Essays on the Effects of Deferred Taxation and Tax Audit Negotiations

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Zusammenfassung

Diese Dissertation beinhaltet insgesamt drei Beiträge. In den ersten beiden Beiträgen werden verhaltensökonomische Effekte infolge einer nachgelagerten Besteuerung untersucht. Der letzte Beitrag widmet sich der Frage, welche Faktoren Steuerprüfer der Finanzverwaltung bei der Wahl der Verhandlungsstrategie beeinflussen und welche Effekte diese Strategien auf das Ergebnis einer Steuerprüfung haben.

Die erste Studie zeigt mithilfe mehrerer Laborexperimente, dass Steuern bei Sparentscheidungen in einem nachgelagerten Besteuerungssystem verzerrt wahrgenommen werden. Dies führt zu wesentlich geringeren Renten nach Steuern als bei einem ökonomisch äquivalenten System der sofortigen bzw. vorgelagerten Besteuerung. Dieses Ergebnis deutet auf substantielle Steuerfehlwahrnehmungen bei der nachgelagerten Besteuerung hin. Für Individuen mit geringem Steuer- und Finanzwissen bleiben die Verzerrungen trotz gesammelter Erfahrung bestehen. Die steuerlichen Fehleinschätzungen verschwinden bei allen Individuen erst dann nahezu, wenn sie wiederkehrende numerische Informationen zur Rentenbesteuerung erhalten und Erfahrung gesammelt haben. Weiterhin können staatliche Zulagen die Nachsteuerrenten über das Niveau der sofortigen Besteuerung anheben, ohne dass zusätzliche steuerliche Informationen bereitgestellt werden.

Die zweite Studie belegt, dass die nachgelagerte Einkommensbesteuerung nicht nur das individuelle Sparverhalten, sondern auch das Produktionsverhalten von Unternehmern und die Risikoallokation beeinflusst. In mehreren Laborexperimenten wird deutlich, dass die nachgelagerte Besteuerung bei 80 % der Probanden zu einer Überproduktion führt. Ein wesentlicher Grund hierfür ist, dass Probanden die nachgelagerte Steuerlast zu gering gewichten, weil sie oft myopisch handeln und dazu neigen, Entscheidungen eher isoliert als gleichzeitig zu treffen (choice bracketing). Infolgedessen sinkt die Risikobereitschaft. Dies ist besonders auf die zusätzliche kognitive Belastung im Zusammenhang mit der Besteuerung von Investitionsrückflüssen zurückzuführen. Die Probanden lernen jedoch durch Erfahrung, wobei sich die Überproduktion nur marginal verringert, da hauptsächlich die Probanden mit hoher kognitiver Kapazität lernen. Nur wenn der Besteuerungszeitpunkt von einem nachgelagerten zu einem wirtschaftlich äquivalenten sofortigen Besteuerungssystem geändert wird, verschwinden die Überproduktion und die Verzerrungen bei der Risikoallokation nahezu vollständig.

Für den letzten Beitrag dieser Dissertation wurden deutsche Steuerprüfer zu ihren Verhandlungsstrategien im Zusammenhang mit dem Ergebnis einer Steuerprüfung befragt. Die Studie zeigt, dass das Ergebnis und die Einigungswahrscheinlichkeit beider Parteien einer Prüfung davon abhängen, welche Verhandlungsstrategie der Steuerprüfer wählt. Weiterhin gibt die Studie über die Determinanten der Strategiewahl eines Prüfers Aufschluss. Danach wird die Wahl der Strategie neben der Berufserfahrung, dem Zeitdruck eines Prüfers oder der Qualität des Finanzbuchhaltungssystems eines Steuerzahlers auch durch die wahrgenommene Verhandlungsstrategie des Steuerberaters beeinflusst.

Summary

This dissertation contains a total of three papers. In the first two studies, behavioral economic effects resulting from deferred taxation are examined. The last study deals with the question which factors influence the choice of negotiation strategies of tax auditors of the tax authorities and which effects these strategies have on the outcome of a tax audit.

The first study uses several laboratory experiments to show that taxes are misperceived when savings decisions are made in a deferred taxation system. This leads to significantly lower after-tax pensions than in an economically equivalent system of immediate taxation. For subjects with low tax and financial knowledge, the misperceptions remain despite accumulated experience. For all subjects, the tax misperceptions almost disappear only after they have received recurrent numerical informational nudges regarding pension taxation and have gained experience. Furthermore, using government matching contributions instead of tax deductions might reduce necessary informational costs and still achieve significantly higher retirement savings.

The second study shows that deferred income taxation influences not only individual saving behavior but also entrepreneurs' production behavior and risk allocation. Several laboratory experiments reveal that nearly 80% of all subjects engage in overproduction. This is mainly due to the fact that subjects underweight the deferred tax burden because they often act myopically and tend to make decisions in isolation rather than simultaneously (choice bracketing). As a result, the willingness to take risks decreases. This is particularly due to the additional cognitive load associated with the taxation of investment income. However, the participants learn through experience. Despite these learning effects, however, the overproduction is only marginally reduced, since mainly participants with high cognitive capacity learn. Overproduction and distortions in risk allocation only almost disappear if the timing of taxation is changed from a deferred to an economically equivalent immediate taxation system.

For the last paper of this dissertation, German tax auditors were asked about their negotiation strategies in connection with the outcome of a tax audit. The study shows that the outcome and the probability of agreement during an audit depend on which negotiation strategy the tax auditor chooses. Furthermore, the study provides insights into the determinants of the auditor's choice of strategy. It is shown that the choice of strategy is influenced not only by tax auditor's audit experience, the availability of higher authority, time pressure or the quality of a taxpayer's financial accounting system but also by the perceived negotiation strategy of the tax advisor.

Schlagwörter: Rentenbesteuerung · Nachgelagerte Besteuerung · Vorgelagerte Besteuerung · Steuerverzerrungen · Lernverhalten · Informative Steuernudges · Zulagen · Choice Bracketing · Überproduktion · Steuervermeidung · Steueroptimierung · Steuerprüfung · Verhandlungsstrategien

Keywords: Pension Taxation · Deferred Taxation · Immediate Taxation · Tax Misperception · Learning Behavior · Informational Tax Nudges · Matching Contribution · Choice Bracketing · Overproduction · Tax Avoidance · Tax Compliance · Tax Audit · Negotiation Strategies

To Hanna, Leni and Lasse

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Chapter 1

Introduction

1.1 Motivation

The traditional (neoclassical) economic approach assumes that people are rational agents who consciously process all available information to maximize their expected benefit. In the area of pensions, for example, this means that individuals rationally plan their consumption throughout their lifes by saving a part of their income during their working lifes in order to achieve a desired pension income when they retire. In addition to the findings of conventional economic theory, the findings of behavioral economics have been gaining ground for some time. These results show that psychological factors influence individuals' pension decisions and induce behavior that leads to deviations from rational choice predictions. Increasing evidence in this context suggests that many individuals misperceive objective tax information. This misperception is particularly pronounced in tax systems with high tax complexity (Beshears et al. 2011; Blaufus and Ortlieb 2009) and low tax salience (Chetty et al. 2009; Goldin and Homonoff 2013; Taubinsky and Rees-Jones 2018). Furthermore, tax and loss aversion (Olsen et al. 2019; Sussman and Olivola 2011), the tax framing (Epley et al. 2006; Lozza et al. 2010), and the timing of taxation (Chambers and Spencer 2008; Sahm et al. 2012) can explain the deviations in savings behavior. A generally low level of tax and financial literacy compound this problem (e.g., Beshears et al. 2011; Blaufus et al. 2015; Gensemer et al. 1965).[1]

Among other things, this thesis at hand aims to contribute to a better understanding of individual savings behavior. This is important, since in many countries statutory pension benefits have been cut in recent years, which has significantly increased the importance of private pension provision. In order to encourage people to save for retirement, many countries offer tax savings incentives for pension contributions. In principle, there are two widespread variants of pension taxation (OECD 2018). In the case of immediate taxation, pension contributions are taxable, but later pension withdrawals and returns on investment are tax-free. This system exists, for example, in Hungary, Poland and the USA. In the system of deferred taxation, pension contributions and returns on investment are tax-free, whereas pension payments are taxable. This system is offered, for example,

[1] See Blaufus et al. (2020) for a review.

in Austria, the Netherlands, Norway, the United Kingdom and the USA.

In addition to individual savings behavior other decisions can also be influenced by deferred taxation. These include in particular production and risk allocation decisions. However, little empirical research has been done in this field. This is where the thesis at hand begins. The aim of the first two studies of this dissertation is to empirically investigate the effects of deferred income taxation on individual savings and production behavior and, taking into account behavioral economic findings, to offer reform considerations with respect to the tax incentive system of deferred taxation, in particular with respect to pension provisions.

The last paper deals, among other things, with behavioral economics in a completely different field of research. This study examines which factors determine tax auditors' use of different negotiation strategies and how these strategies affect tax audit outcomes. To do this, we distinguish between cooperative, competitive and neutral strategies and a combination of competitive and cooperative tactics (a mixed strategy). During the tax audit, there is not only the tax auditor but also the company side (usually represented by a tax advisor). Normally, both negotiating parties are interested in reaching an agreement in order to avoid disputes at tax courts. This article therefore addresses the question of how the perceived strategy of the negotiation opponent, i.e., the tax advisor, affects the auditors' choice of strategy and what this consequently means for the result of the audit.

