Arbeitskreis Quantitative Steuerlehre
Quantitative Research in Taxation – Discussion Papers

Martin Fochmann / Kristina Hemmerich / Dirk Kiesewetter

# Intrinsic and Extrinsic Effects on Behavioral Tax Biases in Risky Investment Decisions

arqus Discussion Paper No. 196

November 2015

www.arqus.info

ISSN 1861-8944

# Intrinsic and Extrinsic Effects on Behavioral Tax Biases in Risky Investment Decisions*

Martin Fochmann†, Kristina Hemmerich‡ and Dirk Kiesewetter§

University of Cologne and University of Würzburg

November 12, 2015

**Abstract**

In a variety of recent papers, it is shown that individuals do not take taxes correctly into account, which results in distorted or unexpected investment behavior. We shed further light on the discussion of such behavioral tax perception biases by analyzing intrinsic and extrinsic effects on decision behavior. We study two dimensions: (1) the influence of emotions and cognition (individual dimension, intrinsic effects) and (2) the influence of available tax information by varying tax complexity and salience (tax system dimension, extrinsic effects). In our laboratory experiment, we construct the payoff structure such that the subjects are confronted with exactly the same choices in net terms in a situation with or without a capital gains tax. This design allows us to identify pure tax perception biases. We show that both dimensions are able to explain tax perception biases. In particular, we find evidence that perceived risk (cognition) is lower and consequently willingness to take risk is higher with a capital gains tax (with full loss offset provision) than without taxation. Furthermore, this positive effect on risky investment is higher in a situation with a rather low level of tax information in which tax complexity is high and tax salience is low. In addition, we are able to provide evidence that the use of decision heuristics can explain the observed tax bias differences between our information treatments. In particular, we find a negative relationship between the information level and the use of heuristics.

**Keywords**

Tax Perception, Behavioral Taxation, Risk Taking Behavior, Tax Complexity, Tax Salience, Affect and Cognition, Experimental Economics

**JEL-Classification**

C91, D14, H24

---

* We thank Kay Blaufus, Jochen Hundsdoerfer, Matthias Braune, Ralf Maiterth, Nadja Wolf, and participants of the 2015 arqus-Conference, 2015 VHB Conference, 2015 EAA Conference, 2014 GfeW Conference for helpful comments and suggestions.

† Prof. Dr. Martin Fochmann, University of Cologne, Faculty of Management, Economics and Social Sciences, Behavioral Accounting/Taxation/Finance, Albertus-Magnus-Platz, D-50923 Köln, Germany, fochmann@wiso.uni-koeln.de.

‡ Kristina Hemmerich, University of Würzburg, Faculty of Economics and Management, Chair in Business Taxation, Sanderring 2, D-97070 Würzburg, Germany, kristina.hemmerich@uni-wuerzburg.de.

§ Prof. Dr. Dirk Kiesewetter, University of Würzburg, Faculty of Economics and Management, Chair in Business Taxation, Sanderring 2, D-97070 Würzburg, Germany, dirk.kiesewetter@uni-wuerzburg.de.

## 1 Introduction

In this study, we examine the investment behavior and the willingness to take risk under taxes. In a variety of recent papers, it is shown that individuals do not take taxes into account correctly, which results in distorted or unexpected decision behavior. We shed further light on the discussion of such behavioral tax biases by analyzing the influence of intrinsic and extrinsic effects on tax perception and decision behavior. In particular, we study two dimensions to contribute to the literature: (1) the influence of emotions and cognition (individual dimension) and (2) the influence of tax and after tax information provided by the tax system (tax system dimension). Whereas the first influence depends on the individual (i.e., intrinsic effect), the second influence depends on fiscal aspects characterizing the tax system itself which are exogenously given (i.e., extrinsic effect). For each dimension, we address the following research questions. First, how are cognitive (i.e., perceived risk) and emotional (i.e., valence and arousal) reactions to taxation related to the occurrence of tax perception biases? Second, how do changes in tax complexity and tax salience (by varying the tax information provided) influence these tax biases?

Our findings hold political and scientific implications. First, we show that both dimensions are able to explain tax perception biases. In particular, we find evidence that perceived risk is lower and consequently willingness to take risk is higher with a capital gains tax (with full loss offset provision) than without taxation. Furthermore, this positive effect on risky investment is stronger in a situation with a rather low level of tax information in which tax complexity is high and tax salience is low. As a consequence, politicians should be aware that governmental interventions could influence risk-taking behavior even more than standard neoclassical theory predicts. Second, future experimental work should consider that investment decisions can be heavily biased. We argue that experimental researchers should ensure that participants receive sufficient tax information to minimize potential tax perception biases. Furthermore, theoretical predictions can be improved if the identified perception biases are considered in investment models.

In several theoretical studies that analyze risky investment behavior under taxation, a rational investor is assumed (see, e.g., Domar and Musgrave, 1944, Stiglitz, 1969, Eeckhoudt et al., 1997, de Waegenaere et al., 2012). As indicated by the behavioral literature, individuals do not always behave as homo oeconomicus; thus, it is not very surprising that a variety of empirical papers show that observed investment behavior stands in contrast to theoretical predictions (see, e.g., Swenson, 1989, King and Wallin, 1990, Davis and Swenson, 1993, de Bartolome, 1995, Fochmann and Hemmerich, 2014). More recently, a growing body of literature—not limited to investment decisions—focuses on such tax biases and shows that taxpayers often do not take taxes into account correctly, resulting in distorted decision behavior (see, e.g., Sausgruber and Tyran, 2005, 2011, Chetty et al., 2009, Finkelstein, 2009, Fochmann et al., 2012a, Ackermann et al., 2013, Feldman and Ruffle, 2015).

To shed further light on the occurrence of tax perception biases in an investment context, we conduct a laboratory experiment. Because archival data that only measure overall responses would not enable us to identify tax perception effects, we decided to pursue an experimental method. Furthermore, a laboratory experiment allows us to clearly identify cause and effect relationships because we are able to vary the level of information provided by the tax system while keeping other economic aspects constant. This ability grants a high level of internal validity. Because individuals' responses are not examined in their natural environment, the level of external validity is lower with this type of research method. However, because an environment in which situations only differ with respect to the existence of a capital gains tax or the level of information provided by the tax system cannot be achieved in reality, such an environment can only be created in a laboratory. As a consequence, we believe that conducting a laboratory experiment is an appropriate method for answering our research questions.

In each independent situation of our simple experiment, subjects must decide on the investment in risky assets with the choice of retaining the non-invested capital. In other words, subjects have two investment alternatives: a risky asset with a positive or a negative capital gain and a risk-free asset with zero return. We use a 2x3 design with two within- and three between-subjects design treatments. In the former, we modify tax rules (no tax and tax treatments). In the latter, we vary the information provided to our subjects to detect net capital gains (low, medium, and high info treatments). In this manner, we aim at identifying the determinants of a correct tax perception. Because we are not able to measure tax perception biases directly, we use the revealed investment decision behavior as an indicator for these biases. In our experiment, we construct the payoff structure such that the subjects are confronted with exactly the same choices in net terms in a situation with or without a capital gains tax. If participants integrate the fiscal effects of taxation correctly into their decisions, they should therefore reveal exactly the same preference for the risky asset in both situations. However, if they do not integrate taxes correctly, the decision behavior is distorted, and differences between both situations are revealed. This difference in risky investment quantifies the extent to which investment behavior is biased by tax perception and is hereafter referred to as the *Perception Effect*.

From the perspective of an economic standard theory, which assumes that individuals decide only on their net payoffs, we would not expect any tax perception bias. In the behavioral tax literature, however, plenty of evidence suggests the occurrence of such a bias. For example, de Bartolome (1995), Rupert and Wright (1998), Rupert et al. (2003), Boylan and Frischmann (2006), Blaufus and Ortlieb (2009), and Ackermann et al. (2013) argue that increasing *tax complexity* lowers the quality of individual investment decisions and, therefore, increases the likelihood that subject’s decision behavior is biased. The main reason for this relationship is that a more complex decision task makes subjects more likely to rely on heuristics or on a rule of thumb (see, e.g., Greenleaf et al., 2015). If we understand tax complexity as a process that imposes cognitive costs on individuals in the case of taxation (e.g., because of complex calculations necessary to receive net values), utility gained from a risky asset is (c.p.) lower in a situation with taxation than without. As a consequence, subjects should exhibit a *lower preference* for the risky asset in the former than in the latter situation.

Another strand of literature suggests that *tax salience* (e.g., the degree of tax visibility) has a significant influence on tax perception and therefore on the occurrence of tax biases. Rupert and Wright (1998), Sausgruber and Tyran (2005, 2011), Chetty et al. (2009), Finkelstein (2009), and Fochmann and Weimann (2013) find, for example, that taxpayers underestimate their tax burden in the case of low tax salience. This effect is strongly related to the effect of partitioned pricing (for a literature review, see Greenleaf et al., 2015). The idea behind partitioned pricing is that purchasing behavior depends on whether an all-inclusive price or a partitioned price (a base price and one or more mandatory surcharges—such as shipping and handling charges or taxes) is presented to the customer. Morwitz et al. (1998), Xia and Monroe (2004), and Hossain and Morgan (2006), for example, find evidence that individuals increase their demand for goods when partitioned pricing is used. In other words, individuals tend to overestimate a good’s value because they do not take all costs into account. Greenleaf et al. (2015) argue that one explanation for this effect is that individuals use heuristics such as anchoring (where the anchor is the base price) and “then insufficiently adjust upward in response to the additional surcharge information, resulting in an underestimated total price”

(p. 12).[1] If we incorporate these findings into our study, we would expect that subjects use the gross capital gain as an anchor and insufficiently adjust to the tax information. Because the expected value of the risky asset is chosen to be positive in our experiment, a higher (perceived) expected net capital gain should be realized in a situation with taxation than in a situation without taxation (in which no misperception can occur because gross and net capital gains are identical). For our case, both the described tax salience effect and partitioned pricing effect would imply that the *perceived* (expected) capital gain after taxes (from the risky asset) is higher than the (expected) capital gain in a situation without taxation. As a consequence, subjects should exhibit a *higher preference* for the risky asset in the former than in the latter situation.

