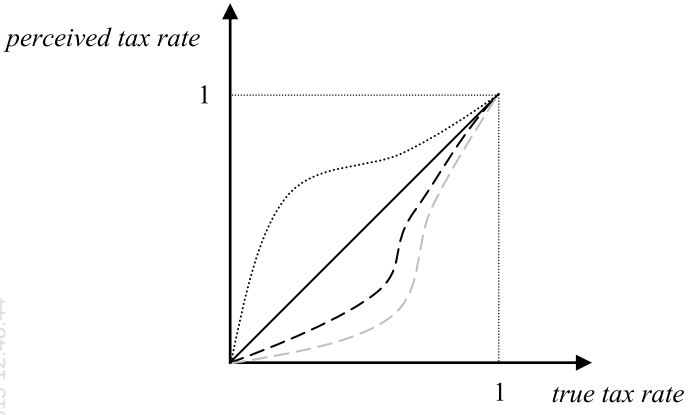
Turning to the relationship between the perceived tax burden $\hat{\tau}$ and the true tax burden τ, we assume that the tax bias is zero for tax rates of 0% and 100%. Theoretically, a tax bias can also occur for tax rates of 0% and 100%. However, we think that tax perception issues will not crop up if an individual is not confronted with any tax (i.e., a tax rate of 0%) or if the whole income a subject earns is immediately taken away (i.e., a tax rate of 100%). Therefore, we are convinced that this assumption is quite realistic. For tax rates between 0% and 100% the tax can be over- or underestimated. In both cases, there has to be (at least) one area in which the difference between perceived and true tax rate increases, and (at least) one area in which this difference and also the tax-burden bias decrease.

Figure 1 depicts different curve shapes of the perceived tax rate with different tax bias levels depending on the true tax rate. The solid line (45-degree line) represents an unbiased tax perception. The dotted line represents an *over*estimation of the tax effect. The two dashed lines represent an *under*estimation of the tax effect. The difference between the dashed lines is the strength of the tax bias. The gray dashed line represents a higher tax misperception than the black dashed line. However, in all three cases with a tax bias, there is an area in which the difference between perceived and true tax rate increases, followed by an area in which this difference decreases. This leads us to the following proposition:

Proposition 1 If the tax bias is zero for tax rates of 0% and 100%, each area in which the absolute value of the tax bias increases has to be followed by an area in which the absolute value of the tax bias decreases. As a result, the tax bias level depends on the tax rate.

We conjecture that tax perception not only depends on the tax rate itself, but also on the salience of the tax and on the experience individuals have with

Figure 1
Perceived Tax Rate as a Function of the True Tax Rate



taxation. We hypothesize that a higher tax salience or a higher tax experience will lead to lower level of tax misperception. With respect to figure 1, the two dashed lines can be seen as examples of different tax-salience or tax-experience levels, where the black dashed line represents higher tax salience or tax experience, leading to lower tax misperception. Formally, the tax-burden bias is a function of the tax salience and tax experience:

$$\Delta\tau := \Delta\tau(\tau, TS, TE)\,, \tag{4}$$

where TS represents the tax salience of the tax scale and TE represents the tax experience of an individual. As we allow for both underestimation and overestimation of the tax effect, we consider the absolute value of the tax-burden bias to show the influence of both parameters. If it is assumed that higher tax salience and higher tax experience both reduce tax misperceptions, the first derivatives of $|\Delta\tau|$ with respect to TS and TE must be negative:

$$\frac{\partial\left|\Delta\tau(\tau, TS, TE)\right|}{\partial TS} < 0\,, \tag{5}$$

$$\frac{\partial\left|\Delta\tau(\tau, TS, TE)\right|}{\partial TE} < 0\,. \tag{6}$$

This is summarized by our conjectures 1 and 2:

Conjecture 1 Higher tax salience leads to lower tax misperception.

Conjecture 2 Higher tax experience leads to lower tax misperception.

3. Experiment: Treatments, Hypotheses, Experimental Design

3.1. Experimental Design and Protocol

To test our proposition and our two conjectures, we first draw on the experimental results observed by Fochmann et al. (2013), and second conduct a real-effort experiment with 118 employees as subjects.[2] As we want to link the results of this experiment to the results of Fochmann et al. (2013), we use exactly the same experimental design and protocol as they used. Therefore, the following holds for both experiments.

As outlined by our model, the task of the participants was to produce a good. Specifically, participants were asked to fold letters and put them into envelopes. For each letter folded a participant earns a gross wage, and – dependent on the treatment – a tax is levied on the gross income. The subjects were told that they could decide how long to stay in the laboratory. They could stop working whenever they wanted to, and there was no time restriction. According to the terminology of Harrison and List (2004), the experiments can be regarded as framed field experiments, since a nonstandard subject pool (employees, no students) and a field context (real-effort task with taxes on labor income) were used.

The experiments were conducted at the experimental laboratory (MaXLab) of the Otto von Guericke University in Magdeburg (Germany). Subjects were recruited randomly from the local telephone book. Potential subjects first received a letter in which they were informed that they could attend an experiment at the university if they were regularly employed with a minimum working time of 30 hours per week. A day later we called the subjects, asking whether they fulfilled our requirements and whether they were willing to participate. Those who agreed were invited to come to the laboratory in the late afternoon, after their regular working time. Approximately 85% of these subjects showed up at the laboratory. When the subjects arrived, they received written instructions informing them about their task, the gross wage rate, and the tax scale. The subjects were located at computer desks, separated from each other, in soundproof booths. No communication was allowed during the experiment. Subjects were paid immediately after the experiment, depending on the number of folded letters, and received a show-up fee of 5 euros.

The total number of folded letters depends on both the working time and the effort level. In the following, however, we will focus only on the effort level, as we do not have enough control over the opportunity costs

2 The instructions for our experiment are available in appendix 6.1.

driving the time decision of a subject.[3] For example, it may be that a subject has an appointment later or that the subject's wife or husband is waiting for dinner. Thus, we assume that the decisions about time and effort are additively separable. Subjects decide how hard they are going to work, given their chosen optimal labor time. This assumption reveals a weakness of our design. Since our aim was to create a *real* work–leisure decision, we had to leave the decision about the time spent in the laboratory to the subjects. This goes along with a loss of control, and we have to rely on the assumption mentioned above. Alternatively, we could have fixed the time subjects had to spend in the laboratory. But in that case some subjects would be forced to stay longer than they wanted to but would, nevertheless, fold letters until the end of the experiment (what else should they do?). On the other hand, some subjects would like to stay longer in the laboratory in order to fold more letters. Thus, to fix the time would bias the results in two directions. Our design restricts the bias to one direction and probably reduces it, because only those people who wanted to work *longer* and could not do so because of an appointment are limited in their decision.

3.2. Test of Proposition: Tax-Rate Effect

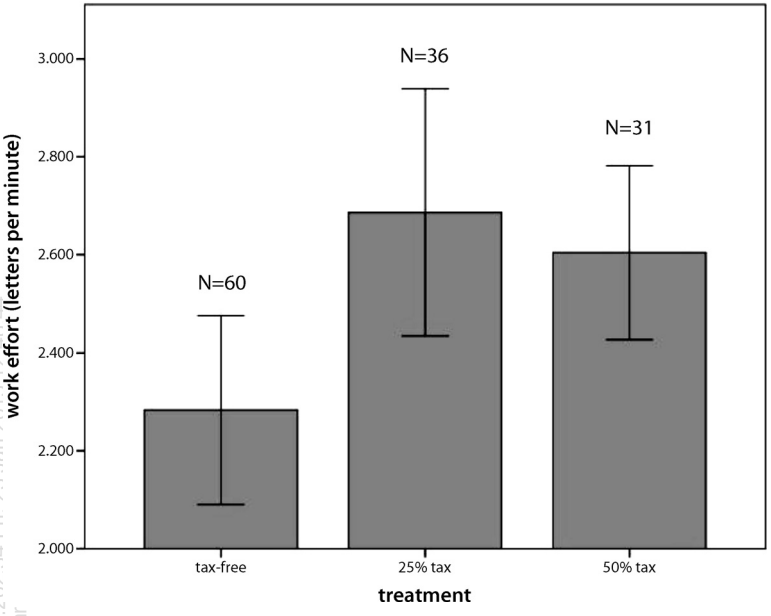
To test our proposition, we will use the results observed by Fochmann et al. (2013). In their experiment with 127 employees as subjects, they consider three treatments with identical net wage rates of 9 euro-cents per folded letter but with different tax rates and gross wage rates adjusted accordingly. In the tax-free treatment, no taxation is applied. In the 25% tax treatment (50% tax treatment), the gross wage rate is 12 (18) euro-cents, but the income is taxed at a constant rate of 25% (50%). Although the net income is identical in all three treatments, they observe significant differences between the treatments. Figure 2 depicts the effort observed in their study on average in a bar plot with error bars (95% confidence interval) for each treatment. Specifically, the subjects' effort levels are significantly higher in the 25% tax and 50% tax treatments than in the tax-free treatment. However, no significant difference between the two treatments is observed.