There are mainly two theories that predict responses to the opponents' negotiation strategy. First, the reciprocation theory (Osgood 1962) predicts that negotiation partners will reciprocate the opponent's strategy. A second theoretical explanation is the level-of-aspiration theory (Siegel and Fouraker 1960). This theory predicts that auditors behave more cooperatively (competitively) if they perceive that the tax advisor is adopting a competitive (cooperative) negotiation strategy. Since this research question has not yet been scientifically investigated, we would like to provide new insights into how firms' tax burden is affected by negotiations between tax auditors and the firms' tax advisors; how these negotiations affect firms' tax burden is of relevance for both tax policy and firms. In addition to this behavioral economic determinant, other factors relating to the choice of an auditor's strategy and its impact on the result of the audit are also examined, including the audit experience, the availability of higher authority, time pressure and the quality of the taxpayer's financial accounting system.

1.2 Main Contributions and Findings

This thesis consists of three separate essays. Table 1.1 provides an overview of the articles. The first study of this dissertation (*Tax Misperceptions and the Effect of Informational Tax Nudges on Retirement Savings*) presented in chapter 2 examines how tax misperceptions influence individuals' retirement savings and whether informational tax nudges and the

form of the tax subsidy can promote tax responses that are in line with rational choice predictions. Using a series of laboratory experiments, this study compares the savings behavior between immediate and deferred taxation. If the tax rate is constant and time-invariant, these two tax systems imply identical economic savings incentives (Beshears et al. 2015). However, we find that deferred taxation results in after-tax pensions that are approximately 25% lower compared to an economically equivalent immediate pension tax system. This is due to significant tax misperceptions. In line with a confirmation bias, subjects (almost) correctly perceive tax information that confirms their intentions to save (tax refund) but underweight tax information that undermines such intentions (deferred pension tax). Moreover, due to the higher complexity of deferred taxation, subjects may reduce cognitive effort by using rough tax estimates instead of exact calculations of the pension. For individuals with low tax and financial knowledge, tax misperceptions remain stable despite accumulated experience. We show that nudging subjects with recurrent numerical informational reminders regarding pension taxation significantly reduces the gap in effective savings. However, this only applies if the subjects have gained sufficient experience.

Table 1.1: Essay Overview

Chapter	**Title**	**Co-authors**	**Current publication status**
Effects of Deferred Taxation			
2	Tax Misperceptions and the Effect of Informational Tax Nudges on Retirement Savings	Kay Blaufus	Management Science, forthcoming
3	The Effect of Deferred Taxation on Overproduction and Asset Allocation	Kay Blaufus Nadja Fochmann Jochen Hundsdoerfer	Working Paper
Tax Audit Negotiation			
4	Negotiating with the Tax Auditor: Determinants of Tax Auditors' Negotiation Strategy Choice and the Effect on Firms' Tax Adjustments	Kay Blaufus Daniela Lorenz Benjamin Peuthert Alexander N. Schwäbe	Accounting, Organizations and Society, Conditional Acceptance/ Minor Revision

We also investigate an alternative way to achieve higher savings under deferred taxation. In another laboratory experiment, the tax refund was replaced by a government matching contribution which was directly paid into the subjects' pension fund. This mechanism increases after-tax pensions above the level under immediate taxation without the need to provide informational tax nudges. We conclude that individuals perceive the received government matching contribution erroneously as a gift, which reduces their perceived cost of saving (so called *matching gift effect*).

The second study of this dissertation (*The Effect of Deferred Taxation on Overproduction and Asset Allocation*), presented in chapter 3, examines whether deferred income taxation

increases overproduction and to what extent this affects the willingness to take risks. In several lab experiments, we find that nearly 80% of all participants engage in overproduction which significantly reduces their wealth. The observed tax misperceptions result from the fact that subjects base their production decisions on lower taxation of income than is actually the case, because they underweight or even tend to ignore deferred tax costs in their current decisions. As a result, we find that risk taking decreases significantly. However, this is not due to the lower after-tax income from overproduction, but reflects the additional cognitive load associated with the taxation of investment income. We find that the participants learn through experience, but that despite the learning effects the overproduction remains considerable. One reason for this is that learning is mainly due to participants with high cognitive capacity. In this respect, we use additional experiments to investigate whether increasing the incentive to make efforts or increasing the salience of deferred taxation reduces the observed tax misperceptions. However, we find that these interventions do not affect overproduction and conclude that the underweighting of deferred taxes is primarily caused by choice bracketing and myopic behavior.

In summary, the first two studies of this dissertation show essential disadvantages of deferred taxation and should be noted in tax policy as well as in future tax research. Researchers might explore alternative forms of designing tax incentives that help tax policy to increase its effectiveness by overcoming disadvantages of traditional deferred tax instruments. Following the idea in the first study of this dissertation, for example, the provision of matchings contributions is conceivable and should be further investigated in various contexts.

The third study of this dissertation (*Negotiating with the Tax Auditor: Determinants of Tax Auditors' Negotiation Strategy Choice and the Effect on Firms' Tax Adjustments*), presented in chapter 4, investigates which factors determine tax auditors' choice of negotiation strategies during tax audits and analyzes the effect of their chosen strategy on the audit outcome. To examine the question empirically, we conduct a survey among 610 German tax auditors.

On the one hand, we find that time pressure, the quality of the taxpayer's financial accounting system, and a perceived cooperative negotiation behavior by the tax advisor increase the probability of using cooperative negotiation tactics either alone (a cooperative strategy) or in combination with competitive tactics (a mixed strategy). On the other hand, tax auditors' audit experience, the availability of higher authority, and a perceived competitive negotiation behavior by the tax advisor increase the probability of using competitive negotiation tactics either alone (a competitive strategy) or in combination with cooperative tactics (a mixed strategy).

Furthermore, we investigate the influence of the choice of the tax auditors' negotiation strategy on the negotiation outcome and the probability that the taxpayer and the auditor will reach an agreement. Compared to using a cooperative strategy (but not compared to

using a mixed strategy), using a competitive negotiation strategy leads to significantly higher additional taxes. Moreover, compared to using a competitive strategy, using a cooperative or mixed strategy leads to a significantly higher probability that the negotiation partners will reach an agreement. This indicates an advantage of combining competitive and cooperative tactics (i.e., using a "mixed strategy"). This study provides new insights into how the tax burden of companies is influenced by negotiations between tax auditors and the companies tax advisors, which is important for both tax policy and companies.

Chapter 2

Tax Misperceptions and the Effect of Informational Tax Nudges on Retirement Saving

 This paper was published as Blaufus, K., Milde, M., 2020. Tax Misperceptions and the Effect of Informational Tax Nudges on Retirement Savings. Management Science.

Doi: 10.1287/mnsc.2020.3761

Chapter 3

The Effect of Deferred Taxation on Overproduction and Asset Allocation*

Abstract

This paper studies whether deferred income taxation increases overproduction and reduces the willingness to take risks. Deferred income taxation is widely used to encourage investment or saving. However, we predict that entrepreneurs underweight the deferred tax burden because individuals often act myopically and tend to make choices in isolation rather than simultaneously (choice bracketing). When underweighting deferred taxes, entrepreneurs make their current production decisions as if their income is taxed less than it actually is, which leads to overproduction. Moreover, this overproduction reduces actual income, which could result in less willingness to take risks in subsequent asset allocation decisions. In several lab experiments, we confirm these predictions. Under deferred taxation, nearly 80% of all subjects engage in overproduction, and the percentage invested in risky assets decreases by 8.95 percentage points. The reduction in risk taking is, however, not due to the lower income earned from overproduction but mirrors the additional cognitive load related to the taxation of investment income. We find that subjects learn through experience but that despite the learning effects, overproduction remains substantial and learning is mainly due to those subjects with high cognitive capacity. Additional analyses confirm that the observed misperception of deferred taxes is not caused by low tax salience or low effort, as providing additional accounting information on deferred taxes and introducing accountability reports do not change overproduction behavior. Overproduction and distorted asset allocations only almost disappear if we change the timing of taxation from deferred to an economically equivalent immediate tax system.

Keywords: Deferred Taxation · Immediate Taxation · Choice Bracketing, · Tax Misperception · Overproduction

* This chapter is co-authored by Kay Blaufus (Leibniz University Hannover), Nadja Fochmann (Leibniz University Hannover), and Jochen Hundsdoerfer (Freie Universität Berlin).

3.1 Introduction

Using a series of lab experiments, this paper studies whether deferred income taxation promotes overproduction and reduces the willingness to take risks. Parts of business income are not taxed immediately, and taxation is deferred to future years. Deferral of taxation is widespread. For example, for the year 2018 and the largest 100 US firms with positive income taxes, the ratio of deferred tax liabilities (WC18183) to income taxes (WC01451) is on average 14.19 (median: 3.44).[1] Examples of deferred taxation include bonus or accelerated depreciation, appreciations in the value of business assets that are not taxed until they are sold, dividend taxation, and capital gains taxation. Another important example is the deferred taxation of retirement savings by entrepreneurs.[2] Savings and interest from savings are tax exempt, but future pensions are taxed. Based on U.S. income tax returns, Joulfaian (2018), for example, reports that 35% of his sample of U.S. entrepreneurs make tax-deferred retirement savings.