Because the influence of the extrinsic effects (tax salience and tax complexity effects) on the willingness to take risk is mixed, the tax perception bias can be positive or negative (i.e., risky investment is either increased or decreased). This fact may explain why other studies focusing on taxes with a loss offset provision observe no uniform results with respect to the sign of this bias. For example, Fochmann and Hemmerich (2014) observe a negative Perception Effect. Most studies, however, observe a positive tax perception bias, indicating that taxation spurs risky investments unexpectedly (see Fochmann et al., 2012a, 2012b, Schüßler et al., 2014).

In addition to these extrinsic effects, affective and cognitive reactions to tax regulations (intrinsic effects) can also have a significant effect on investment behavior. Schüßler et al. (2014), for example, show that investors who perceive a situation to be more positive (valence), less exciting (arousal), and less risky (cognition) exhibit a higher willingness to take risk. For our study, we therefore conjecture that decision making is also influenced by individuals' affective (i.e., arousal and valence) and cognitive (i.e., perceived risk) perception of the investment context and measure this perception. Whereas arousal and valence do not differ between the cases with and without capital gains taxation, we observe that individuals perceive the risk to be significantly lower in the case with taxation. In line with the affect heuristic (Finucane et al., 2000) and the risk-as-feelings hypothesis (Loewenstein et al., 2001), we consequently expect that the amount invested riskily is higher in the tax than in the no tax treatment (hypothesis 1), which implies a positive Perception Effect.

In contrast to other studies, we analyze both extrinsic and intrinsic effects of a capital gains tax with full loss offset. To examine the influence of extrinsic effects on tax perception, we

[1] Clark and Ward (2008), for example, find evidence for the anchoring and adjustment bias in online auctions.

use our three information treatments. In these treatments, we vary the information provided to our subjects to determine the risky asset's net capital gain. This variation has two effects: tax complexity and salience effects. Whereas complexity decreases, salience increases from the low to the high information level. Because both effects influence the extent of the tax bias in the same direction, we hypothesize that the level of the tax perception bias (Perception Effect) decreases as the information level increases (hypothesis 2).

Our main results are threefold: First, we find support for our first hypothesis and observe that subjects are willing to invest a higher share of their endowment riskily in the case of a capital gains tax (i.e., positive Perception Effect). Second, the tax perception bias is decreased by a higher level of information (hypothesis 2 is supported). However, even in the treatment with the highest information level, we find that the Perception Effect does not vanish. Third, we are able to provide evidence that the use of decision heuristics can explain the observed tax bias differences between the information treatments. In particular, we find a negative relationship between the information level and the use of heuristics.

The remainder of the paper is organized as follows: in section 2, we present our experimental design and our treatments. Hypotheses are derived in section 3. Section 4 outlines the sample and the experimental protocol. The results of our study are presented in section 5. Section 6 summarizes our results and discusses the scientific and political implications of our findings.

## 2 Experimental Design and Treatments

### 2.1 Decision Task

In our experiment, subjects decide on a risky investment in 20 independent situations. In each decision situation, every participant receives a fixed endowment $e$ of 100 lab-points (where 1 lab-point corresponds precisely to 20 Euro-cent). Participants' task is to determine which share of this endowment should be invested in risky assets. In particular, each subject is asked to determine the number of risky assets she wants to buy. The amount invested riskily is denoted by $q$. The remaining amount $(e-q)$ is not invested but is retained by the participant in cash. Individuals act as price takers and the constant asset price equals 1 lab-point. Therefore, each subject is able to buy up to 100 risky assets in each decision situation.

In every decision situation, all risky assets bought are sold and yield a cash flow (sales price). However, to keep the design of the experiment simple, we abstract from this sales process during the experiment and concentrate on the (gross) capital gain of the risky asset. The (gross) capital gain of the risky asset is the difference between the cash flow of a risky asset and its purchase price. This capital gain is denoted by *g* and depends on the state of nature *i*. A total of six states of nature are possible. In three states, the capital gain is positive, and in the other three the capital gain is negative (i.e., a capital loss is suffered).[2] All states of nature occur with the same probability $p = 1/6$. Participants do not know the actual state of nature when they decide on their risky asset investment. However, the six potential (gross) capital gains and losses are displayed before the decision is made. The risky asset's capital gain in each state of nature is chosen to satisfy the following inequalities:

$$\sum_{i=1}^{6} p \cdot g^i = \frac{1}{6} \sum_{i=1}^{6} g^i > 0, \tag{1}$$

$$g^1 > g^2 > g^3 > 0 > g^4 > g^5 > g^6. \tag{2}$$

Therefore, investing in the risky asset does not dominate cash holding in any decision situation. However, the expected value of the risky asset is always positive.

### 2.2 Treatments

We use a 2x3 design with two within- and three between-subjects design treatments.[3] In the former, we modify tax rules. In the latter, we vary the information provided to our subjects to detect net capital gains.

#### 2.2.1 Tax Treatments and Definition of Perception Effect

In 10 out of the 20 decision situations (*no tax treatment*), no capital gains tax is applied. In this case, the total payoff resulting in one decision situation is calculated as follows:

$$\pi^i_{\text{no tax}} = (e - q) + q \cdot \left(1 + g^i_{\text{no tax}}\right) = e + q \cdot g^i_{\text{no tax}}. \tag{3}$$

In the other 10 situations (*tax treatment*), the capital gain is subject to a tax with a rate $\tau$ of 50%. The tax is imposed in the case of a positive as well as a negative gross capital gain. Whereas the investor must pay a tax in the first case, she receives an immediate tax refund in the latter (immediate and full loss offset). Thus, any loss is reduced by the tax. The initial

---

2 Within one decision situation, the capital gain is identical for all risky assets (i.e., there is no difference between risky assets), but the capital gain can differ between the decision situations.

3 The instructions for all treatments are presented in appendix A1.

endowment is not subject to taxation because only a capital gains tax is applied. For example, if the gross capital gain of the risky asset amounts to 1.24 lab-points, the subject has to pay a tax of 0.62 lab-points (50% of 1.24), resulting in a net capital gain of 0.62 lab-points. If the gross capital gain is negative (i.e., a gross capital loss occurs) and amounts, for example, to -0.96 lab-points, the subject receives a tax refund of 0.48 lab-points (50% of 0.96), resulting in a net capital gain of -0.48 lab-points. The total payoff resulting in one decision situation with capital gains taxation is calculated as follows:

$$\pi^i_{\text{with tax}} = (e-q) + q \cdot \left(1 + g^i_{\text{with tax}}(1-\tau)\right) = e + q \cdot g^i_{\text{with tax}} \cdot (1-\tau). \tag{4}$$

To analyze tax perception biases in risky investment decisions, we construct the payoff structure such that the subjects are confronted with exactly the same choices in net terms in both tax treatments. In particular, we modify the gross capital gains in the tax treatment such that the net capital gains are equivalent to the corresponding capital gains in the no tax treatment (see table 1 for an example).[4] Therefore, the following holds for each state of nature *i*:

$$g^i_{\text{no tax}} = g^i_{\text{with tax}}(1-\tau). \tag{5}$$

As a consequence, if a subject chooses the same number of risky assets in both cases (i.e., $q_{\text{no tax}} = q_{\text{with tax}}$), she will receive the same payoff (for each state of nature *i*):

$$\pi^i_{\text{no tax}} = \pi^i_{\text{with tax}}. \tag{6}$$

Hence, the only difference between both treatments is that a subject is faced with both gross and net capital gains in the tax treatment and is only faced with capital gains in the no tax treatment. If participants integrate the fiscal effects of taxation correctly into their decisions, they should therefore reveal exactly the same preference for the risky asset in both the tax and the no tax treatment (i.e., $q_{\text{with tax}} = q_{\text{no tax}}$). However, any difference in the share of risky investment between the two tax treatments reveals a tax perception bias, which is hereafter referred to as the *Perception Effect (PE)*. The level of this bias can be calculated as follows:

$$q_{\text{with tax}} - q_{\text{no tax}} = PE. \tag{7}$$

---

4 In appendix A2, the potential gross and net capital gains for the 20 decision situations are displayed, separated by tax treatment. We use 10 different decision situations per tax treatment to achieve a sufficiently high number of observations for our statistical analyses.

**Table 1:** Gross and net capital gains in both tax treatments (example)

| | no tax treatment | | | | | | tax treatment | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | state 1 | state 2 | state 3 | state 4 | state 5 | state 6 | state 1 | state 2 | state 3 | state 4 | state 5 | state 6 |
| gross capital gain | **0.62** | **0.54** | **0.46** | **-0.32** | **-0.40** | **-0.48** | 1.24 | 1.08 | 0.92 | -0.64 | -0.80 | -0.96 |
| **net capital gain** | | | | | | | **0.62** | **0.54** | **0.46** | **-0.32** | **-0.40** | **-0.48** |

*Note:* This table provides an example of the risky asset's gross and net capital gains for both tax treatments. The tax rate is 50%. The values that are equivalent in both treatments are highlighted in bold.

### 2.2.2 Information Treatments

Each participant is assigned to one of three between-subjects design treatments. The difference between the three treatments is the information provided to our subjects to determine the risky asset's net capital gain and potential payoffs in each decision situation. All other factors such as the level of gross and net capital gains, taxation rules, or number of decision situations are not varied. In the *low info treatment*, subjects only receive the potential gross capital gains for each state of nature but no aids for their calculations. In the *medium info treatment*, participants receive the gross capital gains and have the possibility to use a computerized "what-if"-calculator for their own calculations. This calculator allows subjects to calculate the tax, net capital gain, and resulting payoff at different investment levels automatically. Furthermore, we provide subjects with a pocket calculator. In the *high info treatment*, participants receive the potential gross capital gains, the "what-if"-calculator, the pocket calculator, and the potential net capital gains are displayed for each state of nature. Table 2 provides an overview on our three treatments.

**Table 2:** Design of the information treatments

| **low info treatment** | **medium info treatment** | **high info treatment** |
|---|---|---|
| display of gross capital gain | display of gross capital gain | display of gross capital gain |
| | "what-if"-calculator; pocket calculator | "what-if"-calculator; pocket calculator |
| | | display of net capital gain |

*Note:* This table highlights the differences between the three between-subjects design treatments.