Although the perceived tax burden $\hat{\tau}$ is not observable, we can use the effort levels to analyze tax perception in a qualitative way. For this purpose, it is useful to rewrite (3) as

$$\frac{\partial c(e_i)}{\partial e_i} = w - \frac{\partial \hat{\tau}}{\partial e_i} = w - \frac{\partial \tau}{\partial e_i} - \frac{\partial \Delta\tau}{\partial e_i}, \tag{7}$$

3 Nevertheless, we present some descriptive statistics for the duration (minutes spent in the laboratory) and for the number of folded letters, in appendix 6.2.

Figure 2
Work effort on average in the study of Fochmann et al. (2013)



where $\frac{\partial \tau}{\partial e_i}$ denotes the (true) marginal tax burden and $\frac{\partial \Delta\tau}{\partial e_i}$ the marginal-tax-burden bias. For a linear tax scale the latter term can be interpreted as the fraction of the marginal tax burden that is not correctly realized as a tax. The term $w - \frac{\partial \tau}{\partial e_i}$, which determines the true marginal net wage rate, is the same (9 cents) in all three treatments of Fochmann et al. (2013). If no tax misperception exists (i.e., $\frac{\partial \Delta\tau}{\partial e_i} = 0$), the effort should be the same in all three treatments. However, the effort levels are much higher when a tax is levied on the income. In accordance with equation (7), this increase can only be explained by a negative value of $\frac{\partial \Delta\tau}{\partial e_i}$. In this case, as the cost function is assumed to be convex, the effort of the subjects in both tax treatments must be greater than the effort in the tax-free treatment. As a result, subjects seem to ignore the flat tax to a great extent and demonstrate a kind of *net-wage illusion*. They behave as if a significant fraction of the tax is part of their net income. Thus, using the model, we can conclude that the individuals underestimate the tax effects in both tax treatments.

This result is in line with other studies in the field of empirical tax research. For example, de Bartolome (1995), Chetty et al. (2009), Finkelstein (2009), Djanali and Sheehan-Connor (2012), and Fochmann et al. (2012a, 2012b) observe that individuals tend to underestimate tax effects. In addition to these findings, the literature on partitioned pricing (or multidimensional

pricing) reveals that individuals will often not take all parts of a good's price (such as cost of shipping and processing fees) into account and therefore underestimate its true total cost. (See Morwitz, et al., 1998; Hossain and Morgan, 2006; Kim and Kachersky, 2006; and Burman and Biswas, 2007. For a detailed literature review see Morwitz et al., 2009.) This is closely related to the tax issue, since the tax can be seen as one part – in addition to the gross price or wage – of the net price or wage, respectively. Thus, the results of this strand of the literature would also lead one to hypothesize an underestimation of the tax, as has been observed in the tax literature and in the study of Fochmann et al. (2013).

Fochmann et al. (2013) make a further interesting observation. For a given tax bias (a given constant fraction of the true tax burden that is ignored), the higher gross wage rate in the 50% tax treatment (18 versus 12 cents) should lead to higher effort levels in the 50% tax than in the 25% tax treatment, since the perceived net wage rate should be higher in the 50% tax treatment. However, this was not observed. There was no significant difference between the effort levels in the two tax treatments. This implies that the net wage rates in the tax treatments are perceived as identical.

Comparing the 25% and the 50% tax treatments, we need to consider that two things have changed simultaneously: As the net wage rate in the two treatments has to be identical, not only is the tax rate raised from 25% to 50%, but also the gross wage rate is increased from 12 to 18 cents. Both effects will influence the effort level. For a given tax bias an increase of the gross wage rate will lead to a higher effort level. On the other hand, a higher tax rate will lead to a different tax misperception level (according to our proposition) and therefore to a different effort level. While the first effect increases the effort, the sign of the second effect depends on the particular form of $\Delta\tau(\tau, TS, TE)$.

According to our proposition, there has to be an area in which the difference between perceived and true tax rate increases and an area in which this difference decreases, for tax rates between 0% and 100%. In the case of an increase of the tax misperception (a bigger fraction of the true tax is ignored), both effects (higher net wage rate and higher tax rate) work in the same direction. In the case of a decrease of the absolute value of the tax bias, the second effect will result in lower effort. In this case, the first and second effects work in opposite directions.

Fochmann et al. (2013) observed exactly the latter case, as they find no significant difference between the effort levels in the two tax treatments (the two effects canceled each other out). As a result, the tax misperception seems to be high with a tax rate of 25% and lower with a tax rate of 50%. Therefore, our proposition is supported. Nevertheless, it has to be mentioned that even a tax rate of 50% does not prevent individuals from misperceiving

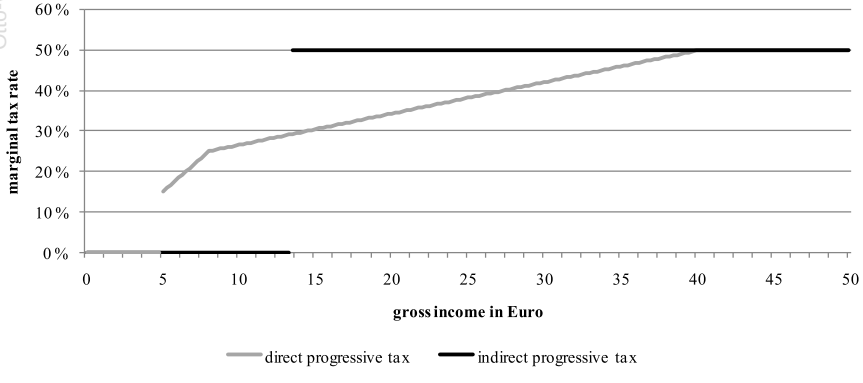
the tax effects, since there is still a significant difference between the 50% tax treatment and the tax-free treatment.

3.3. Test of Conjecture 1: Tax-Salience Effect

Our conjecture 1 states that increasing the salience of a tax decreases the tax misperception level. To test this conjecture, we vary the presentation of complex tax scales. De Bartolome (1995) and Rupert and Wright (1998) show that a less transparent tax rate increases the probability of tax perception biases in an investment setting. In the same manner, Chetty et al. (2009) observe that an explicit tax posting on price tags induces consumers to pay more attention to consumption taxes. Therefore, we conjecture that a more transparent presentation of the tax scale increases tax salience and thus leads to less distortion due to tax-perception biases. To test this hypothesis, we apply two progressive tax scales: an indirect progressive tax on earned income in the *indirect*^{v} and *indirect*$^{v/g}$ *tax treatments*, and a direct progressive tax in the *direct*^{v} and *direct*$^{v/g}$ *tax treatments*. The gross wage rate (12 cents) is identical in all of these four treatments.