If one assumes constant or decreasing future tax rates and positive interest rates, compared to a standard income taxation, deferred income taxation provides net present value benefits for entrepreneurs (Scholes et al. 2016, pp. 57-60). Therefore, deferred taxation is widely used as a policy tool to incentivize investment and savings behavior, and it is thus important to understand the potential disadvantages of deferred taxation. One such disadvantage is that individuals tend to act myopically and might therefore neglect or underweight the future tax burden, which may in turn affect current decision making. Neglecting or underweighting taxes, however, can lead to decisions that reduce one's own income, since pre-tax optimal behavior often deviates from after-tax income optimization. This non-neutrality of business taxation results from differences in economic income and taxable income. Important examples include the non-deductibility of costs for tax purposes, such as the opportunity cost of equity capital or the cost of effort and foregone leisure. When entrepreneurs (partly) ignore deferred taxes on their business income, they make their current production decision as if their income is taxed less than it actually is. If a fraction of the economic cost is not tax deductible, this could lead to overproduction because subjects overweight their earned production income and produce, although the marginal after-tax revenue is already lower than the marginal economic costs. For example, suppose that an entrepreneur has a marginal revenue of \$100 per unit produced (subject to deferred taxation at a rate of 40%) and marginal costs of \$80 (not tax deductible). Consequently, another unit would result in a loss of $\$100(1-40\%)-\$80=-\$20$. From a rational perspective the entrepreneur should not produce another unit. However, if taxes

[1] Source: ThomsonReuters Eikon. Size is measured by total assets at the end of the year.

[2] In the following, the term entrepreneur encompasses self-employed individuals and small business owners.

are not considered in the decision, the entrepreneur would produce one more unit because the entrepreneur expects a profit of \$100 − \$80 = \$20. This overproduction decreases actual after-tax income, which could in turn result in a lower willingness to take risks and thus distort asset allocation decisions.

We conduct several lab experiments to test whether deferred taxation leads to overproduction and reduces risk taking. In the experiment, subjects make two decisions. First, they decide how much output to produce. Second, they decide how they want to allocate the income earned from their production decision between risk-free and risky investment. Earned income is subject to deferred taxation, i.e., income earned in the production decision is tax exempt, but the payoff from the investment is fully taxed. Using an experiment has the advantage that we can clearly identify overproduction while controlling for current and future tax rates. Moreover, an experiment allows us to study economically equivalent immediate tax systems and potential interventions designed to reduce overproduction.

Rational choice theory predicts that subjects consider the deferred tax burden and simultaneously decide their optimal output and asset allocation. Optimal output is determined by the equivalence of marginal revenue after taxes and the marginal cost of effort. By contrast, we predict that subjects do not correctly account for the deferred tax burden. First, due to cognitive capacity limitations and cognitive inertia, many individuals make their choices by making each choice in isolation, a phenomenon known as choice bracketing (Read et al. 1999). When subjects make their production choice separately from the asset allocation, they might not consider deferred taxes in their production choice because they link the tax burden only to their payoff from investment resulting from their subsequent asset allocation choice. Second, even if subjects simultaneously optimize their decisions, the cognitive effort of correctly considering deferred taxes is high. Thus, subjects might ignore taxes to reduce this cognitive effort. In line with this rationale, there is evidence that many subjects underreact to changes in nonsalient taxes (e.g., Chetty et al. 2009), use salient average tax rate information instead of the correct marginal tax rates in their decisions (Graham et al. 2017), underweight taxes that contradict their own intentions due to confirmation bias (Blaufus and Milde 2020; Feldman and Ruffle 2015), focus on pre-tax-values instead of after-tax returns (Fochmann et al. 2013), and use simple decision heuristics to reduce the cognitive effort demanded by tax complexity (Blaufus et al. 2013). When subjects ignore deferred taxes, they determine optimal output by setting marginal revenue before taxes equal to marginal costs. Because marginal costs of effort are typically increasing in output and are not tax deductible, ignoring or underweighting taxes thus results in overproduction.

In addition to its effect on overproduction, we also predict that deferred taxation affects asset allocation decisions by reducing the willingness to take risks. First, overproduction reduces actual after-tax income, which could lead to lower risk taking. Second, the taxation

of the investment payoff increases the cognitive load relative to a situation without any taxes, and prior research indicates that higher cognitive load reduces risk taking (Deck and Jahedi 2015; Gerhardt et al. 2016). Third, if paying taxes reduces positive emotions such as happiness, this could reduce the willingness to take risks according to the *affect infusion model* (Forgas 1995), which assumes that subjects pay more attention to positive (negative) cues when they are in a positive (negative) mood.

Our findings show that most subjects ignore the deferred tax burden, resulting in significant overproduction. Nearly 80% of all subjects under deferred taxation produce additional output, although their net marginal revenue is already below their marginal cost of effort. Moreover, we find that deferred taxation significantly reduces subjects' willingness to take risks. The percentage invested in risky assets decreased by 8.95 percentage points (15.59%) compared to a net-equivalent no-tax treatment. Our analyses suggest that this risk reduction effect is not due to the lower actual after-tax income induced by overproduction but instead to the higher cognitive load under deferred taxation. Importantly, we find the ignorance of deferred taxes to be very robust. First, although we show that learning through experience significantly reduces overproduction and doubles the percentage of optimal decisions, this learning effect is limited to subjects with high cognitive ability. Second, introducing accountability reports, which are known as instruments that motivate subjects to exert higher cognitive effort and have been used successfully to debias decision making in other contexts (e.g., Kennedy 1993), is largely ineffective in reducing observed overproduction and asset allocation distortions. Third, increasing tax salience by introducing additional accounting information on the deferred tax burden does not significantly alter subjects' tax misperceptions. Overproduction is reduced almost to zero only if we change the timing of taxation and study an economically equivalent immediate tax system in which the income from the production decision is taxed immediately but the future investment payoff is fully tax exempted, which is comparable to the tax treatment of Roth Solo 401k contributions. This clearly shows that the observed overproduction is not due to a general aversion to considering taxes but is caused by the timing of income taxation.

Our study makes several contributions. To the best of our knowledge, this is the first study that shows that deferred taxation can cause overproduction that significantly reduces entrepreneurs' wealth. This finding adds to the growing body of accounting research that incorporates tax misperceptions to explain economic behavior (for a review, see Blaufus et al. (2020)). In particular, we extend recent research on behavioral differences between immediate and deferred taxation that finds deferred taxation to be less effective in promoting retirement savings (Beshears et al. 2017; Blaufus and Milde 2020; Cuccia et al. 2017). Moreover, we complement Stinson et al. (2020), who demonstrate that deferred pension taxation results in lower risk taking than immediate pension taxation when subjects are presented with a specific after-tax pension goal. In our study, we

show that even without a set goal that could serve as an anchor for individuals, deferred taxation reduces the willingness to take risks due to the higher cognitive load under deferred taxes. Finally, we also contribute to research that examines firms' overproduction. Prior research mainly examines 'opportunistic overproduction', i.e., firms with higher levels of manufacturing overhead use overproduction to delay expensing overhead into earnings by capitalizing it into inventory (e.g., Gupta et al. 2010). We add to this research stream an additional behavioral explanation for firms' overproduction: the ignorance or underweighting of the deferred tax burden.

Our results inform policy makers of two important disadvantages of a widely used policy tool to encourage saving and investment. Compared to economically equivalent immediate taxation with tax-exempt interest, subjects engage in individually inefficient overproduction and less risk taking under deferred taxation as long as we make the reasonable assumption that at least some economic costs are not tax deductible. Our results are in conflict with the commonly assumed neutrality regarding the timing of taxation as long as tax rates do not vary over time (Warren Jr 1986; Scholes et al. 2015, p. 63 f.). This assumed neutrality has significantly influenced tax research and the evaluation of tax policy options. It has been used to study tax effects in a variety of contexts, e.g., the choices between present and future consumption, lifetime and testamentary gifts, retention and distribution of corporate earnings, receiving or deferring income, and different forms of doing business. However, in light of our findings and the results of the recent studies by Blaufus and Milde (2020), Stinson et al. (2020), and Cuccia et al. (2017), it no longer seems justified to maintain the assumption of neutrality with regard to the timing of taxation.

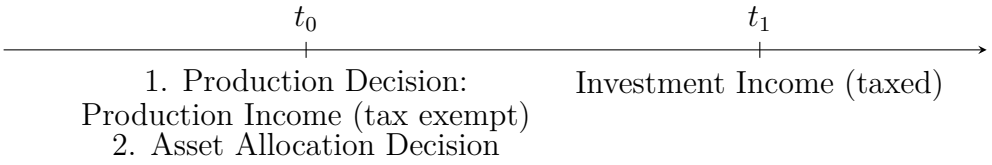
The remainder of this paper is organized as follows: In the next section, we derive our hypotheses. In Section 3.3, we present the experimental design and variable measurement. Sections 3.4 and 3.5 present the results on overproduction, asset allocation, and interventions to reduce subjects' misperception of deferred taxes. In Section 3.6, we present additional analyses, and the last section of this chapter discusses the results and implications for future research.

3.2 Hypotheses Development

To examine the effect of deferred taxation on overproduction and asset allocation, we start with a simple rational choice model with only two points in time (see Section 3.8 (Appendix A) for details). Let us assume that an entrepreneur makes two decisions at $t = 0$. First, the entrepreneur decides how much output to produce (production decision) and, second, how to allocate the income earned from selling the output between a risk-free and a risky investment asset (asset allocation decision). At $t = 1$, the entrepreneur earns the investment payoff. Figure 3.1 illustrates the timeline.

If p denotes the sales price paid for one unit of produced output, x denotes the amount of

Figure 3.1: Timeline



produced output and $e(c)$ the entrepreneur's opportunity costs of effort with $e^{'}(x), e^{''}(x) > 0$, the pre-tax profit π can be easily determined as $\pi = px - e(c)$. In line with current tax systems, we assume non-deductibility of e(c) for tax purposes.[3] Moreover, let α $(1-\alpha)$ denote the percentage of production income (px) that the entrepreneur invests in risky assets generating an uncertain return $\tilde{r}$ (risk-free assets generating a risk-free return r_f).[4] Income is subject to deferred taxation, i.e., production income[5] is tax exempt at $t = 0$, but investment income[6] earned at $t = 1$ is fully taxed at rate τ.