## 3 Hypotheses

### 3.1 Intrinsic Effect: Affective/Cognitive Perception and Tax Perception Bias

In our study, we analyze two dimensions that influence tax perception and consequently decision behavior: individual and tax system dimension. The tax system dimension refers to the influence of tax complexity and tax salience on tax perception. Because these fiscal aspects characterize the tax system itself and are therefore exogenously given for each subject, we call these effects extrinsic effects. The individual dimension refers to the idea that emotions and cognition influence tax perception. Because emotional and cognitive reactions depend on the individual itself, we call these effects intrinsic effects. In a variety of recent papers, it is shown that decision making is influenced by these effects. For example, affective reactions influence bidding behavior in auctions (Ku et al., 2005, Adam et al., 2015) and the development of asset pricing bubbles (Andrade et al., 2015). Heilmann et al. (2010) show that negative affect increases risk aversion, and Mussel et al. (2015) find that positive affect leads to a higher willingness to take risk.[5] Schüßler et al. (2014) observe that risk taking is influenced by affective and cognitive reactions to tax regulations. In particular, they show that investors who perceive a situation to be more positive, less exciting, and less risky exhibit a higher willingness to take risk. The observed results are in line with the affect heuristic (Finucane et al., 2000) and the risk-as-feelings hypothesis (Loewenstein et al., 2001). Both postulate that decision makers use affective reactions to objects and events when making decisions. In particular, positive affect is linked to a lower risk perception, leading to more risk-taking, whereas the opposite is true for negative affect.

We conjecture that affect and cognition also influence the investment behavior of our individuals under taxes. Therefore, we measure the affective and cognitive perception of the investment context. We follow Russel’s (1980) circumplex model of affect, which states that the entire emotional continuum can be explained by valence and arousal. After the actual experiment was completed, participants were again confronted with two decision situations from the experiment: one decision situation with a capital gains tax and one without.[6] For each decision situation, subjects were asked to rate the presented situation with respect to valence, arousal, and cognition (i.e., perceived risk) on a 9-point Likert scale. In particular, the participants were asked the following questions:

---

[5] For the relationship between affect and risk aversion see also the studies of Isen and Patrick (1983), Johnson and Tversky (1983), Au et al. (2003), LeBoeuf and Shafir (2005), and Seo et al. (2010).

[6] We used decision situations 2 (without tax) and 14 (with tax) presented in table A1 (see appendix A2).

- *Valence*: How pleasant do you perceive the situation?
  (1 = extremely unpleasant, 9 = extremely pleasant)
- *Arousal*: How excited are you to be in the situation?
  (1 = completely calm, 9 = extremely excited)
- *Cognition*: How secure do you perceive the situation?
  (1 = extremely secure, 9 = extremely unsecure)

Additionally, we asked our participants to generally rate cognition, valence, and arousal for the case with and that without taxation. In contrast to the previous proceeding, we did not present a certain decision situation with specific values for the capital gains. Instead, we asked the participants generally how secure and pleasant they perceive a situation with/without a tax and how excited they are to be in a situation with/without a tax. Again, we used the 9-point Likert scales for each question.

For each subjective rating (cognition, valence, and arousal), we therefore collected four measures per participant: two measures for the case with taxation (one measure for the general rating and one measure for the rating of a specific decision situation) and two measures for the case without taxation (one measure for the general rating and one for the specific decision situation rating). Because we are interested in the differences in subjective ratings between the cases with and without taxation, we first calculated (for each subjective rating) the mean of the general rating and the specific decision situation rating for each case. Second, we calculated the differences in subjective ratings between the cases with and without taxation. Table 3 presents the subjective ratings on average and the differences between the two cases, which are denoted by the following:[7]

$$\begin{aligned}\Delta valence &= valence_{\text{with tax}} - valence_{\text{no tax}}\\ \Delta arousal &= arousal_{\text{with tax}} - arousal_{\text{no tax}}\\ \Delta cognition &= cognition_{\text{with tax}} - cognition_{\text{no tax}}\end{aligned} \tag{8}$$

We observe that the imposition of the capital gains tax influences the affective and cognitive perception of our participants. Generally, we find that subjects perceive the situation as more pleasant, more exciting, and more secure in the case with taxation. However, the difference between the two tax treatments is only significant with respect to cognition (Wilcoxon signed-rank test, two-sided, p = 0.002). This finding indicates that subjects significantly perceive that

[7] For this analysis, we pooled the data from our three information treatments. However, we observe the same pattern if we present the data for each treatment separately.

the risk is lower in the case with taxation than in that without. An explanation for this finding might be that subjects overestimate the positive tax effect of the loss offset provision (which reduces capital losses). This explanation is in line with the observation of Schüßler et al. (2014), who find that investors perceive a choice situation with loss deduction to be more positive, less exciting, and less risky than one without.

In our experiment, we choose the payoffs such that the decision situations in the tax and no tax treatments are identical in net terms. Therefore, from the perspective of an economic standard theory, which assumes that individuals make decisions based only on their net payoffs, subjects should reveal the same preference for the risky asset in both treatments (i.e., $q_{\text{with tax}} = q_{\text{no tax}}$ and $PE = 0$). However, because we observe that individuals perceive risk to be lower in the case with taxation than in that without, we hypothesize that the individuals have a higher preference for the risky asset in the tax than in the no tax treatment (i.e., $q_{\text{with tax}} > q_{\text{no tax}}$). This result would imply a positive Perception Effect (i.e., $PE > 0$). As a consequence, we formulate our first hypothesis as follows:

*Hypothesis 1: The amount invested riskily is higher in the tax than in the no tax treatment (i.e., $q_{\text{with tax}} > q_{\text{no tax}}$ and $PE > 0$).*

**Table 3:** Affective and cognitive perception

| **valence** (1 = extremely unpleasant, 9 = extremely pleasant) | | | **arousal** (1 = completely calm, 9 = extremely excited) | | | **cognition** (1 = extremely secure, 9 = extremely unsecure) | | |
|---|---|---|---|---|---|---|---|---|
| no tax treatment | tax treatment | Δ | no tax treatment | tax treatment | Δ | no tax treatment | tax treatment | Δ |
| 5.27 | 5.38 | +0.11 | 3.98 | 4.06 | +0.08 | 5.27 | 4.77 | -0.50 |

*Note:* In this table, the subjective ratings valence, arousal, and cognition are presented for each treatment. Each rating is measured on a 9-point Likert scale. The participants were asked how pleasant they perceive the situation (valence, 1 = extremely unpleasant, 9 = extremely pleasant), how excited they are to be in the situation (arousal, 1 = completely calm, 9 = extremely excited), and how secure they perceive the situation (cognition, 1 = extremely secure, 9 = extremely unsecure). In all cases, the mean value is presented and $\Delta$ denotes the difference between the cases with and without taxation.

### 3.2 Extrinsic Effect: Information Level and Tax Perception Bias

In our information treatments, we vary the information provided to our subjects to determine the risky asset's net capital gain. This variation has two extrinsic effects: tax complexity and salience effects. In contrast to the intrinsic effects that influence tax perception from an individual perspective (individual dimension), these fiscal aspects are exogenously given by the tax system (tax system dimension). From the low to the high information level, salience increases whereas complexity decreases. In the low info treatment, for example, subjects receive no aids to calculate net capital gains. Therefore, it is much more complicated for the individuals to gain the same information about the net capital gains in this treatment than in the medium info treatment, in which a "what-if"-calculator and a pocket calculator are provided. However, in the high info treatment, this information is even easier to obtain because the net capital gains are explicitly displayed. De Bartolome (1995), Rupert and Wright (1998), Rupert et al. (2003), Boylan and Frischmann (2006), Blaufus and Ortlieb (2009), and Ackermann et al. (2013) argue that increasing tax complexity lowers the quality of individual investment decisions and therefore increases the likelihood that subjects' decision behavior is biased. The main reason for this relationship is that a more complex decision task makes subjects more likely to rely on heuristics or on a rule of thumb (see, for example, Greenleaf et al., 2015). From this perspective, we therefore expect that tax biases are highest in the low info treatment and lowest in the high info treatment.

Because the tax amount and the net capital gain are displayed when an individual uses the "what-if"-calculator, the tax salience level is higher in the medium and high info treatments than in the low info treatment. Because the net capital gains are additionally presented next to the gross capital gains in the high info treatment, the salience of the after tax values is highest in this treatment. Rupert and Wright (1998), Sausgruber and Tyran (2005, 2011), Chetty et al. (2009), Finkelstein (2009), and Fochmann and Weimann (2013) show that the higher the salience of a tax is (e.g., the degree of tax visibility), the higher the tax perception becomes. Therefore, a salient tax will reduce tax perception biases. From this perspective, we should observe the lowest (highest) tax bias in the high (low) info treatment.

Because both effects influence the extent of the tax bias in the same direction, we can formulate the following hypothesis:

*Hypothesis 2: The level of the tax perception bias, the Perception Effect (PE), decreases as the information level increases (i.e.,* $PE^{\text{low info}} > PE^{\text{medium info}} > PE^{\text{high info}}$*).*

Although we present the gross and net capital gains in the high info treatment, a tax perception bias can also occur in this treatment (i.e., $PE \neq 0$). For example, Xia and Monroe (2004) find that the partitioned pricing effect occurs even in a setting in which the partitioned price (base price and one or more mandatory surcharges—such as shipping and handling charges or taxes) and the all-inclusive price are presented simultaneously, which is very similar to the situation in our high info treatment (in which both the gross and net capital gains are presented).

## 4 Sample and Experimental Protocol

The experiment was conducted at the computerized experimental laboratory of Leibniz University Hannover (LLEW) in August and September 2014. In total, 94 subjects (41 females and 53 males) participated and earned, on average, 23.05 Euros in approximately 100 minutes (approximately 13.83 Euros per hour). Participants were paid in cash immediately after the experiment. A show-up fee was not paid. Table 4 provides an overview of the main characteristics of our participants. The experimental software was programmed with z-Tree (Fischbacher, 2007) and the participants were recruited with the software hroot (Bock et al., 2014).