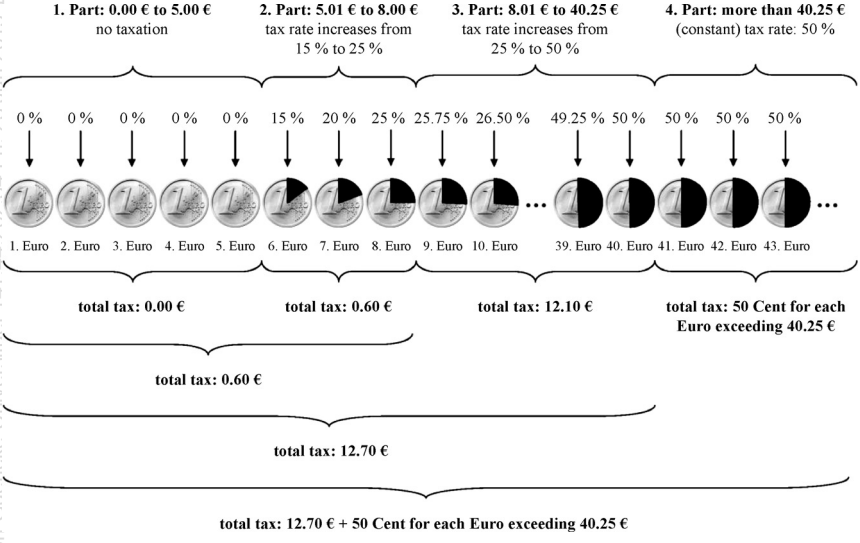
The indirect progressive tax scale consists of a tax-free bracket up to 13.50 euros and a constant marginal tax of 50% thereafter. The direct progressive tax scale mimics the German income tax scale introduced in 2008. Between 0 and 5 euros there is no taxation. Between 5 and 8 euros the marginal tax rate increases from 15% to 25%. Between 8 and (approximately) 42 euros it increases from 25% to 50%, and for all incomes above 42 euros it is constant at 50%. Figure 3 displays the marginal tax rates of both progressive tax scales.

Figure 3
Marginal tax rates in the progressive tax treatments



To test the effect of more versus less transparent tax presentations, both progressive tax scales are presented in two different ways. In the instructions of the indirect^{v} [direct^{v}] tax treatment, the indirect [direct] progressive tax scale is only described verbally. In the indirect$^{v/g}$ [direct$^{v/g}$] tax treatment, a graphical illustration of the respective tax scale is added and an additional verbal explanation of this presentation is provided. This additional information leads to a more transparent tax presentation. Figure 4 shows how the direct progressive tax is illustrated graphically (the graph for the indirect tax is similar).

Figure 4
Graphical Illustration of the Direct Progressive Tax Scale



To analyze the influence of transparency on tax perception, only the effort difference between the indirect^{v} and indirect$^{v/g}$ and that between the direct^{v} and direct$^{v/g}$ are of importance. With respect to equation (7), the term $w - \frac{\partial \tau}{\partial e_i}$ is unaffected by the tax presentation within each progressive tax scale. However, the explicit tax-scale presentation in the indirect$^{v/g}$ and direct$^{v/g}$ tax treatments is expected to lead to a higher tax salience and therefore to a lower level of tax misperception as stated in conjecture 1, i.e., $\left|\frac{\partial \Delta\tau_{\text{indirect}^{v}}}{\partial e_i}\right| > \left|\frac{\partial \Delta\tau_{\text{indirect}^{v/g}}}{\partial e_i}\right|$ and $\left|\frac{\partial \Delta\tau_{\text{direct}^{v}}}{\partial e_i}\right| > \left|\frac{\partial \Delta\tau_{\text{direct}^{v/g}}}{\partial e_i}\right|$. Under the assumption that subjects also underestimate progressive taxes as shown in section 3.2 for proportional

taxes, the effort should be lower in the treatments with the explicit tax presentation. This leads to our first hypothesis:

Hypothesis 1 Participants' effort level is lower in the tax treatments with graphical illustration than in the tax treatments without graphical illustration.

3.4. Test of Conjecture 2: Tax-Experience Effect

We conjecture that tax perception not only depends on the tax rate and the tax presentation, but also on individuals' tax experience (conjecture 2). For an individual to gain this experience, it is necessary to have a personal income that is high enough to create a tax obligation. In Germany, income taxation concentrates very much on higher incomes. For a single person, for example, an income tax is only imposed for monthly gross incomes of more than (approximately) 1,000 euros.[4] As our subjects mainly live in households with two wage earners, those subjects with a net household income per month below 2,000 euros are therefore classified as subjects with no or only limited experience, and those with a household income above 2,000 euros are the experienced subjects.

Of course, a subject's tax experience will not only depend on the household income. However, we are convinced that the income is the best proxy for tax experience in our setting, because experience with income taxes can only arise if individuals are confronted with income taxation. Our assumption that subjects with higher income reveal a lower degree of tax misperception is supported by many empirical studies (see, for example, Gensemer et al., 1965; Morgan et al., 1977; Lewis, 1978; Rupert and Fischer, 1995). Thus, we think that income is an appropriate measure of tax experience.[5]

As Fochmann et al. (2013) did not analyze their data with respect to this question, we will take the results of their and our treatments to analyze tax experience effects in both proportional and progressive tax systems. Thus, the following analyses will combine the results of both studies.

Following conjecture 2, we hypothesize that subjects with more tax experience are more aware of taxes than inexperienced subjects, and this higher sensitivity will lead to more accurate tax perception. Therefore, we expect

4 In 2008, a single person with a gross income from employment of 1,000 euros per month had to pay a monthly tax on wages of 12.91 euros per month. For this calculation we used the BMF tax calculator 2008. The following tax deductions were considered in the calculation: *Arbeitnehmer-Pauschbetrag*, *Sonderausgaben-Pauschbetrag*, and *Vorsorgepauschale*.

5 The empirical tax literature also observes that older and better-educated individuals display better tax perception (for the age influence see, for example, Lewis, 1978; Fujii and Hawley, 1988; for the education influence see, for example, Gensemer et al., 1965; König et al., 1995). However, our results do not support these hypotheses; we do not observe any tax perception differences between these groups.

that $\left|\frac{\partial \Delta\tau_{\text{inexperienced}}}{\partial e_i}\right| > \left|\frac{\partial \Delta\tau_{\text{experienced}}}{\partial e_i}\right|$. In accordance with equation (7) and under the assumption that the subjects will underestimate the taxes in all tax treatments (as shown in section 3.2), hypothesis 2 can be stated as follows:

Hypothesis 2 In all tax treatments, the effort levels of experienced subjects are lower than the effort levels of inexperienced subjects.

Table 1 summarizes the characteristics of all treatments. As we make use of the results of Fochmann et al. (2013), the table includes the parameters of their study as well.

Table 1
Characterization of treatments

Treatment	Tax scale	Gross wage	Marginal tax rate	Net wage	Tax-scale presentation	Number of participants
tax-free	no taxation	€0.09	–	€0.09	–	60
25% tax	proportional income taxation	€0.12	25%	€0.09	no	36
50% tax		€0.18	50%	€0.09	no	31
indirect^{v}	indirect progressive taxation with tax-free bracket	€0.12	0% or 50%	€0.12 or €0.06	no	26
indirect$^{v/g}$					yes	29
direct^{v}	direct progressive taxation	€0.12	from 0% to 50%	from €0.06 to €0.12	no	27
direct$^{v/g}$					yes	36

4. Results

In sections 4.1 and 4.2, we present our results with respect to our two conjectures.[6] In both sections, we first give a descriptive analysis of our results and use the nonparametric Mann–Whitney *U*-test to compare the treatments statistically (all reported *p*-values are two-sided). Second, we run linear regressions to confirm our findings.