Thus, the entrepreneur's future after-tax income $\widetilde{FV}$ in $t = 1$ can be determined as follows:

$$\widetilde{FV} = px(1 + r_f + \alpha(\tilde{r} - r_f))(1 - \tau) - e(x). \tag{3.1}$$

Risk-averse entrepreneurs maximize their expected utility $E[U(\widetilde{FV})]$ by choosing the optimal output such that marginal after-tax revenue equals the marginal cost of effort:

$$(1 - \tau)p - e'(x) = 0, \tag{3.2}$$

and by choosing the optimal asset allocation such that the expected value of the excess returns weighted by the marginal utility equals zero:

$$E[U'(\widetilde{FV}) \cdot (\tilde{r} - r_f)] = 0. \tag{3.3}$$

However, choosing the optimal output and asset allocation requires that the entrepreneur correctly perceives the deferred tax. While the correct perception of taxes is the standard assumption in accounting and economics, there is growing evidence that many individuals are not aware of their own tax rate (Ballard et al. 2018; Blaufus et al. 2015; Gideon 2017; Rees-Jones and Taubinsky 2016) and that even if tax information is provided, individuals often misperceive this information and thus make decisions that deviate from rational choice predictions (Blaufus et al. 2020). Tax misperception exists due to the limited

[3] Even if the owner-manager of a private corporation receives a salary from her firm, the marginal cost of her effort and of foregone leisure are not deductible (as long as the salary is fixed).

[4] We denote random variables using a tilde.

[5] The production income is the amount of $p \cdot x$. In line with current tax systems, we assume non-deductibility of effort costs (opportunity costs) for tax purposes.

[6] The investment income is the total investment payoff. It encompasses the investment amount and the returns on investment.

cognitive abilities of individuals, which require that subjects consider that purely rational choices are costly to operate in terms of both time and cognitive strain. Thus, subjects use simple decision heuristics that may lead to nonoptimal but satisfying outcomes (Simon 1959), they are rationally inattentive (Taubinsky and Rees-Jones 2018; Graham et al. 2017), and their behavior is subject to specific decision biases (Blaufus et al. 2020). According to the *behavioral taxpayer response model* of Blaufus et al. (2020), the impact of provided tax information on tax perception depends on (i) tax information characteristics such as tax salience, tax complexity, tax framing, and tax timing; (ii) characteristics of the non-tax environment (e.g., background complexity, firms' corporate governance and information environment, competition, and learning opportunities); and (iii) individual characteristics (e.g., behavioral intentions, cognitive capacity, and tax knowledge).

In the case of deferred taxation, the following tax information and individual characteristics let us predict that subjects will ignore or at least underweight the deferred tax burden when making their decisions in the production period. First, when making several interrelated decisions that should ideally be solved simultaneously, subjects still tend to make each choice in isolation to reduce their cognitive effort. Such choice bracketing behavior has been observed in a variety of contexts (Read et al. 1999) and could, in the context of deferred taxation, lead to a situation in which subjects make their current production decisions without considering the future tax on their income from their asset allocation choice. Second, because the tax is levied on what is labeled 'investment income', this may conceal that it is effectively a tax on their business income earned in the production period but taxed one period later. This may decrease the salience of the tax, and prior research finds that subjects underweight nonsalient taxes (e.g., Chetty et al. 2009). Third, Feldman and Ruffle (2015), Feldman et al. (2018) and Blaufus and Milde (2020) provide evidence that subjects willfully ignore taxes if they are in conflict with consumption or savings intentions (tax surcharges on prices, a tax on pension income) but consider taxes if they are consistent with consumption or savings intentions (a tax reduction on prices, a tax refund on retirement savings). Such behavior would be in line with the widespread psychological phenomenon of confirmation bias (Nickerson 1998). In the current context of deferred taxation, confirmation bias implies that subjects underweight information regarding the deferred pension tax because it undermines their intentions to produce output. Fourth, people often act myopically (Benartzi and Thaler 1995). In the context of deferred taxation, this could imply that people underweight future decision consequences such as the deferred tax and focus instead on current consequences. In sum, we expect that many subjects ignore or underweight the deferred tax burden. What happens if the entrepreneur neglects the deferred taxes when making the production choice can be directly derived from equation 3.2. If the entrepreneur fully ignores the deferred tax, equation 3.2 simplifies to

$$p - e'(x) = 0. \tag{3.4}$$

The entrepreneur will expand production until the marginal cost of effort equals the price of one unit of output. Thus, the entrepreneur engages in overproduction, which reduces the entrepreneur's future after-tax income $\widetilde{FV}$. Individually, this overproduction is inefficient, as it reduces the entrepreneur's after-tax income after all costs.[7] Our first hypothesis is therefore as follows:

Hypothesis 1. *If not all economic costs are tax deductible, deferred taxation leads to overproduction.*

If subjects maximize expected utility but engage in overproduction, the reduced actual after-tax income necessarily reduces their willingness to take risks if we reasonably assume constant or decreasing absolute risk aversion (see Section 3.9.2 (Appendix B)). Moreover, the taxation of investment income induces a higher cognitive load than a situation without investment income taxation. Research indicates that higher cognitive load reduces risk taking (Deck and Jahedi 2015; Gerhardt et al. 2016), and thus taxes might decrease risk taking independently of the lower actual after-tax income (Ackermann et al. 2013; Fochmann et al. 2018). In addition, paying taxes often causes negative emotions (Fochmann et al. 2017; Blaufus and Möhlmann 2014). According to the *affect infusion model* (Forgas 1995), this could reduce the willingness to take risks because subjects pay more attention to negative cues when they are in a negative mood. On the other hand, deferred taxation may induce participants to neglect deferred tax liability and overstate their financial means. This effect of deferral may increase the willingness to take risks. We expect the former effects to dominate. In sum, we expect that deferred taxation reduces risk taking and thus state our hypothesis as follows:

Hypothesis 2. *Deferred taxation reduces risk taking.*

According to the *behavioral taxpayer response model* of Blaufus et al. (2020), tax misperceptions can be reduced by providing learning opportunities, increasing incentives for cognitive effort, and increasing the salience of a tax.

"Learning is an enduring change in behavior [...] which results from practice or other forms of experience" (Schunk 2012). If subjects have experienced that their production decisions result in low after-tax income, this might help them to reduce their tax misperceptions. By contrast, if the complexity of the decision environment causes status quo effects (Samuelson and Zeckhauser 1988), then experience would not reduce tax misperceptions. Moreover, the ability to learn may depend on subjects' cognitive capacity. For example, Blaufus and Milde (2020) report that only subjects with high tax and financial knowledge learn through experience. However, there is already some evidence that learning through experience in repetitive decisions with feedback can be an effective instrument to reduce

[7] Whether the production decision is inefficient from a public economic perspective depends on several factors (e.g., externalities) that are beyond the scope of this paper.

tax-related decision errors and biases (Blaufus et al. 2013; Boylan and Frischmann 2006; Rupert and Wright 1998). Thus, we hypothesize as follows:

Hypothesis 3. *Learning through experience reduces overproduction.*

Another potential instrument to debias behavior that has been shown to be effective in other contexts is to increase the incentive to exert effort by raising the accountability of the decision maker. For example, Kennedy (1993) reports that accountability reduces the recency bias of auditors, Cloyd (1997) finds that accountability increases the search effectiveness of tax professionals, and Asare et al. (2000) demonstrates that accountability increases the breadth of testing and thus improves audit performance. In line with these results, we expect that subjects who are required to justify their decisions to others are motivated to increase their effort and thus overcome tax misperceptions. Accordingly, we hypothesize the following:

Hypothesis 4. *Accountability reduces overproduction.*

Because tax salience has been identified as an important driver of tax misperceptions (e.g., Chetty et al. 2009; Graham et al. 2017), we expect that providing additional information on deferred tax liability during the production period should mitigate tax misperceptions. There is empirical evidence that investors respond to information on deferred tax liabilities (e.g., Givoly and Hayn 1992). Moreover, informational nudges have been shown to be effective in reducing tax misperceptions (Blaufus and Milde 2020). Thus, we expect that the provision of additional information that highlights future tax liability encourages subjects to consider the deferred taxes when making their production choice. We hypothesize the following:

Hypothesis 5. *Accounting information on deferred tax liability reduces overproduction.*

Finally, we hypothesize on the effect of changing the timing of taxation. It is well known that immediate taxation and deferred taxation are equivalent in net present value terms assuming constant tax rates over time (e.g., Scholes et al. 2015, p. 63 f.; Stinson et al. 2020). Under immediate taxation, the production income at $t = 0$ is subject to taxes, but the investment income earned at $t = 1$ is fully tax exempt. Thus, future income can be determined as follows:

$$\widetilde{FV} = px(1-\tau)(1 + r_f + \alpha(\tilde{r} - r_f)) - e(x). \tag{3.5}$$