**Table 4:** Descriptive statistics for individual characteristics

| | **mean** | **median** | **standard deviation** |
|---|---|---|---|
| **age** | 23.42 | 23.00 | 2.91 |
| **female** | 43.62% | | |
| **econ major** | 24.47% | | |
| **bachelor's degree** | 77.66% | | |
| **no. of semesters studied** | 4.91 | 5.00 | 2.63 |
| **investment behavior** | 1.60 | 2.00 | 0.65 |
| **income (in Euro)** | 309.90 | 300.00 | 183.49 |
| **focus on net payoffs** | 70.97% | | |
| **tax knowledge** | 21.51% | | |
| **tax declaration completed** | 29.03% | | |

*Note:* This table provides an overview of the individual characteristics of the 94 participants of the experiment. "Economics major" ("bachelor's degree") denotes whether a subject studies economics or management (in a bachelor's degree program). "Investment behavior" measures whether a subject regularly invests capital in investment assets, 1 = never, 2 = occasionally, 3 = regularly. "Income" is the monthly income after fixed cost. "Focus on net payoffs" denotes whether a subject stated that she focused rather on net payoffs in the decision situations. "Tax knowledge" shows whether a subject has tax knowledge (e.g., because of an apprenticeship or lectures on tax law), and "tax declaration completed" denotes whether a subject stated that she ever completed a tax declaration in the past.

Before the actual experiment was executed, we measured subjects' willingness to take risk (paper-based). We used a modified version of the choice-table approach presented by Dohmen et al. (2010).[8] Participants were asked to choose between a risk-free payment and a

[8] Instructions were originally written in German.

lottery in 10 decision situations. Whereas the risk-free payment is identical in all situations (2 Euros), the lottery offers either -100% or +200% of the risk-free payment (0 or 4 Euros). The probability of the higher (lower) payoff increases (decreases) with the number of the decision situation (see table 5). As a consequence, the expected value of the lottery and therefore the willingness to choose the risky alternative increases as well. We use the total number of lottery choices (out of 10) as our measure for the willingness to take risk. In this regard, subject's willingness to make risky investments is measured on an 11-point Likert scale, where 0 = not willing to take risk and 10 = highly willing to take risk.

With respect to our actual experiment, the sequence of the 20 decision situations was randomized for each participant to avoid order effects. Although we used a very simple setting with a simple tax rate and simple tax rules, we provided several mechanisms to make sure subjects understood the decision environment. First, we included a detailed numerical example for a positive and a negative gross capital gain in the written instructions. We differentiated between a decision situation in which no tax and in which a tax is applied. In the latter case, the instructions provided a detailed explanation of how to compute the net capital gain. Second, subjects had to solve two further numerical examples correctly to ensure comprehension. Only after all subjects passed this comprehension test, the experiment started. When the participants had completed the 20 decision situations, they were asked to rate two specific decision situations as well as a situation with and without taxation in general with respect to affective and cognitive perception (see section 3.1). A questionnaire was then presented to obtain further information about the participants.

After the entire experiment was completed, we first determined participants' payoff from the experiment conducted to measure subjects' willingness to take risk. To this end, each participant was asked to cast a ten-sided die (with 1, 2, …, 10) to determine the relevant decision situation by chance. If the participant had chosen the risk-free payment in the relevant decision situation, her payoff was 2 Euros. Otherwise, the participant had to cast a ten-sided die (with 10, 20, …, 100) once more. If the diced number was less than or equal to the probability for the higher payoff, she received 4 Euros. Otherwise, the participant received 0 Euros.

To avoid income effects and strategies to hedge the risk across all decision situations, only one out of the 20 decision situations determined the pay from the actual experiment. Each participant was asked to draw a number randomly from 1 to 20 to determine the payoff relevant decision situation. The participant then had to cast a six-sided die to determine the relevant state of nature. Depending on the chosen quantity of the risky asset in the selected decision situation and the relevant state of nature, the participant's payoff was calculated, converted to Euro, and paid out in cash.

**Table 5:** Experiment to measure subjects' individual willingness to take risk

| | risk-free payment | Your Choice: risk-free payment | Your Choice: lottery | lottery |
|---|---|---|---|---|
| 1. | 2 € | o | o | 4 € with 10% or 0 € with 90% |
| 2. | 2 € | o | o | 4 € with 20% or 0 € with 80% |
| 3. | 2 € | o | o | 4 € with 30% or 0 € with 70% |
| 4. | 2 € | o | o | 4 € with 40% or 0 € with 60% |
| 5. | 2 € | o | o | 4 € with 50% or 0 € with 50% |
| 6. | 2 € | o | o | 4 € with 60% or 0 € with 40% |
| 7. | 2 € | o | o | 4 € with 70% or 0 € with 30% |
| 8. | 2 € | o | o | 4 € with 80% or 0 € with 20% |
| 9. | 2 € | o | o | 4 € with 90% or 0 € with 10% |
| 10. | 2 € | o | o | 4 € with 100% or 0 € with 0% |

*Note:* This choice table was presented to the subjects in the paper-based experiment to measure subjects' willingness to take risk. Originally, this table was written in German.

# 5 Results

## 5.1 Willingness to Take Risk and Risk Taking Behavior

For our statistical analyses, we use the share of endowment invested in the risky asset as our dependent variable. The residual endowment is retained by the investor in cash. Table 6 presents the mean, median, standard deviation (SD), and the number of observations of the dependent variable separated by treatments. Figure 1 displays the mean values. We observe that the share of endowment invested riskily is highest in the medium info treatment and lowest in the high info treatment (irrespective of whether a tax is applied). Therefore, at first glance, it appears that the information level influences risk-taking behavior in some way. However, these differences can be explained by the different risk attitudes of the participants in our between-subjects design treatments.

Table 7 shows the descriptive statistics for our willingness to take risk measure (see section 4). We find that participants assigned to the medium (high) info treatment exhibit a higher (lower) willingness to take risk than participants assigned to the other two treatments.[9] Furthermore, we observe (as expected) a highly significant and positive correlation between the revealed willingness to take risk and the share of endowment invested in the risky asset (Spearman's rank correlation coefficient across all treatments equals 0.439, $p < 0.001$).[10] This finding implies that participants with a higher willingness to take risk invest a higher share of their endowment riskily in the actual experiment. As a consequence, the differences between the treatments regarding the share of endowment invested in the risky asset cannot be explained by different information levels but rather by the different risk attitudes of our subjects.

Considering the differing risk attitudes across the treatments, we must concede that our randomization has failed with respect to the willingness to take risk. However, our primary focus (to analyze tax perception biases) is not the difference in risky asset investment across the three information treatments but the difference in risky asset investment between the two tax treatments. In this case, regardless of the information level, the same participant decides on the risky asset investment in the decision situations with and without taxation (within-subjects design). Consequently, differing risk attitudes across the three between-subjects design treatments do not influence the analysis of the Perception Effect.

---

[9] As a robustness check, participants' risk attitude was additionally collected as part of our questionnaire. The survey question (obtained from the SOEP survey) asked participants to assess their general willingness to take risk using an 11-point scale, where 0 = not willing to take risk and 10 = highly willing to take risk. Here, no obscurities about completing the table or the procedure of the payout at the end of the experiment could occur (see Dohmen et al., 2010, p. 1255, for a detailed discussion). However, the self-assessment was not incentivized. We observe a mean value of 3.67, 4.66, and 3.54 in the low, medium, and high info treatments, respectively. Therefore, participants of the medium info treatment claim on average, to be more willing to take risk in general than the participants of both other treatments. The mean willingness to take risk is lowest among the subjects of the high info treatment. As a result, we observe the same pattern as with our (incentivized) willingness to take risk measure.

[10] Because we only have one observation for each participant's willingness to take risk but 20 observations for the share of endowment invested in the risky asset (20 decision situations), we calculated the mean share of endowment invested riskily across all 20 decision situations to avoid autocorrelation or a lack of random selection.

**Table 6:** Share of endowment invested in the risky asset

| treatment | statistic | no tax treatment | tax treatment |
|---|---|---|---|
| low info<br>(# of subjects: 33) | mean | 47.49 | 53.27 |
| | median | 41 | 50 |
| | SD | 32.02 | 29.83 |
| | # of observations | 330 | 330 |
| medium info<br>(# of subjects: 33) | mean | 53.15 | 55.86 |
| | median | 50 | 51 |
| | SD | 34.79 | 33.02 |
| | # of observations | 330 | 330 |
| high info<br>(# of subjects: 28) | mean | 39.51 | 42.19 |
| | median | 30 | 40 |
| | SD | 29.42 | 31.70 |
| | # of observations | 280 | 280 |

*Note:* This table presents the descriptive statistics for the share of endowment invested in the risky asset in all treatments.

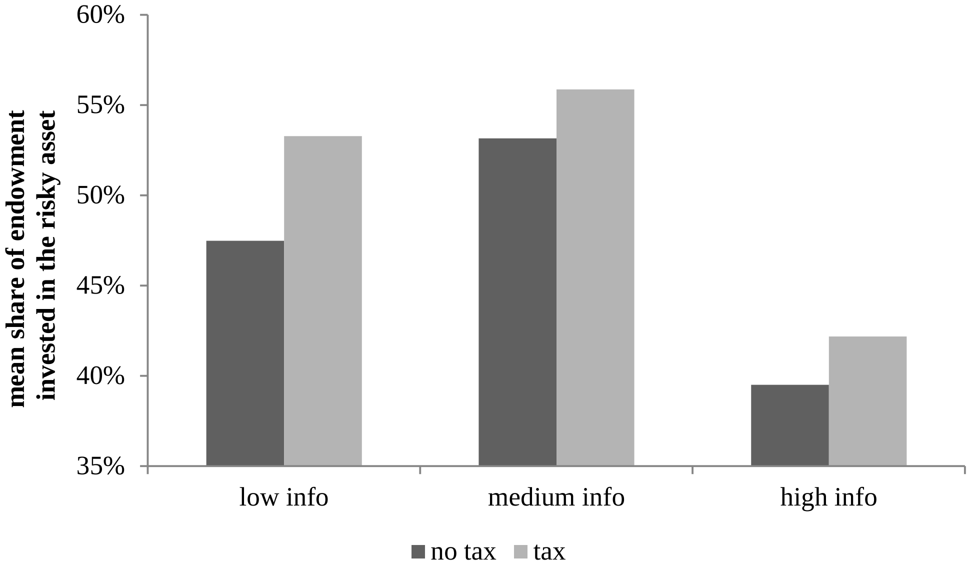


**Figure 1:** Mean share of endowment invested in the risky asset (in percent)

*Note:* In this figure, the mean share of endowment invested in the risky asset is depicted for each treatment.