4.1. Tax-Salience Effect

In order to analyze the effect of a transparent tax-scale presentation, we compare the results of the progressive tax treatments with and without graphical

6 The raw data of our experiment is available in appendix 6.3.

Table 2
Work Effort in the Treatments with a Progressive Tax Scale

Treatment	No. of subjects	Mean	Median
indirect^{v}	26	2.569	2.470
indirect$^{v/g}$	29	2.273	2.151
direct^{v}	27	2.421	2.283
direct$^{v/g}$	36	2.208	2.176

Figure 5
Work Effort on Average in the Treatments with a Progressive Tax Scale

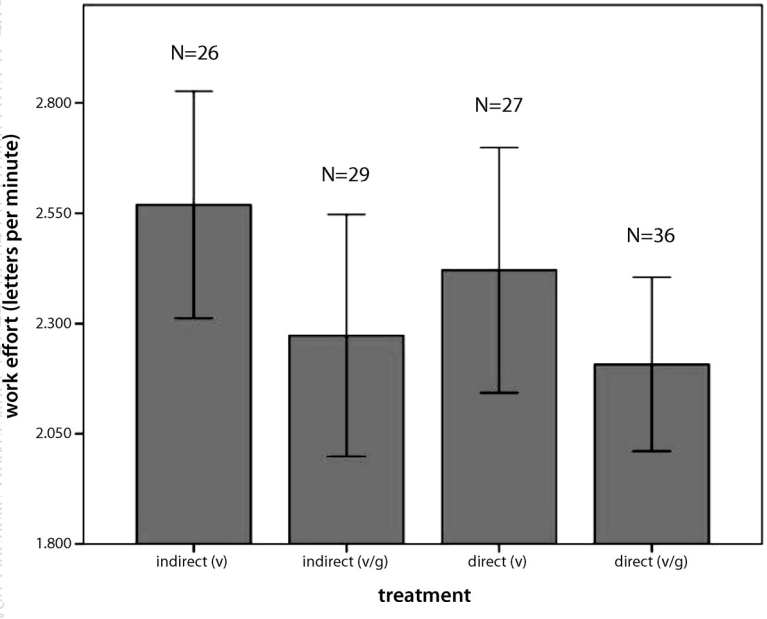


illustration. Table 2 shows the number of subjects, mean, and median for the work effort in these treatments of our sample with 118 observations. Figure 5 depicts the effort on average in a bar plot with error bars (95% confidence interval). As hypothesized, the graphical presentation of the tax scale leads to lower effort for both kinds of progressive tax scales. According to the indirect progressive tax scale, this difference is significant at a 10% level ($p = 0.057$). With respect to the direct progressive tax scale, we observe no significant differences ($p = 0.178$).

The fact that the difference is only significant for the indirect progressive tax scale is surprising, because the tax scale used in both the indirect^{v} and

the indirect$^{v/g}$ treatments is already very simple: it has only two marginal tax rates (0% and 50%). Nevertheless, explaining this simple form of taxation in more detail causes a significant decrease in the effort level. However, this is not true for the much more complex tax scale in the direct^{v} and direct$^{v/g}$ tax treatments. A possible explanation for this result is that the complexity of a tax scale itself is a determinant of its salience. The more complex taxes are, the more salient the taxation is. If subjects realize that the tax system they are confronted with is complex, this will motivate them to investigate the taxation more closely in order to understand the system. Furthermore, because the tax rate varies, it is necessary to have a look at the tax scales when the income increases. This leads to a more intense engagement and a better understanding of taxation. This interpretation is in line with the observation by Fochmann et al. (2013) that the extremely simple tax scales in the 25% and 50% tax treatments are not perceived correctly. It is simply too easy to accept them immediately.

Table 3 shows the results of different linear regression analyses with the effort as the dependent variable (standard errors in brackets). The indirect^{v} treatment is the default. To analyze the treatment effects, we use dummy variables as independent variables. The dummy variable "presentation" takes the value 1 if a subject received a tax-scale presentation (0 otherwise). The dummy variable "direct progressive tax" takes the value 1 if a subject participated in one of the two treatments with the direct progressive tax scale (0 otherwise). In specification 1, only these two dummy variables are included.

Specification 2 additionally includes information from an *ex post* questionnaire: dummies are introduced for "gender" (female = 0, male = 1), "education" (low educational level = 0, high educational level = 1)[7] and "income" (net household income per month below €2,000 = 1, above €2,000 = 0). Since we defined subjects with an income below 2,000 € as inexperienced with taxes, a value of 1 also indicates an inexperienced subject. Furthermore, we use a dummy that takes the value 1 if the person is in an "executive position," a dummy for "brain work" (no brain work = 0, brain work = 1), and a dummy for whether the person had worked on the day the experiment was carried out (if so, then "worked today" equals 1). The variable "age" is measured on a 6-point scale from 1 (20–25) to 6 (older than 65). We further asked the subjects how they felt about work in general ("value work") and how exhausting they found the experiment ("experiment exertion"). Both

7 Low educational level includes the answers: no completed apprenticeship, completed apprenticeship, and master craftsman. High educational level includes the answers: college (university of applied sciences) degree and university degree.

Table 3
Tax-salience effect

	Specification 1	Specification 2
constant	2.546***	2.537***
	(0.109)	(0.517)
Treatment effects		
presentation	−0.252**	−0.237*
	(0.121)	(0.124)
direct progressive tax	−0.103	−0.074
	(0.121)	(0.119)
Individual characteristics		
age		−0.147***
		(0.055)
gender		−0.427***
(male = 1)		(0.121)
education		0.207
(high educational level = 1)		(0.133)
hours worked		−0.0005
		(0.009)
brain work		0.001
(yes = 1)		(0.161)
executive position		0.034
(yes = 1)		(0.129)
worked today		0.273*
(yes = 1)		(0.148)
value work		0.051*
		(0.030)
experiment exertion		−0.016
		(0.027)
income (low income = 1)		0.281**
(i.e., no experience = 1)		(0.123)
N	118	111
R^2	0.043	0.304
Adjusted R^2	0.027	0.218
Specification's p-value	0.079	0.000

Note: *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

are measured on a 10-point scale from 1 (totally dissatisfied; relaxing) to 10 (deeply satisfied; exhausting). The variable "hours per week" is the number of hours a participant works per week on average.

The regression results of specification 1 show that the behavior in the indirect progressive tax treatment does not differ significantly from the behavior observed in the direct progressive tax treatment. However, as hypothesized, the dummy variable "presentation" is negative and significant at a 5% level. Thus, our previous finding that the presentation of the tax scale reduces the subjects' effort is confirmed. In specification 2, almost the same findings are observed. The only exception is that the presentation dummy is now only weakly significant (at a 10% level).With respect to demographic variables, we observe that "age" and "gender" have a significant negative and "worked today," "value work," and "income" a significant positive effect on effort. However, controlling for these effects does not change the significant presentation effect we have already detected. Overall, we can confirm our first hypothesis and thus find evidence for our conjecture 1. That means that higher tax salience indeed leads to lower tax misperception.

4.2. Tax-Experience Effect

The second hypothesis concerns the role of experience with income taxation. As we want to analyze tax-experience effects in settings with a proportional (rather simple) and a progressive (rather complex) income tax, we also look at the data collected by Fochmann et al. (2013) (tax-free, 25% tax, 50% tax treatment). Table 4 shows the average and median effort levels as well as the number of experienced (high income) and inexperienced (low income) subjects.[8] The *p*-values presented in the last column result from a Mann–Whitney *U*-test (two-sided). Figure 6 plots the average effort levels of both subject groups over all treatments.

It turns out that experience with taxation does not provide any protection against tax perception bias at all. In the flat-tax treatments, 25% tax and 50% tax, the higher income group always shows a higher effort level than the low income group (although not significantly). Experience becomes important when the tax scales become more complex, as in the four progressive tax treatments. Starting with the indirect^{v} treatment, the effort levels of the experienced subjects are always below those of the inexperienced. It is only in the direct^{v} treatment, however, that the difference is (weakly) significant (at a 10% level). In this treatment, expert knowledge has the highest value, because the tax scale is complicated and only described verbally. But the results of the direct$^{v/g}$ treatment demonstrate that expert knowledge can be replaced by a better and more transparent presentation of the tax.

8 Subjects who did not report their income are excluded from the analyses in this section. Thus, the sum of experienced and inexperienced subjects can be lower than the total number of subjects in a treatment.