A comparison of equation 3.1 in the case of deferred taxation and equation 3.5 in the case of immediate taxation shows that these equations are identical and that rational choice theory, therefore, predicts no differences in taxpayers' responses. By contrast, behavioral tax research has shown that the timing of taxation could be relevant for individuals. For example, Falsetta et al. (2013) experimentally show that taxpayers invest more (less) in

a riskier asset when a tax decrease (increase) is implemented gradually rather than at once. Moreover, Cuccia et al. (2017) find that most subjects prefer immediately taxed pension plans over deferred taxed pension plans, Blaufus and Milde (2020) report lower effective savings under deferred than under immediate pension taxation, and Stinson et al. (2020) report higher risk taking under immediate than under deferred pension taxation if subjects are provided with a set pension goal. In our setting, we also expect that the timing of taxation is key to predicted overproduction. First, under immediate taxation, individuals who make each of their decisions in isolation (choice bracketing) will still consider the tax because it is directly linked with the output of their production choice. Second, since taxes are directly levied on production income instead of on investment income, the taxation of production income is highly salient. Third, myopic individuals will also consider the immediate tax because it is already levied at $t = 0$. From these considerations, it follows that immediate taxation should reduce overproduction compared to deferred taxation. However, whether overproduction could be fully eliminated is unclear because confirmation bias that induces subjects to underweight tax information that contradicts their behavioral intentions could also cause overproduction under immediate taxation. In addition, subjects tend to anchor on pre-tax values (Fochmann et al. 2013), which could also promote overproduction under immediate taxation. In sum, we predict that immediate taxation should reduce overproduction but may not eliminate it fully. Accordingly, we hypothesize the following:

Hypothesis 6. *Changing the timing of taxation from deferred to economically equivalent immediate taxation reduces overproduction.*

3.3 Experimental Design and Variable Measurement

3.3.1 Experimental Design and Procedures

To study whether deferred income taxation promotes overproduction and distorts asset allocation decisions, we conducted a series of lab experiments. Subjects made production and asset allocation decisions in a model with two points in time. All experiments in this paper were conducted in thirty-eight sessions at the computerized experimental laboratory of Leibniz University Hannover. All experiments in this paper were programmed by using the software z-Tree (Fischbacher 2007). Participants were students[8] and were recruited

[8] Using students as the subject pool instead of entrepreneurs increases the internal validity because we can better control their preferences through monetary rewards, and they have sufficient cognitive capacity to understand the instructions and rules of the experiment. Moreover, in our context (testing the effect of choice bracketing and myopic decision making on misperception of deferred taxes), the usage of students should not restrict external validity. Students are younger and less tax experienced and might have higher cognitive skills than the general entrepreneurship population. However, we are able to control for cognitive ability and tax knowledge and do not believe that age interacts with our treatment variables.

via the software hroot (Bock et al. 2014). We present a translation of the instructions and screenshots of the experiment in Sections 3.10 (Appendix C) and 3.11 (Appendix D).

The session starts with some general information regarding the workstation's utilities (a computer, a pen, and a calculator) and general laboratory rules (no talking or other contact, etc.). Before the actual experiment starts, we measure risk taking with a modified variant of the experimental design used by Holt and Laury (2002) (see Section 3.3.2). Thereafter, instructions on the experiment are distributed, and related questions are answered in private. Before the experiment starts, the participants have to answer some comprehension questions with respect to the experimental design and the tax rules. Only after all questions have been answered correctly are the subjects allowed to start the experiment. Thus, we ensure that everyone understands the deferred taxation rules before they make their production and investment decisions.

Subjects were randomly assigned to the following three treatment groups (between-subjects design): *Deferred* (99 participants), *NoTaxNet* (88) and *NoTaxGross* (86); 46.2% of the subjects were female, and their average age was 24.21 years (SD 4.38). The subjects earned €20.36 on average in approximately 90 minutes (approximately €13.57 per hour), with a range from €0.90 to €63.20.

In the first treatment, subjects make production and asset allocation decisions in a deferred taxation setting (*Deferred*). Subjects participate in three rounds, each which is divided into two parts: a *production task* and an *asset allocation decision*. We describe the experiment in neutral language to avoid using individual scripts when interpreting loaded terms (Alm 1991, 2010). At the beginning of each round, participants earn money by solving mathematical puzzles. Each puzzle comprises a 3x3 grid of nine numbers (each with two decimals). Participants have to select the two numbers that sum to ten (see Figure 3.8 in Section 3.11 (Appendix D)). The computer checks the correctness of the input. In the case of an incorrect answer, the initial input must be corrected. There is no time limit, and subjects can decide to stop producing math puzzle solutions at any time they wish. This production task offers an important advantage: it is largely independent of the participants' education and abilities, and the task has been used successfully in previous experiments (e.g., Mazar et al. 2008). In the first round, the participants earn €3.00 (before taxes) for each correctly solved puzzle. However, the generation of each math puzzle causes increasing marginal costs. Thus, we combine a real effort task with induced effort costs (Gächter et al. 2016). The cost of generating the first math puzzle in Round 1 amounts to €0.15 and increases with each additional math puzzle by €0.15. After each solved puzzle, participants have to decide whether to solve another puzzle or stop working.

Participants are informed that their production income is tax free but that they must pay taxes at a rate of 40% on both the investment returns and the invested capital. The tax information is presented first at the beginning of the instructions and again during

the production and investment parts separately. Additionally, after each correctly solved puzzle, the participants are presented with an information screen that summarizes the number of puzzles solved so far, the respective income and costs.

After the subject decides to stop producing math puzzle solutions, the asset allocation decision starts. At the beginning of this stage, the participants are again given an overview of their production results (i.e., how many puzzles they solved and the corresponding production income (= investment amount)). The participants are presented with a risk-free investment and an alternative independent lottery. They are asked to allocate their entire production income between the two investments. The rate of return of the risk-free investment amounts to 0%. In the lottery, two different states may occur with a probability of 50% each. In the first state, the rate of return amounts to -20%, and in the second state, the rate of return amounts to 40%. Thus, the expected risky return amounts to 10%. To determine the relevant state, participants roll a die after the experiment. After the asset allocation decision, participants are presented with an overview of their payoffs depending on the state of the risky lottery. This overview also contains the deferred taxation of the returns and the investment amount (see Figure 3.22 in Section 3.11 (Appendix D)). Based on this, subjects can decide to revise their decision and allocate the production income differently. They can do this until they are satisfied with their decision.

After accepting the final decision, the second and third rounds start consecutively. Whereas the income per puzzle is €2.50 (before taxes) and the marginal cost of effort increases by €0.10 in the second round, these values are identical for the first and third rounds and are used to analyze whether participants learn though experience (see hypothesis 3).

The other two treatments are identical, except that no taxes are levied. In the *NoTaxNet* treatment, the price paid for each solved math puzzle amounts to €1.80 (Rounds 1 and 3) and €1.50 (Round 2). This is exactly the price after taxes that are earned in the *Deferred* treatment, i.e., the two treatments offer identical net payoffs, and rational choice theory predicts no behavioral differences between the two. A comparison between these treatments allows us to clearly identify tax misperceptions, as the only difference between these treatments is the tax. As we use induced effort costs, we are already able to determine overproduction using the data from the *Deferred* treatment by simply comparing observed production and the rational choice prediction. However, although we induce effort costs, real effort costs may still differ due to individual differences in nonmonetary benefits and costs (the enjoyment and suffering associated with solving the math puzzles; see footnote 15). Thus, the between-subjects comparison ensures that observed overproduction can be directly attributed to taxation and thus allows us to isolate the predicted tax misperception.

In the third treatment (*NoTaxGross*), subjects receive the same pre-tax price for each solved math puzzle as in the *Deferred* treatment but do not have to pay taxes. The

comparison of *NoTaxGross* and *Deferred* allows us to study whether subjects fully ignore or only partly underweight deferred taxes. Moreover, comparing *NoTaxGross* and *NoTaxNet* enables us to determine the effect of deferred taxation in the absence of tax misperceptions.

After finishing the experimental task, the participants in each treatment are asked to complete a questionnaire that collects sociodemographic data. A translated version of the questionnaire is presented in Section 3.12 (Appendix E). For payout purposes, only one decision round is relevant. To determine the relevant round, the participant must roll a die. Each participant also receives a participation fee of €1.50 and the payout from the lottery-choices experiment. The participants are successively and separately paid out in cash, and the payment is rounded up to the next ten cents.

The predicted hypotheses are tested using both bivariate and multivariate analyses. We present (two-sided) t-tests for all bivariate analyses. To control for various sociodemographic variables and other factors influencing investment behavior, we perform several robust regressions proposed by Huber (Huber et al. 1973, Huber's M-estimator).[9]

3.3.2 Variable Measurement

Dependent Variables

To examine the impact of deferred taxation on production behavior, we use the number of math puzzles solved as the dependent variable *Production*. Furthermore, we consider a measure of nonoptimal production behavior. The variable *Overproduction* measures the difference between the number of math puzzles solved and the rational choice optimum (see Section 3.9.3 (Appendix B) for the determination of the optima). Since the optima are not integers, we round down (round up) a positive (negative) difference to an integer.[10]

To investigate whether deferred income taxation reduces the willingness to take risks, we use the percentage of the production income (= investment amount) that the participant invests in the risky asset (*Risk Taking*).

Independent and Control Variables

As independent variables, we use the treatment variables *Deferred*, *NoTaxNet* and *NoTaxGross*. These are dummy variables equal to one if the observation belongs to the respective treatment. In our multivariate analyses, we consider different sociodemographic factors

[9] Robust regressions provide a statistical compromise by using all of the original data but downweighting influential observations. In the statistical literature, the validity of robust regression estimators has been demonstrated both analytically and empirically (see Andersen (2008) for a review) and are recommended for accounting studies by Leone et al. (2019).

[10] For risk-averse participants in the deferred taxation treatment, for example, theoretical optimum is 11.5. Accordingly, the optimal production behavior is to stop working at eleven solved math puzzles. The participant in the twelfth period is indifferent to whether she solves another puzzle or stops working because the marginal cost of the twelfth math puzzle equals the net income. Consequently, the variable *Overproduction* is zero for participants with production of eleven or twelve.

such as gender (*Male*), field of study (*Economist*), income (*Low Income*), age (*High Age*), risk attitude (*Risk Attitude*), tax knowledge (*Tax Knowledge*), cognitive ability (*CRT* and *High NCC*), procrastination (*Procrastination*), and two different types of learners (*Global Learner*) as control variables. *Male* is a dummy variable equal to one if the participant is male. *High Age* (*Low Income*) is a binary variable that takes value one if the participant's age (income) is above (below) the median of all observations.