**Table 7:** Subjects' willingness to take risk

| statistic | low info treatment | medium info treatment | high info treatment |
|---|---|---|---|
| mean | 4.09 | 4.58 | 3.75 |
| median | 4.00 | 5.00 | 4.00 |
| SD | 1.28 | 1.20 | 1.51 |
| # of observations | 33 | 33 | 28 |
| minimum | 1 | 1 | 1 |
| maximum | 6 | 7 | 7 |

*Note:* This table shows the descriptive statistics for our willingness to take risk measure for each between-subjects design treatment.

### 5.2 Perception Effect

Because the decision situations in the two tax treatments are identical in net terms, every difference in risky asset investment between these two treatments reveals a tax perception bias (see section 2.2.1). Evidence for the existence of such a bias is provided in figure 1, which shows that investment in the risky asset is always higher in the cases with a capital gains tax. To further analyze this behavior, we calculated the Perception Effect using equation (7).[11] In particular, the Perception Effect is the difference in the amount invested riskily between the two tax treatments. Because the available endowment equals 100 lab-points, the Perception Effect can also be expressed in % of the endowment. Table 8 presents the mean values of the calculated Perception Effect. To control for outliers, we report the data for the full sample as well as for truncated and winsorized samples.[12] Figure 2 illustrates the Perception Effect for the full sample. As expected, we find that the Perception Effect does exist and is positive in all three information treatments. However, the bias is distinctly higher in the treatment with low information (5.78%) than in the treatments with medium (2.71%) or high (2.67%) information.

To analyze whether the calculated Perception Effect is significantly different from zero, we utilize the non-parametric Wilcoxon signed-rank test (two-sided).[13] Table 8 (upper part)

[11] We calculated the difference in risky asset investment between a decision situation in the tax treatment and the corresponding decision situation in the no tax treatment. Because a subject is confronted with 10 decision situations per treatment, 10 values for the Perception Effect are calculated for each participant.

[12] In the two latter cases, we truncated and winsorized the full sample at the 2% and 98% percentiles.

[13] Because one subject makes a decision in the decision situations of both the tax and the no tax treatment (within-subjects design) and because we calculate the Perception Effect as the difference in risky asset investment between these treatments, we apply the Wilcoxon signed-rank test for one sample to analyze whether the calculated Perception Effect is statistically different from zero. Note that the Wilcoxon signed-

provides the resulting *p*-values. We observe that the Perception Effect is significant in all three treatments and in each sample. Therefore, we find support for our first hypothesis (i.e., the amount invested riskily is higher in the tax than in the no tax treatment). However, the magnitude of this bias depends on the information level. In the cases of low and medium information, the Perception Effect is significant at the 1%-level and 5%-level, respectively. In the case of high information, the Perception Effect is significant at the 10%-level only. From this point of view, it appears that the magnitude of the perception bias decreases with an increase in information level, supporting our second hypothesis (i.e., the higher the information level, the lower the Perception Effect). To further analyze this finding, we apply non-parametric Mann-Whitney U tests (two-sided) for independent samples and examine whether the Perception Effect differs statistically between two information treatments. The resulting *p*-values are summarized in table 8 (lower part). Independent of the sample, we observe significant differences (at least at the 10%-level) between the low and high info treatments as well as between the low and medium info treatment. In both comparisons, we observe that the perception bias is more pronounced in the low info treatment. However, between the medium and high info treatment, we find no significant differences.

As a consequence, we can draw the following conclusions: First, the investment decisions of the subjects are biased. In particular, subjects are willing to invest a higher share of their endowment riskily in the case of a capital gains tax (hypothesis 1 is supported). In the low info treatment, in particular, in which neither a "what-if"-calculator nor a pocket calculator is available to the subjects, we observe that the investment decisions are heavily biased. Second, the perception bias decreases with increasing information level, which supports hypothesis 2. Third, although a higher information level reduces the bias, we do not observe that the Perception Effect vanishes. Even at a high information level we find a significant Perception Effect (although only at the 10%-level). Fourth, we do not find differences between the medium and high info treatments. This finding indicates that providing subjects with a "what-if"-calculator and a pocket calculator reduces the perception bias. However, the additional presentation of the risky asset's net capital gains has no further diminishing effect.

rank test for two dependent samples, which analyzes whether two dependent samples (in our case, with and without taxation) are statistically different from each other, would reveal exactly the same results.

**Table 8:** Statistical analyses of the Perception Effect (measured in % of endowment)

| treatment | Perception Effect (full sample) | Perception Effect (truncated, 2%) | Perception Effect (winsorized, 2%) |
|---|---|---|---|
| | Wilcoxon signed-rank test, two-sided | | |
| low info | 5.78<br>$p < 0.001$ | 5.83<br>$p < 0.001$ | 5.80<br>$p < 0.001$ |
| medium info | 2.71<br>$p = 0.011$ | 2.97<br>$p = 0.007$ | 2.77<br>$p = 0.012$ |
| high info | 2.67<br>$p = 0.079$ | 2.83<br>$p = 0.061$ | 2.46<br>$p = 0.081$ |
| | Mann-Whitney U test, two-sided | | |
| low vs. medium info | $p = 0.049$ | $p = 0.038$ | $p = 0.044$ |
| low vs. high info | $p = 0.090$ | $p = 0.076$ | $p = 0.091$ |
| medium vs. high info | $p = 0.950$ | $p = 0.940$ | $p = 0.970$ |

*Note:* In this table, the mean Perception Effect is presented for each information treatment. The full sample includes all observations. To control for outliers, we truncated/winsorized the full sample at the 2% and 98% percentile. In the upper part, each p-value results from a non-parametric Wilcoxon signed-rank test for one sample (two-sided), which analyzes whether the Perception Effect is significantly different from zero. In the lower part, each p-value results from a non-parametric Mann-Whitney U test for independent samples (two-sided), which analyzes whether the Perception Effect differs statistically between two information treatments.

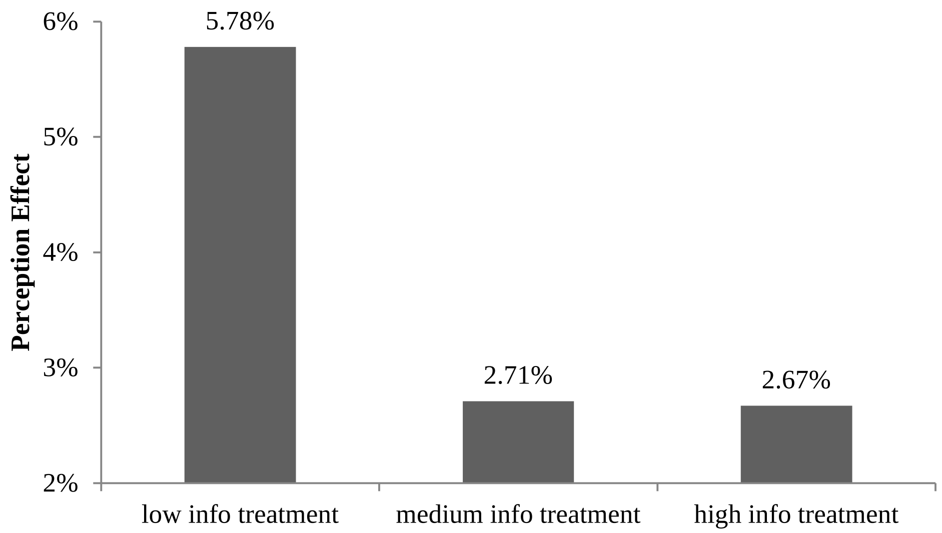


**Figure 2:** Perception Effect (in % of endowment)

*Note:* This figure illustrates the mean Perception Effect for each cognitive load treatment (full sample).

Furthermore, as indicated in section 3.1, we find that individuals perceive the situation as more pleasant (valence), more exciting (arousal), and more secure (cognition) in cases with taxation than in cases without (whereas the effect is only significant in the latter). To examine the relationship between these tax-induced changes in affective and cognitive perception (i.e., Δvalence, Δarousal, and Δcognition) and the Perception Effect (i.e., difference in risky investment between tax and no tax treatment), we utilize Spearman's rank correlation coefficient.[14] The results are summarized in table 9.[15] We consistently observe that the correlation between Δvalence (Δarousal, Δcognition) and the Perception Effect is positive (negative). This finding can be interpreted as follows: The more pleasant, less exciting, or more secure a situation is perceived in the tax treatment compared to the no tax treatment, the higher the risky investment becomes in the tax treatment compared to the no tax treatment.

**Table 9:** Correlations between the Perception Effect (i.e., difference in risky investment between tax and no tax treatment) and the changes in cognitive and affective perception

| **Correlation between Perception Effect and…** | | |
|---|---|---|
| …Δ valence | …Δ arousal | …Δ cognition |
| *r* = 0.203<br>(*p* = 0.049) | *r* = -0.241<br>(*p* = 0.019) | *r* = -0.264<br>(*p* = 0.010) |

*Note:* In this table, the Spearman rank correlation coefficients between the Perception Effect and changes in cognitive and affective perception are presented. The Perception Effect is defined as the difference in risky investment between the tax and no tax treatment. With respect to cognitive and affective perception, the participants were asked how pleasant they perceive the situation (valence, 1 = extremely unpleasant, 9 = extremely pleasant), how excited they are to be in the situation (arousal, 1 = completely calm, 9 = extremely excited), and how secure they perceive the situation (cognition, 1 = extremely secure, 9 = extremely unsecure). Δ denotes the difference between the cases with and without taxation.

## 5.3 Use of Decision Heuristics

A variety of studies show that tax perception biases increase with increasing tax complexity or decreasing tax salience (see section 3.2). The most plausible explanation for these observations is that subjects increasingly tend to use a decision heuristic in these cases (see, for example, Greenleaf et al., 2015). Although we did not test this relationship explicitly, we are able to provide evidence that the use of decision heuristics can explain the observed tax

[14] We only have one observation for Δ valence, Δ arousal, and Δ cognition per participant, but 10 observations for the Perception Effect. Therefore, we calculated the mean Perception Effect for each participant before calculating Spearman's rank correlation coefficient.