Table 4

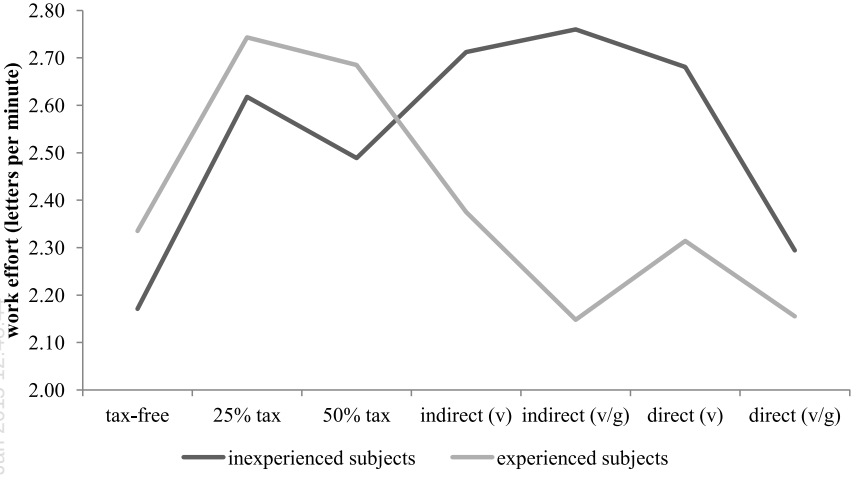
Average and Median (in Brackets) Effort Levels of Experienced and Inexperienced Subjects

Treatment	Statistic	Inexperienced subjects	Experienced subjects	*p*-value
tax-free	mean	2.171	2.335	0.409
	median	2.083	2.281	
	no. of subjects	19	41	
25% tax	mean	2.618	2.743	0.861
	median	2.512	2.380	
	no. of subjects	6	29	
50% tax	mean	2.489	2.685	0.359
	median	2.401	2.818	
	no. of subjects	10	19	
indirect^{v}	mean	2.712	2.375	0.139
	median	2.651	2.393	
	no. of subjects	15	11	
indirect$^{v/g}$	mean	2.760	2.148	0.490
	median	2.108	2.151	
	no. of subjects	5	23	
direct^{v}	mean	2.681	2.314	0.092
	median	2.532	2.162	
	no. of subjects	10	16	
direct$^{v/g}$	mean	2.294	2.155	0.257
	median	2.313	2.000	
	no. of subjects	15	17	

As in section 4.1, we run linear regressions to confirm our findings. Table 5 shows the results of these regressions with the effort as the dependent variable (standard errors in brackets). In specifications 1 to 3, the data collected by Fochmann et al. (2013) is analyzed. In specifications 4 to 6, we look at the data of our experiment.

In specification 1 only the dummy variable "income" (our measure of experience) is used as independent variable. In specification 2, we additionally control for the treatment effects. In this case the tax-free treatment is the default. The dummy variable "proportional tax" takes the value 1 if a subject participates either in the 25% or in the 50% tax treatment. The interaction term "proportional tax $\times$ 50% tax treatment" is 1 if a subject participates

Figure 6
Average Effort Levels of Experienced and Inexperienced Subjects



in the 50% tax treatment. The coefficient of this dummy variable measures the difference between the 25% and 50% tax treatments. In specification 3, we further control for individual characteristics that Fochmann et al. (2013) obtained from their *ex post* questionnaire (identical to the individual characteristics reported in section 4.1).

In specifications 4 to 6, the same procedure is applied. In specification 4, only the dummy variable "income" is used as independent variable. In specification 5, we additionally control for the treatment effects, where the treatment variables "presentation" and "direct progressive tax" are the same as used in section 4.1. The indirect^{v} treatment is the default again. In specification 6, the individual characteristics (as in section 4.1) are further applied as controls.

In the case of a proportional income tax (specification 1 to 3), we observe no experience effect. In all of these specifications, the coefficient of the dummy variable "income" is negative, but not significant. In contrast, we observe an experience effect when a progressive tax is levied on the income (specifications 4 to 6). In all of these specifications, the coefficient of the dummy variable is positive and significant at least at a 5% level. Thus, we can conclude that in the case of a proportional income tax, tax experience does not prevent a tax bias. That means that the behavior of the subjects with and without tax experience does not differ. However, in the case of a progressive income tax, tax experience plays an important role and we observe significant differences between the two groups.

Overall, we can confirm our second hypothesis and thus find evidence for our conjecture 2 for the cases with a progressive income tax. That means that higher tax experience leads to lower tax misperception. However, for the cases with a proportional income tax, we found no support for our hypothesis 2.

Table 5

Tax-experience effect

	specification 1	specification 2	specification 3	specification 4	specification 5	specification 6
	treatments: tax-free, 25% tax, 50% tax			progressive tax treatments:		
constant	2.543*** (0.075)	2.336*** (0.100)	2.793*** (0.460)	2.227*** (0.080)	2.407*** (0.123)	2.537*** (0.517)
Experience effects						
income (low income = 1) (i.e., no experience = 1)	−0.205 (0.141)	−0.165 (0.139)	−0.201 (0.135)	0.344*** (0.126)	0.316** (0.127)	0.281** (0.123)
Treatment effects						
proportional tax	–	0.414*** (0.147)	0.226 (0.140)	–	–	–
proportional tax ×50% tax treatment	–	−0.076 (0.174)	0.049 (0.160)	–	–	–
presentation	–	–	–	–	−0.225* (0.125)	−0.237* (0.124)
direct progressive tax	–	–	–	–	−0.094 (0.123)	−0.074 (0.119)
Individual characteristics	no	no	yes	no	no	yes
N	124	124	123	112	112	111
R^2	0.017	0.090	0.338	0.064	0.096	0.304
Adjusted R^2	0.009	0.067	0.265	0.055	0.071	0.218
Specification's p-value	0.150	0.010	0.000	0.008	0.012	0.000

Notes: *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

5. Discussion

The experimental results reported by Fochmann et al. (2013) demonstrate that the perception of taxes can be heavily biased even in a very simple tax

setting. In particular, they observe that individuals increase their work effort when a proportional tax with a rate of 25% or 50% is levied on the income even though the net income is identical to that in the tax-free treatment. Using our simple model, this increase can be explained by an underestimation of tax effects. We believe that the reason for this tax unawareness is that the tax salience is too low if the tax is too simple. In addition, we can show that the tax rate itself is a further determinant of tax perception. As Fochmann et al. (2013) observe no significant difference between their 25% and 50% tax treatments, we can conclude that a higher tax rate increases the impact of the tax and therefore increases its salience. As a result, tax-perception biases are reduced. A possible explanation for the higher effort in the treatments with 25% and 50% taxes is that subjects like to work for the government or derive utility from producing public goods. If this is a true explanation, however, then we should not observe that subjects work less hard if they are more aware of the tax. But the results of our four treatments show that this is precisely what happens.

A promising way to overcome the misperception of taxes is their transparent presentation. Progressive tax scales with more than one marginal tax rate have a higher tax salience, simply because they are more complex. Nevertheless, a graphical illustration also improves the accuracy of tax perception for these tax scales. Experience with taxation does not protect taxpayers from a net-wage illusion when taxes are simple and therefore not salient. It does, however, become valuable when taxes are more complicated and in need of more transparent explanation. Furthermore, this experience can be supplemented with a clear presentation of complicated tax scales so that people with little or no tax experience also have a fair chance of perceiving taxes as they are.

Our results have policy and welfare implications. Chetty et al. (2009) show theoretically that a tax that is not recognized to its full extent can lead to a lower excess burden of taxation. Therefore, an underestimation of the income tax as in our study can achieve higher total welfare than an accurate tax perception. We observe a hump-shaped curve of the tax misperception resulting from flat tax rates. Given this trend and our results concerning the role of tax experience, government should choose rather simple and rather low tax rates for efficiency and equity reasons, because these tax rates minimize excess burdens and high-income people do not benefit from their tax experience. Of course, this recommendation presumes firstly that our results hold, and secondly that the government does not have any qualms about cheating taxpayers a little bit.

On the other hand, a tax-perception bias can increase welfare losses if, for example, further decisions are negatively affected by irrational decision-making. Furthermore, Sausgruber and Tyran (2011) observe that voting be-

havior is influenced by tax perception. Thus, an incorrect perception can distort the outcome of voting decisions and therefore can create welfare losses. Policymakers should take all these effects into account if they want to influence the tax perception of individuals by, for example, changing the tax presentation.

6. Appendix

6.1. Instructions

In the following, the instructions for our experiment are displayed. As the instructions for all the treatments differ only in one specific passage, we first present the general instructions, which are identical in all the treatments, and then the specific instructions for each treatment. The instructions were originally written in German.