Previous studies have shown that subjects are severely limited in the amount of information they can obtain, process, or remember (e.g., Miller 1956; Kahneman 1973; Baddeley et al. 1986). Therefore, cognitive capacity limitations are an important factor of predicted tax misperceptions. We control for cognitive ability with two measures for cognitive ability (*CRT* and *High NCC*). We use a three-item cognitive reflection test (CRT) as a simple measure of subjects' cognitive ability (Frederick 2005). The variable *CRT* denotes a CRT score from 0 (those who scored 0 out of 3) to 3 (those who scored 3 out of 3). A higher CRT score indicates a higher cognitive ability. Additionally, we use the need for cognitive closure (NCC) as a second measure. The effort a subject is willing to invest in searching for problem solutions may be affected by the individual's NCC (Webster and Kruglanski 1994). The need for cognitive closure (*High NCC*) is measured with the German need for cognitive closure scale of Schlink and Walther (2007), which is based on the classic NCC scale of Webster and Kruglanski (1994). A median split was accomplished on their scores from the NCC scale, where subjects were divided into low and high conditions. Moreover, we also control for familiarity with economic decision making by field of study (*Economist*) and for subjects' tax knowledge (*Tax Knowledge*). *Economist* denotes whether a subject studies at the Faculty of Economics and Management. The control variable *Tax Knowledge* includes the answer to our post-experimental question regarding tax knowledge. In this question, the participants assess their personal tax knowledge on a 9-point scale from 1 = no experience to 9 = considerable experience.

Next, we control for procrastination, as it is regarded as an important determinant of choice bracketing (Sabini and Silver 1982). To do so, participants are presented with five statements concerning procrastination (Blaufus and Milde 2020). Participants are asked to decide whether they are personally uncharacteristic or characteristic of them on a scale from 1 = very uncharacteristic to 5 = very characteristic. The subjects' procrastination is measured by the sum of all five answers (*Procrastination*).

The analyses also contain the participants' risk attitudes (*Risk Attitude*) measured by a short incentivized lottery-choice task at the beginning of the experiment. Participants choose 20 times either a certain payoff or a fixed gamble, where the certain payoff is raised by €0.10 in each decision. During the payout at the end of the experiment, the participants roll a 20-sided die to determine which of the 20 choices will be used to compute a payoff. For those choosing the risky option, a second throw of the die determines the realized payoff. The degree of risk taking is measured by the point at which the participant

switches from the gamble to the safe payoff. This is a modified variant of the experimental design used by Holt and Laury (2002), which better reflects the asset allocation choice made in the experiment.

In addition, we consider sequential and global learners as a potential factor for learning (*Global Learners*). Felder et al. (1988) developed a learning style model based on experience in engineering education that has four different learning dimensions. In particular, the distinction between global and sequential learners is interesting for our study. Sequential learners tend to learn step by step and prefer to follow linear, stepwise paths in finding a solution. However, global learners tend to learn in a substantial leap. They wish to see the big picture by taking in information randomly before assembling it. They are able to solve complex problems quickly. In the context of choice bracketing, we assume that global learners are able to learn faster than sequential learners. To identify sequential and global learners, we use the self-scoring instrument called the index of learning styles developed by Felder et al. (1988).

3.4 Empirical Results

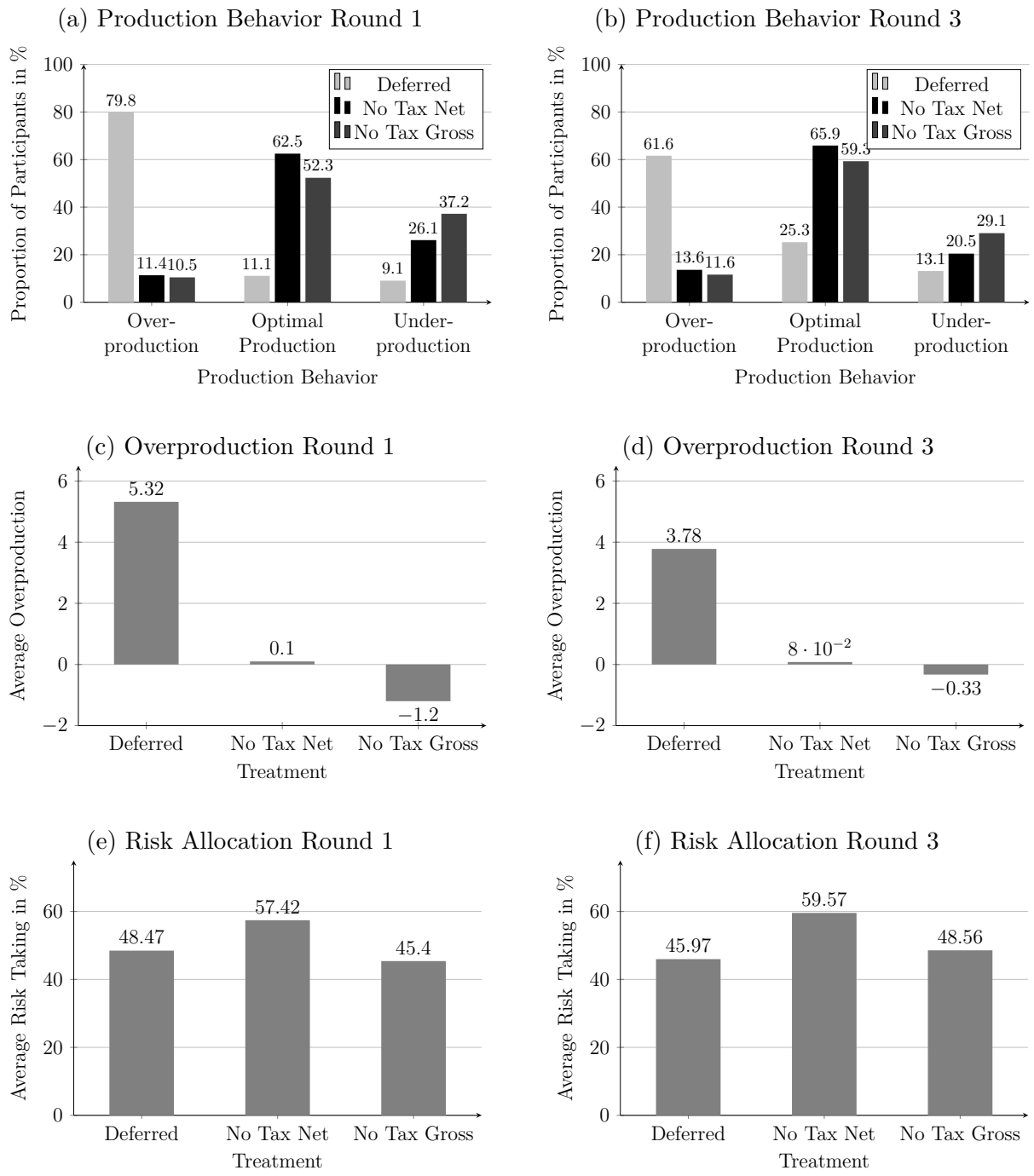
3.4.1 Overproduction

Figure 3.2 shows our main results, and Table 3.7 in Section 3.8 (Appendix A) displays the descriptive statistics for our dependent variables *Overproduction* and *Production*. We find that 79.8% of the subjects in the deferred taxation treatment exhibit overproduction in the first round (see Figure 3.2a). *Overproduction* amounts to 5.32 (see Figure 3.2c), which is significantly different from zero ($p < 0.001$; two-sided one-sample t-test).

To exclude the possibility that non-tax reasons explain the observed overproduction, we compare the production decisions under deferred taxation with those in a treatment without taxes and identical net values on the prices paid for one produced unit (*NoTaxNet*). Rational choice theory would predict no differences here. First, we find no significant overproduction in treatment *NoTaxNet* ($p = 0.684$; two-sided, one-sample t-test). The comparison of the two treatments in the first round emphasizes that deferred taxation costs lead to a significant *tax misperception effect* and inefficient overproduction ($p < 0.001$). Hence, subjects at least partially neglect deferred taxation costs, which leads to overproduction and thus decreases the subject's wealth. Moreover, the comparison of the output (*Production*) between the treatments *Deferred* and *NoTaxGross* suggests that subjects almost fully neglect the deferred taxes because we find that the output in the first round in both treatments does not differ statistically ($p = 0.122$).

In sum, we conclude that most subjects in our experiment do not consider deferred taxes in their production decision. Therefore, we confirm our Hypothesis 1 that deferred taxation leads to overproduction.

Figure 3.2: Results



Note. This figure presents descriptive statistics for our dependent variables *Production*, *Overproduction* and *Risk Taking*. The treatment variables are dummy variables equal to one if the observation belongs to the respective treatment. The variable *Production* is the number of math puzzles solved. The variable *Overproduction* measures the difference between the number of math puzzles solved and the rational choice optimum rounded down (rounded up) in the case of a positive (negative) difference. *Risk Taking* is the percentage of the production income that the participant invested in the risky asset.