[15] For this analysis, we pooled the data from our three information treatments.

bias differences between the information treatments. In particular, we find a negative relationship between the information level and the use of heuristics.

Because a lower information level implies that subjects have less information and therefore must spend more time to reach the same level of knowledge as the subjects in a treatment with a higher information level, a negative relationship between information level and time is generally expected. Surprisingly, the participants in the low info treatment, who spent 21.84 sec. on average, were fastest. In the medium info treatment, the mean time spent per decision situation was 31.82 sec., whereas participants in the high info treatment spent 39.23 sec. on average. The Mann-Whitney U tests (two-sided) show that in the case of a low information level, the participants spent significantly less time on a decision situation than in the case of a medium ($p < 0.001$) or high ($p < 0.001$) information level. The difference between the medium and high information treatments is statistically significant at the 5%-level ($p = 0.020$). Clearly, a lower information level does not induce the participants to dwell upon a decision situation to compensate for the missing information. In contrast, participants spend more time per decision situation if more sources of information are offered.[16]

One possible explanation for this unexpected finding is that our subjects differ systematically between the treatments, for example, with respect to tax problem comprehension, tax knowledge, or tax and investment experiences. We first examine the time spent to pass the comprehension test, in which subjects had to solve two numerical examples correctly. On average, participants needed 10.57, 8.14, and 10.85 min. to complete the comprehension test in the low, medium, and high info treatments, respectively.[17] These results indicate no systematic differences, and we conclude that we have no evidence that the tax problem comprehension of our participants differs systematically between the treatments. Therefore, we are not able to explain the lower mean time spent per decision situation in, for example, the low compared to the medium info treatment with a higher level of comprehension. In contrast, the lower comprehension test time in the medium info treatment would lead us to expect less time spent per decision situation in this treatment compared to the low info treatment. However, exactly the opposite is observed.

---

[16] This observation is supported by the number of “what-if”-calculations. In the case of a medium information level, the “what-if”-calculator is used on average 1.61 times per decision situation. If, in addition, the risky asset’s net returns are given (i.e., high info treatment), the mean utilization increases to 2.52. The Mann-Whitney U test (two-sided) shows that this difference between both treatments is significant at the 1%-level ($p < 0.001$).

[17] Only the difference between the medium and high info treatments is statistically significant (Mann-Whitney U test, two-sided, $p = 0.009$).

As part of the questionnaire, participants were asked about their previous investment experience, tax knowledge (for example, due to apprenticeship or tax law lectures), and whether they completed a tax declaration in the past. Figure 3 summarizes the answers. In all treatments, approximately 50% of our subjects stated that they occasionally or regularly invest capital in investment assets. In the medium and high info treatments, approximately 25% and 21% of the participants indicated that they have tax knowledge and that they have completed a tax declaration. In the low info treatment, 39% of the participants had already completed a tax declaration. However, only 18% of the subjects indicated that they had tax knowledge. Overall, we do not find evidence that subjects differ systematically between the treatments. In particular, we do not observe that participants in the low info treatment, for example, have more investment experience or tax knowledge that could explain their faster decision making.

Consequently, we can conclude that the observed differences in time spent per decision situation cannot be attributed to different characteristics of participants in the treatments. Instead, it appears that subjects are generally less willing to pay attention to the decision problem in the case of a lower information level. It is reasonable that subjects apply a heuristic when the decision problem is too complicated or requires too much effort (e.g., brain activity). If subjects do not calculate net terms or refuse to think deeply about the decision problem, the time spent per decision situation will decrease. Therefore, it appears that the differences in time spent arise because the use of imprecise decision heuristics increases with a decreasing information level. As a consequence, the level of tax perception bias increases as well.

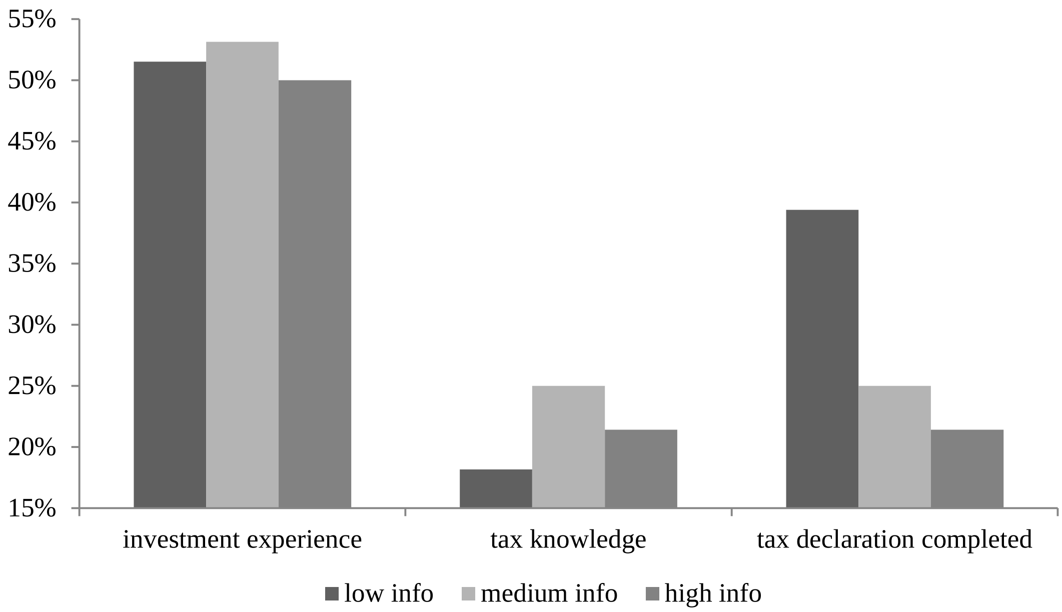


**Figure 3:** Participants with investment experience and tax knowledge

*Note:* This figure summarizes answers obtained from our ex post questionnaire. Each bar represents the share of subjects per treatment who stated to have investment experience (i.e., occasionally or regularly invest capital), tax knowledge (e.g., because of apprenticeship or tax law lectures), and completed a tax declaration in the past.

## 6 Summary and Implications

In this paper, we study intrinsic and extrinsic effects on behavioral tax biases and on decision behavior in risky investment decisions. Whereas extrinsic effects refer to the influence of tax information provided by the tax system to vary tax complexity and tax salience levels and is exogenously given (tax system dimension), intrinsic effects refer to the influence of emotional and cognitive reactions to tax regulations (individual dimension). We find that introducing a capital gains tax with a full loss offset provision influences affective and cognitive perception. Generally, we observe that subjects perceive the situation as more pleasant, more exciting, and more secure when a capital gains tax is levied. However, a statistically significant influence is only found with respect to cognition, which indicates that subjects have a significantly lower risk perception with taxation than they do without. One explanation for this finding might be that subjects overestimate the positive tax effect of the loss offset provision, which reduces capital losses. In line with the affect heuristic (Finucane et al., 2000) and the risk-as-feelings hypothesis (Loewenstein et al., 2001), we therefore expect that the amount invested riskily is higher in our tax than in our no tax treatment (hypothesis 1). To examine the influence of extrinsic effects on investment decisions, we vary the information provided to our subjects to determine the risky asset's net capital gain. We argue that a higher information level decreases the level of tax complexity and increases the level of tax salience. Consequently, we hypothesize that the revealed tax perception bias decreases in this case (hypothesis 2).

Our results are manifold. First, subjects are willing to invest a higher share of their endowment riskily if a capital gains tax is levied, supporting hypothesis 1. Because we constructed the payoff structure such that the subjects are confronted with exactly the same choices in net terms in situations with and without taxation, we argue that the reason for this effect is a tax perception bias. In the low info treatment in particular, in which neither a "what-if"-calculator nor a pocket calculator is available to the subjects, we observe that the investment decisions are heavily biased. Second, the perception bias decreases with an increase in the level of tax information provided to the subjects, supporting hypothesis 2. Both results indicate that politicians and researchers should be aware that governmental interventions could bias risk-taking behavior even more than standard neoclassical theory predicts. Because we observe the lowest tax perception bias in the case of a high level of tax information, one task of the government could be to boost individuals' level of information to reduce investment biases. Furthermore, theoretical predictions can be improved if the identified perception biases are considered in investment models.

Third, although a higher information level reduces the bias, we do not observe that the tax perception bias vanishes. Even in the case of a high information level, we find a significant effect on investment decisions. Fourth, we do not find differences between the medium and high info treatments. Providing subjects with a "what-if"-calculator and a pocket calculator therefore diminishes the perception bias. However, the additional presentation of the risky asset's net capital gains has no further diminishing effect. To minimize potential tax perception biases, we therefore argue that experimental researchers should ensure that participants can utilize a "what-if"-calculator and a pocket calculator for their investment decisions with taxes. Only if it is ensured that participants decide on their net payoffs is it possible to reliably validate theoretical results in experimental environments.

Fifth, we find that the more pleasant (valence), less exciting (arousal), or more secure (cognition) a situation is perceived in the tax treatment compared to the no tax treatment, the higher the risky investment becomes in the tax treatment compared to the no tax treatment. This finding indicates that emotional and cognitive reactions to tax regulations can influence economic decision behavior significantly. Sixth, we provide evidence that the use of decision heuristics can explain the observed tax bias differences between the information treatments. In particular, we find a negative relationship between the information level and the use of heuristics. However, future work is needed to gain a better understanding of the applied decision heuristics.

## Appendix

### A1 Instructions (Originally Written in German)

#### A1.1 Instructions for All of the Three Treatments

In the second part of the experiment your payoff depends on your decisions and on chance. These instructions will explain you, how you are able to influence your payoff through your decisions. Therefore, read the following paragraphs carefully. When all participants have understood the instructions, the experiment will start. *The experiment consists in total of 20 decision situations that are independent of each other.*

For reasons of simplicity, during the experiment there are no calculations in Euro-amounts, but in lab-points. At that 1 lab-point exactly corresponds to 20 Euro-cents. That means 100 lab-points exactly correspond to 20 Euros.