6.1.1. General Instructions

By participating in this experiment, you have the opportunity to earn money. The payoff at the end of the experiment depends on your individual effort. Please read the instructions carefully. If you have any further questions, please ask the experimenter.

Primary note:
The aim of this experiment is to obtain information about the individual labor supply. For this purpose you will be confronted with a real work task, with which you earn money. To compare the data of various research participants, a work task has been chosen in such a way that absolutely no previous knowledge or special talent is required and that it is easy to measure.

Procedure:
We would like to point out that communicating with other participants or leaving your seat is not allowed for the duration of the whole experiment. After reading the instructions, you will receive letters and envelopes. Your task is to fold these letters and to put them into the envelopes. Please seal the envelopes. The letters are used to acquire research participants in Magdeburg.

You determine your working time yourself. This means that there is no time limit and you can stop the experiment at any time. Afterwards, you will receive your payoff in accordance with the following rule, and you are then allowed to leave the laboratory.

[specific instructions of a treatment]

After this experiment, we will ask you to fill out a short questionnaire. We would like to emphasize that we do not record your name at any time, and therefore all your statements remain anonymous.

Enjoy yourself!

6.1.2. Specific Instructions for the Indirect^{v} and Indirect$^{v/g}$ Tax Treatments

You will receive a payoff at the end of the experiment that depends on the number of letters folded and put into envelopes. You will receive 12 cents for each letter. If you fold on average 2 letters per minute, this leads to an hourly wage of 14.40 euros; 2.5 letters, to 18.00 euros; and 3 letters, to 21.60 euros. Your income will not be subject to a tax up to an earned amount of 13.50 euros. A tax at a rate of 50% will be deducted from each amount above 13.50 euros, and the rest will be paid in cash to you at the end of the experiment.

6.1.3. Specific Instructions for the Direct^{v} and Direct$^{v/g}$ Tax Treatments

You will receive a payoff at the end of the experiment that depends on the number of letters folded and put into envelopes. You will receive 12 cents for each letter. If you fold on average 2 letters per minute, this leads to an hourly wage of 14.40 euros; 2.5 letters, to 18.00 euros; and 3 letters, to 21.60 euros. A tax will be deducted from your earned amount, and the rest will be paid to you at the end of the experiment in cash. The tax burden depends on your total amount and is determined as follows:

Bracket 1: Your total amount is between 0.00 euros and 5.00 euros:

If your total amount is not higher than 5.00 euros, no tax will be imposed.

Bracket 2: Your total amount is between 5.01 euros and 8.00 euros:

A tax is deducted from each amount above 5.00 euros. The tax rate uniformly increases from 15% (at 5.01 euros) to 25% (at 8.00 euros) in this bracket.

Bracket 3: Your total amount is between 8.01 euros and 40.25 euros:

If your total amount is in this bracket, a lump sum tax of 0.60 euros will be levied.

In addition to this tax, a further tax is deducted from each amount above 8.00 euros. The tax rate uniformly increases from 25% (at 8.01 euros) to 50% (at 40.25 euros) in this bracket.

Bracket 4: Your total amount is above 40.25 euros:

If your total amount is in this bracket, a lump sum tax of 12.70 euros will be levied.

In addition to this tax, a further tax is deducted from each amount above 40.25 euros. The tax rate is always 50%.

6.2. Duration and Number of Folded Letters

In table A1, we display the mean and median of the duration (minutes spent in the laboratory) and number of folded letters in each treatment. In addition, we report the *p*-values (Mann–Whitney *U*-test, two-sided) resulting from the treatment comparisons in table A2. With respect to the progressive tax treatments, we observe no significant differences (either for the duration or for the number of folded letters) between treatments with and without the graphical illustration.

Table 6

Duration and number of folded letters

Treatment	Duration		Number of folded letters	
	Mean	Median	Mean	Median
tax-free	64.87	61.50	148.72	145.50
25% tax	89.14	66.00	256.06	170.50
50% tax	77.81	79.00	202.16	182
indirect^{v}	59.96	58.50	156.00	127.50
indirect$^{v/g}$	74.00	64.00	168.62	149.00
direct^{v}	71.33	67.00	170.22	146.00
direct$^{v/g}$	68.67	56.50	157.50	124.50

Table 7

Statistical Analyses (Mann–Whitney U-test, two-sided)

Treatment	Duration	Number of folded letters
tax-free versus 25% tax	$p = 0.110$	$p = 0.021$
tax-free versus 50% tax	$p = 0.037$	$p = 0.007$
25% tax versus 50% tax	$p = 0.925$	$p = 0.945$
indirect^{v} versus indirect$^{v/g}$	$p = 0.1130$	$p = 0.7422$
direct^{v} versus direct$^{v/g}$	$p = 0.2295$	$p = 0.1648$

6.3. Raw Data

Table 8

Raw data

Subject	Treatment	Folded letters	Duration (min)	Effort (letters per min)	Tax experience
1	tax-free	94	39	2.410	inexperienced
2	tax-free	30	24	1.250	inexperienced
3	tax-free	93	44	2.114	inexperienced
4	tax-free	215	73	2.945	inexperienced
5	tax-free	217	107	2.028	inexperienced
6	tax-free	156	64	2.438	inexperienced
7	tax-free	275	59	4.661	inexperienced
8	tax-free	217	84	2.583	inexperienced
9	tax-free	202	101	2.000	inexperienced
10	tax-free	189	75	2.520	experienced
11	tax-free	127	91	1.396	experienced
12	tax-free	184	76	2.421	experienced
13	tax-free	49	39	1.256	experienced
14	tax-free	157	79	1.987	experienced
15	tax-free	120	81	1.481	experienced
16	tax-free	268	91	2.945	experienced
17	tax-free	160	84	1.905	experienced
18	tax-free	231	91	2.538	experienced
19	tax-free	30	17	1.765	experienced
20	tax-free	58	33	1.758	experienced
21	tax-free	107	31	3.452	experienced
22	tax-free	114	62	1.839	experienced
23	tax-free	192	70	2.743	experienced
24	tax-free	73	32	2.281	experienced
25	tax-free	145	58	2.500	inexperienced
26	tax-free	105	53	1.981	inexperienced
27	tax-free	100	48	2.083	inexperienced
28	tax-free	219	105	2.086	inexperienced
29	tax-free	138	64	2.156	inexperienced
30	tax-free	25	17	1.471	inexperienced
31	tax-free	54	26	2.077	inexperienced
32	tax-free	141	108	1.306	inexperienced
33	tax-free	104	56	1.857	inexperienced
34	tax-free	52	40	1.300	inexperienced
35	tax-free	150	80	1.875	experienced
36	tax-free	200	94	2.128	experienced
37	tax-free	40	32	1.250	experienced
38	tax-free	122	53	2.302	experienced
39	tax-free	148	61	2.426	experienced
40	tax-free	37	14	2.643	experienced
41	tax-free	57	23	2.478	experienced
42	tax-free	92	50	1.840	experienced
43	tax-free	55	36	1.528	experienced
44	tax-free	146	67	2.179	experienced
45	tax-free	78	43	1.814	experienced
46	tax-free	100	71	1.408	experienced
47	tax-free	214	100	2.140	experienced
48	tax-free	217	94	2.309	experienced
49	tax-free	200	101	1.980	experienced

Table 8
Continued.