Table 3.1: Multivariate Regression Analyses: Overproduction in Rounds 1 and 3

	Round 1		Round 3	
VARIABLES	Overproduction (1)	Production (2)	Overproduction (3)	Production (4)
Treatment				
Deferred	——— **(base)** ———			
No Tax Net	**-7.167*** **	**-7.697*** **	**-4.607*** **	**-4.943*** **
	(0.140)	**(0.165)**	**(0.404)**	**(0.445)**
No Tax Gross	**-7.310*** **	**0.0878**	**-5.017*** **	**2.545*** **
	(0.141)	**(0.166)**	**(0.407)**	**(0.448)**
Male	-0.379***	-0.115	-0.666*	-0.324
	(0.121)	(0.143)	(0.350)	(0.385)
Economist	0.0596	0.199	0.193	0.209
	(0.152)	(0.180)	(0.441)	(0.485)
Low Income	0.0613	0.182	-0.513	-0.401
	(0.129)	(0.152)	(0.374)	(0.411)
High Age	0.0377	0.0941	-0.202	-0.226
	(0.125)	(0.148)	(0.363)	(0.399)
Risk Attitude	-0.0193	0.0141	0.0616	0.0972**
	(0.0154)	(0.0182)	(0.0447)	(0.0493)
Tax Knowledge	0.0198	0.00459	-0.0902	-0.116
	(0.0347)	(0.0409)	(0.100)	(0.111)
CRT	0.0296	0.0961	-0.266*	-0.229
	(0.0529)	(0.0625)	(0.153)	(0.169)
Procrastination	0.00737	0.0172	-0.00364	-0.00854
	(0.0137)	(0.0161)	(0.0396)	(0.0436)
Global Learner	-0.0104	0.134	-0.382	-0.195
	(0.120)	(0.142)	(0.349)	(0.384)
Constant	7.149***	18.23***	5.723***	16.94***
	(0.344)	(0.406)	(0.996)	(1.096)
Observations	273	273	273	273
R^2	0.398	0.373	0.456	0.534
$R^2_{adj.}$	0.372	0.347	0.433	0.515

Note. This table presents the robust regression results explaining subjects' production behavior for Rounds 1 and 3. The treatment variables are dummy variables equal to one if the observation belongs to the respective treatment. The variable *Overproduction* measures the difference between the number of math puzzles solved and the rational choice optimum rounded down (rounded up) in the case of a positive (negative) difference. The variable *Production* is the number of math puzzles solved. *Male*, *Economist*, and *Global Learner* are dummy variables that takes a value of one if the subject is male, is studying at the Faculty of Economics or is a global learner (measured according to Felder et al. (1988)). *High Age* (*Low Income*) is a binary variable that takes on a value of one if the participant's age (income) is above (below) the median of all observations. *Risk Attitude* is measured by a short incentivized lottery-choice task where subjects must select 20 times either a certain increasing payoff or a fixed gamble. The degree of risk taking is measured by the point at which the participant switches from gamble to safe payoff. *Tax Knowledge*, *CRT*, and *Procrastination* are the answers to the underlying questions. We present standard errors in parentheses. ***, **, and * denote significance at the 1%, 5%, and 10% levels, respectively.

To test whether our results are affected by individual characteristics of the participants, we run multivariate regression analyses with the variables *Overproduction* and *Production* as dependent variables and include our control variables (see Section 3.3.2). Models 1 and 2 in Table 3.1 display the results for the first round, and they are in line with our bivariate findings. Regarding our control variables, we only observe a negative association between men and overproduction.[11]

As shown in Figure 3.2a, only 11.1% of the participants under deferred taxation are able to choose the optimal and efficient production level in the first round. To examine the sociodemographic characteristics of these persons in comparison to the other participants, we run a multinomial logistic regression (see Table 3.8 in Section 3.8 (Appendix A)). We find that the probability of inefficient overproduction is significantly lower for participants with greater tax knowledge and higher cognitive ability (the optimal group serves as the reference category). To determine the effect on the probability scale, we compute average marginal effects. We compare the probability of making optimal production decisions between two groups: participants with very high tax knowledge (fourth quartile of *TaxKnowledge*) and those with very low tax knowledge (first quartile of *TaxKnowledge*). We find that the probability of making optimal production decisions for participants in the high tax knowledge group increases by 20.3 percentage points compared to participants with very low tax knowledge. Similarly, we find that the probability of producing optimally for participants with a very high cognitive ability increases by 17.8 percentage points compared to participants with a very low cognitive ability.

3.4.2 Learning through Experience

We designed the experiment based on three rounds, each comprising a production and an asset allocation phase. Therefore, the first and third rounds are identical in all parameters, whereas the second round contains different production income and costs but the same lotteries. This design was chosen to analyze the decisions over time to study whether subjects learn through experience. To analyze these learning effects, we compare possible tax misperceptions in the first and third periods.[12] We have already presented the results in Section 3.4.1 in the respective tables and figures.

Although subjects are presented the same income per puzzle, taxes and costs in the third round and should have learned from their overproduction in the first round, we still find substantial overproduction compared to the theoretical predictions ($p < 0.001$, one-sample t-test) and to the *NoTaxNet* treatment ($p < 0.001$; see Figure 3.2d). Overall, however, the overproduction decreases compared to the first round, which we interpret as learning

[11] Instead of *CRT*, we also use *High NCC* as another measure of cognitive ability. The results remain unchanged.

[12] We do not analyze the second period in our baseline analysis, as it yields a different optimal production due to the different parameters and is thus not directly comparable to the other two rounds. However, in the second period, we also find that deferred taxation leads to overproduction (see Section 3.6.1).

(see Table 3.2). In the third round, the proportion of participants in the overproduction group decreases significantly from 79.8% to 61.6% (p = 0.005, Pearson chi2 test), and the number of subjects whose production is optimal doubles significantly from the first to the third round (p = 0.010, Pearson chi2 test; see also Figure 3.2b). Taxes are no longer completely neglected in the third round, as production is now significantly lower than in treatment *NoTaxGross* ($p < 0.001$; see also Model (4) in Table 3.4.1). Hence, we confirm our Hypothesis 3 that learning through experience decreases tax misperceptions.

Table 3.2: Learning Behavior under Deferred Taxation

VARIABLES	Overproduction (1)	Overproduction (2)
Round 1	——— (base) ———	
Round 3	-1.545***	-1.545**
	(0.584)	(0.598)
Controls	NO	YES
Observations	198	198
R^2	0.032	0.137
$R^2_{adj.}$	0.027	0.091

Note. This table presents linear regression results with clustered standard errors by participant ID. The variable *Overproduction* measures the difference between the number of math puzzles solved and the rational choice optimum rounded down (rounded up) in the case of a positive (negative) difference.*Round* is an indicator variable measuring the round in the experiment. In Model (2), we use *Male*, *Economist*, *Low Income*, *High Age*, *Risk Attitude*, *Tax Knowledge*, *CRT*, *Procrastination*, and *Global Learner* as control variables (see Section 3.3.2). We present standard errors in parentheses. ***, **, and * denote significance at the 1%, 5%, and 10% levels, respectively.

Next, we test for a moderating effect of cognitive ability on learning through experience. Therefore, we split our sample into two groups (median split): subjects with high cognitive capacity and those with low cognitive capacity. Table 3.3 shows the results for both rounds.

Regardless of the measure of cognitive ability considered (CRT or NCC), we find that subjects with a higher cognitive ability learn in the third round, while subjects with a low cognitive ability do not. This emphasizes the importance of cognitive ability for the misperception of deferred taxes. Not only does the probability of deciding optimally in the first round increase significantly with cognitive ability but high cognitive ability also appears to be a prerequisite for learning through experience. In addition, we run a pooled OLS regression combining both rounds and clustering the standard errors by participant ID. To check the robustness of the bivariate results, we include interaction terms in the regression. The results (untabulated) confirm the bivariate findings.

Table 3.3: Average Overproduction – Heterogeneous Learning Behavior

	N	Round 1	Round 3	p-value
Cognitive Ability (CRT):				
High CRT	60	5.05	2.62	0.002
Low CRT	39	5.74	5.56	0.850
Cognitive Ability (NCC):				
High NCC	49	5.31	3.14	0.016
Low NCC	50	5.34	4.40	0.261

Note. This table presents average *Overproduction* explaining the heterogeneous learning behavior. The variable *Overproduction* measures the difference between the number of math puzzles solved and the rational choice optimum rounded down (rounded up) in the case of a positive (negative) difference. To test for a moderating effect of cognitive ability on learning through experience, we split our sample into two groups: participants with high and low cognitive ability (median split). We use a three-item cognitive reflection test (CRT) as a simple measure of subjects' cognitive ability (Frederick 2005). The variable *CRT* denotes the CRT score from 0 (those who scored 0 out of 3) to 3 (those who scored 3 out of 3). A higher CRT score indicates a higher cognitive ability. The p-values are calculated according to the 2-sided t-test.

3.4.3 The Effect of Deferred Taxation on Asset Allocation

After the production stage, subjects are asked to allocate their entire production income between two different investments as described in Section 3.3.1. The average asset allocation for each treatment is displayed in Figures 3.2e and 3.2f. In Section 3.4.1, we identify substantial tax misperceptions under deferred taxation, which results in overproduction. From a theoretical perspective, overproduction reduces actual after-tax income and thus decreases risk taking if we assume constant or decreasing absolute risk aversion (see Section 3.9.2 (Appendix B)). To identify whether deferred taxation leads to reduced risk taking, we compare the asset allocation decisions between *Deferred* and *NoTaxNet* (Round 1: $p = 0.102$; Round 3: $p = 0.011$). While in our bivariate analyses, the effect is significant only in the third round, in the multivariate analyses, the *tax misperception effect* is significant in both rounds (see Models (1) and (2) in Table 3.4).