**1. Your task during the experiment**

At the beginning of each decision situation you receive an initial endowment of 100 lab-points that you may invest in assets. The price for the purchase of an asset is always the same and amounts to 1 lab-point. Since your initial endowment amounts to 100 lab-points, you may buy up to 100 assets in each decision situation. Alternatively, you always have the opportunity to dispense with the purchase of assets and keep the non-invested capital.

Therefore, you are expected to determine how many assets you want to purchase in each decision situation. On this, simply select the number of assets. The remaining endowment, which is still available from your initial endowment, is not invested.

***Example:*** *If you decide, for example, to purchase 70 assets, you have spent 70 lab-points on this (= 70 · 1 lab-point per asset). So, non-invested capital of 30 lab-points remains (= 100 lab-points – 70 lab-points) that you can keep directly.*

**2. Gross return per asset**

At the end of each decision situation the assets you have purchased will be sold automatically. In the following, the result from the purchase and the sale of the assets is determined by the so-called *gross return*. For each asset, the gross return is the difference between the sale price and the purchase price of 1 lab-point. A positive gross return results when the sale price is greater than the purchase price (so greater than 1). A negative gross return results when the sale price is less than the purchase price (so less than 1). For reasons of simplicity, only the gross return is considered in the following.

The gross return of each asset depends on the occurring state of nature. A total of 6 states are possible. In 3 of 6 states of nature the gross return is positive (so greater than 0), in the other 3 of 6 states of nature the gross return is negative (so less than 0). All six states occur with the same probability of 1/6 (so 16.67%). Which state of nature is actually present, is not known to you prior to your decision.

The possible gross returns may vary from decision situation to decision situation and are shown to you before each of your decisions.

***Example:*** *Here an example for the possible gross returns per asset in the 6 states of nature:*

| **state 1** | **state 2** | **state 3** | **state 4** | **state 5** | **state 6** |
|---|---|---|---|---|---|
| 0.72 | 0.60 | 0.48 | -0.08 | -0.20 | -0.32 |

## 3. Net return per asset

In 10 of 20 decision situations, a tax is levied. In the remaining 10 of 20 decision situations, no tax is levied. In each decision situation you will be informed before your decision whether a tax is levied.

### 3.1 Tax is levied

If a tax is levied, the tax is always 50% of the gross return per asset. Then, the net return per asset results as follows:

gross return per asset
– tax
= net return per asset

***Example:*** *The following example assumes that you have purchased 70 assets. It is further assumed that the actual gross return is 0.60 lab-points (state 2 in the table above) or -0.20 lab-points (state 5 in the table above). In a decision situation in which <u>a tax is levied,</u> the net return per asset results as follows:*

| | | **state 2** | **state 5** |
|---|---|---|---|
| | gross return per asset | 0.60 | -0.20 |
| – | tax<br>(= 50% of the gross return) | $0.60 \cdot 0.50$<br>= 0.30 | $-0.20 \cdot 0.50$<br>= -0.10 |
| **=** | **net return per asset** | **0.60 – 0.30<br>= 0.30** | **-0.20 – (-0.10)<br>= -0.10** |

The tax applies both in the case of a positive and in the case of a negative gross return. However, the effect of the tax is different in both cases: With a positive gross return, you have to pay a tax. Therefore, in this case, the net return is less than the gross return. With a negative gross return, you get a tax refund. Therefore, in this case, the net return is greater than the gross return, i.e. losses are reduced by the tax refund.

### 3.2 No tax is levied

If no tax is levied, the gross return and the net return per asset are identical:

|   | gross return per asset |
|---|---|
| = | net return per asset |

***Example:*** *Based on the previous example, in a decision situation in which no tax is levied, the net return per asset results as follows:*

| | | **state 2** | **state 5** |
|---|---|---|---|
| | gross return per asset | 0.60 | -0.20 |
| – | tax<br>(= 50% of the gross return) | --- | --- |
| = | **net return per asset** | **0.60** | **-0.20** |

## 4. Payoff

Your payoff in a decision situation is calculated as follows:

|   | number of assets · net return per asset |
|---|---|
| + | invested capital |
| + | non-invested capital |
| = | payoff |

***Example (tax is levied):*** *Based on the previous example, in a decision situation in which a tax is levied your payoff is calculated as follows:*

| | state 2 | state 5 |
|---|---|---|
| net return per asset | 0.30 | -0.10 |
| number of assets | 70 | 70 |
| number of assets · net return per asset | 70 · 0.30<br>= 21 | 70 · (-0.10)<br>= -7 |
| invested capital | 70 | 70 |
| non-invested capital | 30 | 30 |
| **calculation of the payoff** | | |
| number of assets · net return per asset<br>+ invested capital<br>+ non-invested capital | 21<br>+ 70<br>+ 30 | -7<br>+ 70<br>+ 30 |
| = **payoff** | **121** | **93** |

***Example (no tax is levied):*** *Based on the previous example, in a decision situation in which* <u>*no tax is levied*</u> *your payoff is calculated as follows:*

| | state 2 | state 5 |
|---|---|---|
| net return per asset | 0.60 | -0.20 |
| number of assets | 70 | 70 |
| number of assets · net return per asset | 70 · 0.60<br>= 42 | 70 · (-0.20)<br>= -14 |
| invested capital | 70 | 70 |
| non-invested capital | 30 | 30 |
| **calculation of the payoff** | | |
| number of assets · net return per asset<br>+ invested capital<br>+ non-invested capital | 42<br>+ 70<br>+ 30 | -14<br>+ 70<br>+ 30 |
| = **payoff** | **142** | **86** |

Please note: With a positive net return your initial endowment of 100 lab-points increases. A negative gross return, however, leads to a reduction of your initial endowment.

### A1.2 Specific Instructions for the Low Info Treatment

**<u>5. General Information</u>**

In each decision situation the possible gross returns for each state of nature are shown to you.

After you have made decisions in all 20 situations, you will be asked to draw a slip of paper from a container in which 20 numbered slips of paper (from 1 to 20) are located. The number on the slip of paper you draw determines the decision situation that will be paid out. This means that at the end of the experiment **one** decision situation is chosen randomly, which then determines your payoff from the experiment.

In order to determine which state of nature is present in this decision situation, you will be asked to cast a six-sided die once. The number which you will cast determines which state of nature from 1 to 6 is present. Depending on the number of assets you have bought in this decision situation, the payoff from the experiment results. The payoff from this decision situation converted into Euro will be paid to you in cash after the experiment.

After you have read these instructions, we will ask you to answer some questions on your computer. Answering these questions is merely for checking the understanding and is not relevant for the payoff. Subsequently, the experiment starts. Please note that the computer program we use does not separate decimal places with a comma, but with a point.

### A1.3 Specific Instructions for the Medium Info Treatment

**5. General Information**

In each decision situation the possible gross returns for each state of nature are shown to you. In addition, you have in each decision situation the possibility to practice calculations on your computer (bottom half). Beyond that, you can use the pocket calculator which is at your workplace for own calculations.

After you have made decisions in all 20 situations, you will be asked to draw a slip of paper from a container in which 20 numbered slips of paper (from 1 to 20) are located. The number on the slip of paper you draw determines the decision situation that will be paid out. This means that at the end of the experiment **one** decision situation is chosen randomly, which then determines your payoff from the experiment.

In order to determine which state of nature is present in this decision situation, you will be asked to cast a six-sided die once. The number which you will cast determines which state of nature from 1 to 6 is present. Depending on the number of assets you have bought in this decision situation, the payoff from the experiment results. The payoff from this decision situation converted into Euro will be paid to you in cash after the experiment.

After you have read these instructions, we will ask you to answer some questions on your computer. Answering these questions is merely for checking the understanding and is not relevant for the payoff. Subsequently, the experiment starts. Please note that the computer program we use does not separate decimal places with a comma, but with a point.

### A1.4 Specific Instructions for the High Info Treatment

**5. General Information**

In each decision situation both the possible gross returns and the possible net returns for each state of nature are shown to you. In addition, you have in each decision situation the possibility to practice calculations on your computer (bottom half). Beyond that, you can use the pocket calculator which is at your workplace for own calculations.

After you have made decisions in all 20 situations, you will be asked to draw a slip of paper from a container in which 20 numbered slips of paper (from 1 to 20) are located. The number on the slip of paper you draw determines the decision situation that will be paid out. This means that at the end of the experiment **one** decision situation is chosen randomly, which then determines your payoff from the experiment.

In order to determine which state of nature is present in this decision situation, you will be asked to cast a six-sided die once. The number which you will cast determines which state of nature from 1 to 6 is present. Depending on the number of assets you have bought in this decision situation, the payoff from the experiment results. The payoff from this decision situation converted into Euro will be paid to you in cash after the experiment.

After you have read these instructions, we will ask you to answer some questions on your computer. Answering these questions is merely for checking the understanding and is not relevant for the payoff. Subsequently, the experiment starts. Please note that the computer program we use does not separate decimal places with a comma, but with a point.

### A2 Gross and Net Capital Gains

Table A1 depicts the (potential) gross and net capital gains of the risky asset in each decision situation and for each tax treatment.