Subject	Treatment	Folded letters	Duration (min)	Effort (letters per min)	Tax experience
50	tax-free	201	67	3.000	experienced
51	tax-free	339	107	3.168	experienced
52	tax-free	306	118	2.593	experienced
53	tax-free	165	44	3.750	experienced
54	tax-free	55	28	1.964	experienced
55	tax-free	108	32	3.375	experienced
56	tax-free	288	60	4.800	experienced
57	tax-free	405	169	2.396	experienced
58	tax-free	217	114	1.904	experienced
59	tax-free	153	61	2.508	experienced
60	tax-free	189	51	3.706	experienced
61	25% tax	410	164	2.500	inexperienced
62	25% tax	150	53	2.830	inexperienced
63	25% tax	100	42	2.381	inexperienced
64	25% tax	308	122	2.525	inexperienced
65	25% tax	1174	312	3.763	experienced
66	25% tax	166	74	2.243	experienced
67	25% tax	132	47	2.809	experienced
68	25% tax	289	66	4.379	experienced
69	25% tax	145	50	2.900	experienced
70	25% tax	230	95	2.421	experienced
71	25% tax	215	61	3.525	experienced
72	25% tax	71	33	2.152	experienced
73	25% tax	218	125	1.744	experienced
74	25% tax	305	129	2.364	experienced
75	25% tax	19	13	1.462	missing
76	25% tax	175	106	1.651	inexperienced
77	25% tax	432	113	3.823	inexperienced
78	25% tax	363	122	2.975	experienced
79	25% tax	38	16	2.375	experienced
80	25% tax	525	150	3.500	experienced
81	25% tax	1213	312	3.888	experienced
82	25% tax	144	64	2.250	experienced
83	25% tax	138	59	2.339	experienced
84	25% tax	333	109	3.055	experienced
85	25% tax	300	102	2.941	experienced
86	25% tax	151	65	2.323	experienced
87	25% tax	100	49	2.041	experienced
88	25% tax	188	94	2.000	experienced
89	25% tax	322	141	2.284	experienced
90	25% tax	160	77	2.078	experienced
91	25% tax	149	38	3.921	experienced
92	25% tax	63	17	3.706	experienced
93	25% tax	201	59	3.407	experienced
94	25% tax	21	14	1.500	experienced
95	25% tax	119	50	2.380	experienced
96	25% tax	151	66	2.288	experienced
97	50% tax	155	80	1.938	missing
98	50% tax	173	60	2.883	missing
99	50% tax	268	114	2.351	inexperienced
100	50% tax	120	58	2.069	inexperienced

Table 8
Continued.

Subject	Treatment	Folded letters	Duration (min)	Effort (letters per min)	Tax experience
101	50% tax	356	114	3.123	inexperienced
102	50% tax	100	43	2.326	inexperienced
103	50% tax	226	123	1.837	inexperienced
104	50% tax	269	92	2.924	inexperienced
105	50% tax	83	44	1.886	experienced
106	50% tax	233	72	3.236	experienced
107	50% tax	123	57	2.158	experienced
108	50% tax	200	69	2.899	experienced
109	50% tax	315	104	3.029	inexperienced
110	50% tax	332	119	2.790	inexperienced
111	50% tax	255	104	2.452	inexperienced
112	50% tax	131	66	1.985	inexperienced
113	50% tax	279	86	3.244	experienced
114	50% tax	182	66	2.758	experienced
115	50% tax	31	11	2.818	experienced
116	50% tax	62	23	2.696	experienced
117	50% tax	195	70	2.786	experienced
118	50% tax	175	74	2.365	experienced
119	50% tax	271	90	3.011	experienced
120	50% tax	143	44	3.250	experienced
121	50% tax	350	124	2.823	experienced
122	50% tax	245	81	3.025	experienced
123	50% tax	122	42	2.905	experienced
124	50% tax	182	79	2.304	experienced
125	50% tax	331	102	3.245	experienced
126	50% tax	179	91	1.967	experienced
127	50% tax	181	110	1.645	experienced
128	indirect^{v}	113	53	2.132	inexperienced
129	indirect^{v}	250	75	3.333	inexperienced
130	indirect^{v}	112	50	2.240	inexperienced
131	indirect^{v}	200	80	2.500	inexperienced
132	indirect^{v}	197	82	2.402	inexperienced
133	indirect^{v}	393	103	3.816	inexperienced
134	indirect^{v}	226	79	2.861	inexperienced
135	indirect^{v}	116	65	1.785	inexperienced
136	indirect^{v}	200	95	2.105	experienced
137	indirect^{v}	101	66	1.530	experienced
138	indirect^{v}	150	56	2.679	experienced
139	indirect^{v}	60	19	3.158	experienced
140	indirect^{v}	100	47	2.128	experienced
141	indirect^{v}	51	36	1.417	experienced
142	indirect^{v}	240	61	3.934	inexperienced
143	indirect^{v}	112	48	2.333	inexperienced
144	indirect^{v}	120	43	2.791	inexperienced
145	indirect^{v}	114	43	2.651	inexperienced
146	indirect^{v}	200	67	2.985	inexperienced
147	indirect^{v}	50	23	2.174	inexperienced
148	indirect^{v}	222	81	2.741	inexperienced
149	indirect^{v}	112	54	2.074	experienced
150	indirect^{v}	100	41	2.439	experienced
151	indirect^{v}	181	71	2.549	experienced
152	indirect^{v}	135	37	3.649	experienced

Table 8
Continued.

Subject	Treatment	Folded letters	Duration (min)	Effort (letters per min)	Tax experience
153	indirect^{v}	201	84	2.393	experienced
154	indirect$^{v/g}$	124	46	2.696	missing
155	indirect$^{v/g}$	112	62	1.806	inexperienced
156	indirect$^{v/g}$	347	188	1.846	inexperienced
157	indirect$^{v/g}$	156	74	2.108	inexperienced
158	indirect$^{v/g}$	92	51	1.804	experienced
159	indirect$^{v/g}$	46	40	1.150	experienced
160	indirect$^{v/g}$	186	84	2.214	experienced
161	indirect$^{v/g}$	347	123	2.821	experienced
162	indirect$^{v/g}$	104	63	1.651	experienced
163	indirect$^{v/g}$	132	97	1.361	experienced
164	indirect$^{v/g}$	128	60	2.133	experienced
165	indirect$^{v/g}$	291	108	2.694	experienced
166	indirect$^{v/g}$	233	77	3.026	experienced
167	indirect$^{v/g}$	368	73	5.041	inexperienced
168	indirect$^{v/g}$	186	62	3.000	inexperienced
169	indirect$^{v/g}$	129	64	2.016	experienced
170	indirect$^{v/g}$	191	86	2.221	experienced
171	indirect$^{v/g}$	55	25	2.200	experienced
172	indirect$^{v/g}$	200	93	2.151	experienced
173	indirect$^{v/g}$	100	52	1.923	experienced
174	indirect$^{v/g}$	112	44	2.545	experienced
175	indirect$^{v/g}$	149	55	2.709	experienced
176	indirect$^{v/g}$	167	61	2.738	experienced
177	indirect$^{v/g}$	300	121	2.479	experienced
178	indirect$^{v/g}$	183	88	2.080	experienced
179	indirect$^{v/g}$	127	51	2.490	experienced
180	indirect$^{v/g}$	118	81	1.457	experienced
181	indirect$^{v/g}$	41	23	1.783	experienced
182	indirect$^{v/g}$	166	94	1.766	experienced
183	direct^{v}	150	67	2.239	inexperienced
184	direct^{v}	200	65	3.077	inexperienced
185	direct^{v}	285	136	2.096	inexperienced
186	direct^{v}	121	53	2.283	inexperienced
187	direct^{v}	234	54	4.333	inexperienced
188	direct^{v}	141	55	2.564	inexperienced
189	direct^{v}	150	64	2.344	inexperienced
190	direct^{v}	146	52	2.808	inexperienced
191	direct^{v}	350	140	2.500	inexperienced
192	direct^{v}	133	63	2.111	experienced
193	direct^{v}	127	79	1.608	experienced
194	direct^{v}	115	51	2.255	experienced
195	direct^{v}	71	34	2.088	experienced
196	direct^{v}	148	73	2.027	experienced
197	direct^{v}	101	93	1.086	experienced
198	direct^{v}	197	66	2.985	experienced
199	direct^{v}	142	44	3.227	experienced
200	direct^{v}	197	89	2.213	experienced
201	direct^{v}	316	78	4.051	experienced
202	direct^{v}	134	68	1.971	experienced
203	direct^{v}	120	78	1.538	missing

Table 8
Continued.

Subject	Treatment	Folded letters	Duration (min)	Effort (letters per min)	Tax experience
204	direct^{v}	100	39	2.564	inexperienced
205	direct^{v}	181	74	2.446	experienced
206	direct^{v}	256	93	2.753	experienced
207	direct^{v}	115	68	1.691	experienced
208	direct^{v}	306	119	2.571	experienced
209	direct^{v}	60	31	1.935	experienced
210	direct$^{v/g}$	66	38	1.737	missing
211	direct$^{v/g}$	320	137	2.336	missing
212	direct$^{v/g}$	322	143	2.252	missing
213	direct$^{v/g}$	60	30	2.000	inexperienced
214	direct$^{v/g}$	220	72	3.056	inexperienced
215	direct$^{v/g}$	180	64	2.813	inexperienced
216	direct$^{v/g}$	229	97	2.361	inexperienced
217	direct$^{v/g}$	204	93	2.194	inexperienced
218	direct$^{v/g}$	229	99	2.313	inexperienced
219	direct$^{v/g}$	245	105	2.333	inexperienced
220	direct$^{v/g}$	100	49	2.041	inexperienced
221	direct$^{v/g}$	66	49	1.347	experienced
222	direct$^{v/g}$	138	47	2.936	experienced
223	direct$^{v/g}$	60	27	2.222	experienced
224	direct$^{v/g}$	52	30	1.733	experienced
225	direct$^{v/g}$	42	27	1.556	experienced
226	direct$^{v/g}$	189	95	1.989	experienced
227	direct$^{v/g}$	118	56	2.107	missing
228	direct$^{v/g}$	231	122	1.893	inexperienced
229	direct$^{v/g}$	60	40	1.500	inexperienced
230	direct$^{v/g}$	307	135	2.274	inexperienced
231	direct$^{v/g}$	80	61	1.311	inexperienced
232	direct$^{v/g}$	690	238	2.899	inexperienced
233	direct$^{v/g}$	259	109	2.376	inexperienced
234	direct$^{v/g}$	222	73	3.041	inexperienced
235	direct$^{v/g}$	243	102	2.382	experienced
236	direct$^{v/g}$	110	57	1.930	experienced
237	direct$^{v/g}$	41	21	1.952	experienced
238	direct$^{v/g}$	42	21	2.000	experienced
239	direct$^{v/g}$	46	34	1.353	experienced
240	direct$^{v/g}$	131	63	2.079	experienced
241	direct$^{v/g}$	40	28	1.429	experienced
242	direct$^{v/g}$	99	24	4.125	experienced
243	direct$^{v/g}$	41	16	2.563	experienced
244	direct$^{v/g}$	41	19	2.158	experienced
245	direct$^{v/g}$	147	51	2.882	experienced

References

Ackermann, H., Fochmann, M., and Mihm, B. (2013), Biased Effects of Taxes and Subsidies on Portfolio Choices, Economics Letters 120, 23–26.

Arrazola, M., de Hevia, J., and Sanz, J. F. (2000), More on Tax Perception and Labour Supply: the Spanish Case, Economics Letters 67, 15–21.

Blaufus, K., and Ortlieb, R. (2009), Is Simple Better? A Conjoint Analysis of the Effects of Tax Complexity on Employee Preferences Concerning Company Pension Plans, Schmalenbach Business Review 61, 60–83.

Blumkin, T., Ruffle, B. J., and Ganun, Y. (2010), Are Income and Consumption Taxes Ever Really Equivalent? Evidence from a Real-Effort Experiment with Real Goods, IZA Discussion Paper No. 5145.

Boylan, S. J., and Frischmann, P. J. (2006), Experimental Evidence on the Role of Tax Complexity in Investment Decision, Journal of the American Taxation Association 28, 69–88.

Burman, B., and Biswas, A. (2007), Partitioned Pricing: Can we Always Divide and Prosper?, Journal of Retailing 83, 423–436.

Chetty, R., Looney, A., and Kroft, K. (2009), Salience and Taxation: Theory and Evidence, American Economic Review 99, 1145–1177.

deBartolome, C. A. (1995), Which Tax Rate Do People Use: Average or Marginal?, Journal of Public Economics 56, 79–96.

Djanali, I., and Sheehan-Connor, D. (2012), Tax Affinity Hypothesis: Do We Really Hate Paying Taxes?, Journal of Economic Psychology 33, 758–775.

Feldman, N. E., and Ruffle, B. J. (2012), The Impact of Tax Exclusive and Inclusive Prices on Demand, FEDS Working Paper No. 2012-50.

Finkelstein, A. (2009), E-ZTAX: Tax Salience and Tax Rates, Quarterly Journal of Economics 124, 969–1010.

Fochmann, M., Kiesewetter, D., and Sadrieh, A. (2012a), Investment Behavior and the Biased Perception of Limited Loss Deduction in Income Taxation, Journal of Economic Behavior and Organization 81, 230–242.

Fochmann, M., Kiesewetter, D., and Sadrieh, A. (2012b), The Biased Effect of Aggregated and Disaggregated Income Taxation on Investment Decisions, Journal of Institutional and Theoretical Economics 168, 519–545.

Fochman, M., Weimann, J., Blaufus, K., Hundsdoerfer, J., and Kiesewetter, D. (2013), Net Wage Illusion in a Real Effort Experiment, Scandinavian Journal of Economics 115, 476–484.

Fujii, E. T., and Hawley, C. B. (1988), On the Accuracy of Tax Perceptions, Review of Economics & Statistics 70, 344–347.

Gamage, D., Hayashi, A., and Nakamura, B. K. (2010), Experimental Evidence of Tax Framing Effects on the Work/Leisure Decision, SSRN Working Paper.

Gensemer, B. L., Lean, J. A., and Neenan, W. B. (1965), Awareness of Marginal Income Tax Rates Among High-Income Taxpayers, National Tax Journal 18, 258–267.

Harrison, G. W., and List, J. A. (2004), Field Experiments, Journal of Economic Literature 42, 1009–1055.

Hossain, T., and Morgan, J. (2006), ldots Plus Shipping and Handling: Revenue (Non) Equivalence in Field Experiments on eBay, Advances in Economic Analysis & Policy 6.

Kim, H. M., and Kachersky, L. (2006), Dimensions of Price Salience: a Conceptual Framework for Perceptions of Multi-Dimensional Prices, Journal of Product & Brand Management 15, 139–147.

König, H., Laisney, F., Lechner, M., and Pohlmeier, W. (1995), Tax Illusion and Labour Supply of Married Women. Evidence from German Data, KYKLOS 48, 347–368.

Lewis, A. (1978), Perceptions of Tax Rates, British Tax Review 6, 358–366.

Morgan, J. N., Dye, R. F., and Hybels, J. H. (1977), Results from Two National Surveys of Philanthropic Activity, in: Commission on Private Philanthropy and Public Needs (ed.), Research Papers Volume I: History, Trends, and Current Magnitudes, 157–324.

Morwitz, V. G., Greenleaf, E. A., and Johnson, E. J. (1998), Divide and Prosper: Consumers' Reactions to Partitioned Prices, Journal of Marketing Research 35, 453–463.

Morwitz, V. G., Greenleaf, E. A., Shalev, E., and Johnson, E. J. (2009), The Price Does Not Include Additional Taxes, Fees, and Surcharges: A Review of Research on Partitioned Pricing, SSRN Working Paper.

Rupert, T. J., and Fischer, C. M. (1995), An Empirical Investigation of Taxpayer Awareness of Marginal Tax Rates, Journal of the American Taxation Association 17, 36–59.

Rupert, T. J., and Wright, A. M. (1998), The Use of Marginal Tax Rates in Decision Making: The Impact of Tax Rate Visibility, Journal of the American Taxation Association 20, 83–99.

Rupert, T. J., Single, L. E., and Wright, A. M. (2003), The Impact of Floors and Phase-Outs on Taxpayers Decisions and Understanding of Marginal Tax Rates, Journal of the American Taxation Association 25, 72–86.

Sausgruber, R., and Tyran, J.-R. (2005), Testing the Mill Hypothesis of Fiscal Illusion, Public Choice 122, 39–68.

Sausgruber, R., and Tyran, J.-R. (2011), Are We Taxing Ourselves? How Deliberation and Experience Shape Voting on Taxes, Journal of Public Economics 95, 164–176.