**Table A1:** Gross and net capital gains

| | decision situation | gross capital gains of the risky asset | | | | | | net capital gains of the risky asset | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | 1 | 2 | 3 | 4 | 5 | 6 | 1 | 2 | 3 | 4 | 5 | 6 |
| no tax treatment | 1 | --- | --- | --- | --- | --- | --- | 0.62 | 0.54 | 0.46 | -0.32 | -0.40 | -0.48 |
| | 2 | --- | --- | --- | --- | --- | --- | 0.56 | 0.48 | 0.40 | -0.28 | -0.36 | -0.44 |
| | 3 | --- | --- | --- | --- | --- | --- | 0.50 | 0.42 | 0.34 | -0.24 | -0.32 | -0.40 |
| | 4 | --- | --- | --- | --- | --- | --- | 0.44 | 0.36 | 0.28 | -0.20 | -0.28 | -0.36 |
| | 5 | --- | --- | --- | --- | --- | --- | 0.38 | 0.30 | 0.22 | -0.16 | -0.24 | -0.32 |
| | 6 | --- | --- | --- | --- | --- | --- | 0.31 | 0.27 | 0.23 | -0.16 | -0.20 | -0.24 |
| | 7 | --- | --- | --- | --- | --- | --- | 0.28 | 0.24 | 0.20 | -0.14 | -0.18 | -0.22 |
| | 8 | --- | --- | --- | --- | --- | --- | 0.25 | 0.21 | 0.17 | -0.12 | -0.16 | -0.20 |
| | 9 | --- | --- | --- | --- | --- | --- | 0.22 | 0.18 | 0.14 | -0.10 | -0.14 | -0.18 |
| | 10 | --- | --- | --- | --- | --- | --- | 0.19 | 0.15 | 0.11 | -0.08 | -0.12 | -0.16 |
| tax treatment | 11 | 1.24 | 1.08 | 0.92 | -0.64 | -0.80 | -0.96 | 0.62 | 0.54 | 0.46 | -0.32 | -0.40 | -0.48 |
| | 12 | 1.12 | 0.96 | 0.80 | -0.56 | -0.72 | -0.88 | 0.56 | 0.48 | 0.40 | -0.28 | -0.36 | -0.44 |
| | 13 | 1.00 | 0.84 | 0.68 | -0.48 | -0.64 | -0.80 | 0.50 | 0.42 | 0.34 | -0.24 | -0.32 | -0.40 |
| | 14 | 0.88 | 0.72 | 0.56 | -0.40 | -0.56 | -0.72 | 0.44 | 0.36 | 0.28 | -0.20 | -0.28 | -0.36 |
| | 15 | 0.76 | 0.60 | 0.44 | -0.32 | -0.48 | -0.64 | 0.38 | 0.30 | 0.22 | -0.16 | -0.24 | -0.32 |
| | 16 | 0.62 | 0.54 | 0.46 | -0.32 | -0.40 | -0.48 | 0.31 | 0.27 | 0.23 | -0.16 | -0.20 | -0.24 |
| | 17 | 0.56 | 0.48 | 0.40 | -0.28 | -0.36 | -0.44 | 0.28 | 0.24 | 0.20 | -0.14 | -0.18 | -0.22 |
| | 18 | 0.50 | 0.42 | 0.34 | -0.24 | -0.32 | -0.40 | 0.25 | 0.21 | 0.17 | -0.12 | -0.16 | -0.20 |
| | 19 | 0.44 | 0.36 | 0.28 | -0.20 | -0.28 | -0.36 | 0.22 | 0.18 | 0.14 | -0.10 | -0.14 | -0.18 |
| | 20 | 0.38 | 0.30 | 0.22 | -0.16 | -0.24 | -0.32 | 0.19 | 0.15 | 0.11 | -0.08 | -0.12 | -0.16 |

## References

Ackermann, H., M. Fochmann and B. Mihm (2013), Biased effects of taxes and subsidies on portfolio choices, Economics Letters 120, 23-26.

Adam, M. T. P., J. Krämer and M. B. Müller (2015), Auction Fever! How Time Pressure and Social Competition Affect Bidders' Arousal and Bids in Retail Auctions, Journal of Retailing 91, 468-485.

Andrade, E. B., T. Odean and S. Lin (2015), Bubbling with Excitement: An Experiment, Review of Finance, doi: 10.1093/rof/rfv016.

Au, K., F. Chan, D. Wang and I. Vertinsky (2003), Mood in foreign exchange trading: Cognitive processes and performance, Organizational Behavior and Human Decision Processes 91, 322-338.

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

Bock, O., I. Baetge and A. Nicklisch (2014): hroot: Hamburg Registration and Organization Online Tool, European Economic Review 71, 117-120.

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

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

Clark, J. M. and S. G. Ward (2008), Consumer Behavior in Online Auctions: An Examination of Partitioned Prices on eBay, Journal of Marketing Theory and Practice 16, 57-66.

de Bartolome, C. A. (1995), Which tax rate do people use: Average or marginal?, Journal of Public Economics 56, 79-96.

de Waegenaere, A., R. C. Sansing and J. L. Wielhouwer (2012), Multinational Taxation and R&D Investments, The Accounting Review 87, 1197-1217.

Davis, J. S. and C. W. Swenson (1993), Experimental Evidence on Tax Incentives and the Demand for Capital Investments, The Accounting Review 68, 482-514.

Dohmen, T., A. Falk, D. Huffman and U. Sunde (2010), Are Risk Aversion and Impatience Related to Cognitive Ability?, The American Economic Review 100, 1238-1260.

Domar, E. D. and R. A. Musgrave (1944), Proportional Income Taxation and Risk-Taking, The Quarterly Journal of Economics 58, 388-422.

Eeckhoudt, L., C. Gollier and H. Schlesinger (1997), The no-loss offset provision and the attitude towards risk of a risk-neutral firm, Journal of Public Economics 65, 207-217.

Feldman, N. E. and B. J. Ruffle (2015), The Impact of Including, Adding, and Subtracting a Tax on Demand, American Economic Journal: Economic Policy 7, 95-118.

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

Finucane, M. L., A. Alhakami, P. Slovic and S. M. Johnson (2000), The Affect Heuristic in Judgments of Risks and Benefits, Journal of Behavioral Decision Making 13, 1-17.

Fischbacher, U. (2007), z-Tree: Zurich toolbox for ready-made economic experiments, Experimental Economics 10, 171-178.

Fochmann, M. and K. Hemmerich (2014), Real Tax Effects and Tax Perception Effects in Decisions on Asset Allocation, arqus Discussion Paper No. 156.

Fochmann, M., D. Kiesewetter and A. Sadrieh (2012a), Investment behavior and the biased perception of limited loss deduction in income taxation, Journal of Economic Behavior & Organization 81, 230-242.

Fochmann, M., D. Kiesewetter and A. Sadrieh (2012b), The Biased Effect of Aggregated and Disaggregated Income Taxation on Investment Decisions, Journal of Institutional and Theoretical Economics 168, 519-546.

Fochmann, M. and J. Weimann (2013), The Effects of Tax Salience and Tax Experience on Individual Work Efforts in a Framed Field Experiment, FinanzArchiv/Public Finance Analysis 69, 511-542.

Greenleaf, E. A., E. J. Johnson, V. G. Morwitz and E. Shalev (2015), The price does not include additional taxes, fees, and surcharges: A review of research on partitioned pricing, Journal of Consumer Psychology, http://dx.doi.org/10.1016/j.jcps.2015.04.006.

Heilman, R. M., L. G. Crişan, D. Houser, M. Miclea and A. C. Miu (2010), Emotion Regulation and Decision Making Under Risk and Uncertainty, Emotion 10, 257-265.

Hossain, T. and J. Morgan (2006), …Plus Shipping and Handling: Revenue (Non) Equivalence in Field Experiments on eBay, Advances in Economic Analysis & Policy 6, 1-27.

Isen, A. M. and R. Patrick (1983), The Effect of Positive Feelings on Risk Taking: When the Chips Are Down, Organizational Behavior and Human Performance 31, 194-202.

Johnson, E. J. and A. Tversky (1983), Affect, Generalization, and the Perception of Risk, Journal of Personality and Social Psychology 45, 20-31.

King, R. R. and D. E. Wallin (1990), Individual Risk Taking and Income Taxes: An Experimental Examination, The Journal of the American Taxation Association 12, 26-38.

Ku, G., D. Malhotra and J. K. Murnighan (2005), Towards a competitive arousal model of decision-making: A study of auction fever in live and Internet auctions, Organizational Behavior and Human Decision Processes 96, 89-103.

LeBoeuf, R. A. and E. B. Shafir (2005), Decision Making, Holyoak, K. J. and R. G. Morrison (eds.): The Cambridge Handbook of Thinking and Reasoning, 243-265.

Loewenstein, G. F., E. U. Weber, C. K. Hsee and N. Welch (2001), Risk as Feelings, Psychological Bulletin 127, 267-286.

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

Mussel, P., A. M. F. Reiter, R. Osinsky and J. Hewig (2015), State- and trait-greed, its impact on risky decision-making and underlying neural mechanisms, Social Neuroscience 10, 126-134.

Rupert, T. J., L. E. Single and A. M. Wright (2003), The Impact of Floors and Phase-Outs on Taxpayers' Decisions and Understanding of Marginal Tax Rates, The Journal of the American Taxation Association 25, 72-86.

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

Russel, J. A. (1980), A Circumplex Model of Affect, Journal of Personality and Social Psychology 39, 1161-1178.

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

Sausgruber, R. and J.-R. Tyran (2011), Are we taxing ourselves? How deliberation and experience shape voting on taxes, Journal of Public Economics 95, 164-176.

Schüßler, K., J. Hewig, D. Kiesewetter and M. Fochmann (2014), Affective Reactions Influence Investment Decisions: Evidence from a Laboratory Experiment with Taxation, arqus Discussion Paper No. 160.

Seo, M., B. Goldfarb and L. F. Barrett (2010), Affect and the framing effect within individuals over time: Risk taking in a dynamic investment simulation, Academy of Management Journal 53, 411-431.

Stiglitz, J. E. (1969), The Effects of Income, Wealth and Capital Gains Taxation on Risk-Taking, The Quarterly Journal of Economics 83, 263-283.

Swenson, C. W. (1989), Tax Regimes and the Demand for Risky Assets: Some Experimental Market Evidence, The Journal of the American Taxation Association 11, 54-76.

Xia, L. and K. B. Monroe (2004), Price Partitioning on the Internet, Journal of Interactive Marketing 18, 63-73.

**Impressum:**
**Arbeitskreis Quantitative Steuerlehre, arqus, e.V.**
Vorstand: Prof. Dr. Ralf Maiterth (Vorsitzender),
Prof. Dr. Kay Blaufus, Prof. Dr. Dr. Andreas Löffler
Sitz des Vereins: Berlin

Herausgeber: Kay Blaufus, Jochen Hundsdoerfer,
Martin Jacob, Dirk Kiesewetter, Rolf J. König,
Lutz Kruschwitz, Andreas Löffler, Ralf Maiterth,
Heiko Müller, Jens Müller, Rainer Niemann,
Deborah Schanz, Sebastian Schanz, Caren Sureth-Sloane, Corinna Treisch

Kontaktadresse:
Prof. Dr. Caren Sureth-Sloane, Universität Paderborn,
Fakultät für Wirtschaftswissenschaften,
Warburger Str. 100, 33098 Paderborn,
www.arqus.info, Email: info@arqus.info

ISSN 1861-8944