To examine whether the risk-reducing effect of deferred taxation is due to the amount of overproduction (which reduces actual after-tax income), the investment amount (which might serve as an anchor), more negative emotions, or the higher cognitive load (see our derivation of hypothesis H2), we stepwise include additional control variables (see Models (3) to (8) in Table 3.4). The estimate for the treatment effect in these models has to be interpreted conditional on the added controls, so that it measures the causal effect of the treatment on risk behavior that does not travel along the overproduction, investment

amount, and emotions path. Thus, the residual treatment effect in Models (7) and (8) should present the isolated effect of cognitive load induced by deferred taxation.

Table 3.4: Multivariate Regression Analyses: Risk Allocation in Rounds 1 and 3

VARIABLES	(1) Round 1 Risk Taking	(2) Round 3 Risk Taking	(3) Round 1 Risk Taking	(4) Round 3 Risk Taking	(5) Round 1 Risk Taking	(6) Round 3 Risk Taking	(7) Round 1 Risk Taking	(8) Round 3 Risk Taking
Treatment								
Deferred	———	———	———	**- (base)**	———	———	———	———
No Tax Net	**9.084***	**11.89****	**14.71****	**15.18*****	**20.86*****	**18.85*****	**23.33*****	**19.06*****
	(5.232)	**(4.913)**	**(6.042)**	**(5.379)**	**(7.953)**	**(6.970)**	**(8.010)**	**(6.849)**
No Tax Gross	**-1.926**	**2.495**	**5.092**	**6.347**	**-3.656**	**0.0275**	**2.178**	**4.134**
	(5.271)	**(4.949)**	**(6.419)**	**(5.519)**	**(5.276)**	**(5.368)**	**(6.163)**	**(5.498)**
Overproduction			1.168**	0.873				
			(0.583)	(0.603)				
Investment Amount					0.393**	0.261	0.389**	0.219
					(0.192)	(0.191)	(0.191)	(0.188)
Happiness							-2.151*	-3.014***
							(1.160)	(1.031)
Male	20.28***	23.28***	19.21***	23.62***	19.10***	23.66***	19.36***	25.51***
	(4.531)	(4.254)	(4.549)	(4.270)	(4.545)	(4.269)	(4.524)	(4.249)
Economist	-1.871	6.682	-2.061	6.452	-1.992	6.515	-2.466	6.900
	(5.707)	(5.358)	(5.695)	(5.406)	(5.684)	(5.402)	(5.663)	(5.315)
Low Income	-6.598	-5.248	-7.286	-5.417	-7.630	-5.465	-7.588	-5.871
	(4.837)	(4.541)	(4.827)	(4.556)	(4.830)	(4.556)	(4.807)	(4.478)
High Age	-2.122	-1.312	-1.538	-1.220	-1.469	-1.198	-2.745	-1.849
	(4.692)	(4.405)	(4.673)	(4.419)	(4.665)	(4.418)	(4.696)	(4.345)
Risk Attitude	3.141***	3.324***	3.098***	3.312***	3.084***	3.310***	3.069***	3.150***
	(0.579)	(0.544)	(0.576)	(0.546)	(0.575)	(0.546)	(0.573)	(0.539)
Tax Knowledge	0.279	-0.739	0.349	-0.771	0.316	-0.760	0.532	-0.652
	(1.299)	(1.220)	(1.295)	(1.226)	(1.293)	(1.226)	(1.292)	(1.205)
CRT	1.718	2.529	1.902	2.696	1.868	2.689	2.029	2.593
	(1.985)	(1.864)	(1.980)	(1.881)	(1.975)	(1.882)	(1.967)	(1.849)
Procrastination	0.331	0.168	0.397	0.212	0.382	0.207	0.454	0.152
	(0.512)	(0.481)	(0.510)	(0.483)	(0.509)	(0.483)	(0.507)	(0.474)
Global Learner	5.433	5.487	4.598	5.034	4.650	5.077	4.308	5.293
	(4.510)	(4.235)	(4.497)	(4.256)	(4.486)	(4.255)	(4.466)	(4.180)
Constant	-9.882	-14.12	-15.54	-18.11	-28.76*	-26.95*	-23.09	-10.78
	(12.88)	(12.10)	(13.21)	(12.46)	(16.04)	(15.35)	(16.38)	(15.97)
Observations	273	273	273	273	273	273	273	273
R^2	0.219	0.284	0.229	0.290	0.229	0.290	0.240	0.313
$R^2_{adj.}$	0.186	0.254	0.193	0.257	0.194	0.257	0.202	0.279
Wald-Tests (p-value)								
NoTaxNet vs. NoTaxGross	0.045	0.068	0.080	0.088	0.005	0.031	0.017	0.087

Note. This table presents the robust regression results explaining subjects' risk allocation in Rounds 1 and 3. The treatment variables are dummy variables equal to one if the observation belongs to the respective treatment. *Risk Taking* is the percentage of the production income that the participant invested in the risky asset. The variable *Overproduction* measures the difference between the number of math puzzles solved and the rational choice optimum rounded down (rounded up) in the case of a positive (negative) difference. *Investment Amount* is the production income. Happiness is measured by a control question after the risk allocation stage on a 9-point scale. The variable *Happiness* reflects the value of the answer. *Male*, *Economist*, and *Global Learner* are dummy variables that takes a value of one if the subject is male, is studying at the Faculty of Economics or is a global learner (measured according to Felder et al. (1988)). *High Age* (*Low Income*) is a binary variable that takes on a value of one if the participant's age (income) is above (below) the median of all observations. *Risk Attitude* is measured by a short incentivized lottery-choice task where subjects must select 20 times either a certain increasing payoff or a fixed gamble. The degree of risk taking is measured by the point at which the participant switches from gamble to safe payoff. *Tax Knowledge*, *CRT*, and *Procrastination* are the answers to the underlying questions. We present standard errors in parentheses. ***, **, and * denote significance at the 1%, 5%, and 10% levels, respectively.

First, we find that the risk-reducing effect of deferred taxation is not due to a correlation between overproduction and risk (see Models (3) and (4) in Table 3.4). If anything, overproduction has a positive effect on risk taking. Hence, there must be another explanation for our result.

Second, deferred taxation increases the investment amount and thereby shifts the anchor and influences investment behavior. Participants in treatment *Deferred* earn nominally

more due to significant tax misperceptions in the production stage and, hence, have a higher investment amount. This amount could serve as an anchor for the expected payoff after the investment. With regard to risk allocation, two effects are possible: (i) If we assume that subjects have a specific income goal in mind, participants in treatment *NoTaxNet* may perceive themselves as further away from a set goal and thus may be more likely to take on additional investment risk to earn higher returns than participants in the *Deferred* treatment if the latter participants anchor on their production income (= investment amount). In line with this, Stinson et al. (2020) show that deferred pension taxation results in lower risk taking than immediate pension taxation when subjects are presented with a specific after-tax pension goal. (ii) A higher anchor could also lead to a greater willingness to take risks, since a specific income goal has already been mentally achieved and the risk can therefore be increased. Models (5) and (6) in Table 3.4 show that an anchoring effect can only partially explain investment behavior. In accordance with our second argument, we find a positive association between the investment amount and the risk. This even causes the *tax misperception effect* to increase between treatments *Deferred* and *NoTaxNet*, as the comparison of the coefficients to the baseline Models (1) and (2) shows.

Third, emotions could lead to different risk-taking decisions. During the investment decision, we asked the participants which emotions are triggered when reading the overview of their investment payoffs for the first time. Recall that they have the opportunity to change their investment decision at this point in time. We find that participants under deferred taxation feel unhappier ($p < 0.001$), angrier ($p = 0.005$), more frustrated ($p = 0.001$) and more disappointed ($p < 0.001$) than their counterparts in treatment *NoTaxNet*. This is in line with prior research showing that paying taxes may cause negative emotions (Fochmann et al. 2017; Blaufus and Möhlmann 2014). To investigate the influence of emotions on risk behavior, we include the emotions individually as control variables in the multivariate regression. We find that happiness has a negative influence on risk taking in both rounds (see Models (7) and (8) in Table 3.4). This finding contradicts the *affect infusion model* (Forgas 1995) and is instead in line with the *mood maintenance hypothesis*, which predicts that subjects in a positive mood behave more cautiously and raise their individual reference points (Kliger and Levy 2003; Lane 2017; Yechiam et al. 2016). Thus, controlling for emotions does not affect our results regarding the residual treatment effect, but it tends to increase the effect size.[13]

Fourth, prior research indicates that higher cognitive load reduces risk taking (Deck and Jahedi 2015; Gerhardt et al. 2016), and thus taxes might decrease risk taking (Ackermann et al. 2013; Fochmann et al. 2018). We find some evidence that cognitive load is indeed

[13] The emotions were measured using a 9-point scale. The control variables reflect the values of the answers. In Table 3.4, we report only the regression results that include the control variable *Happiness*. Regarding the other emotions, we find only a weak positive correlation between frustration and risk taking in the third round. However, the main effect remains robust in all analyses.

higher with deferred taxes than in the *NoTaxNet* treatment: Participants under deferred taxation (i) use the calculator more often during the experiment ($p = 0.009$, 1-sided Fisher's exact test; see the post-experimental questionnaire), (ii) change their investment decision more often in the first round ($p < 0.001$, 1-sided Fisher's exact test), and (iii) need on average 90% more time (80 seconds) for their investment decision in the first round ($p < 0.001$) than their counterparts.

The multivariate analyses also show that there is no significant difference in risk allocation between treatments *Deferred* and *NoTaxGross*. This holds even if we check for possible explanations for investment behavior such as emotions. A further explanation for investment behavior in the deferred taxation system could thus be that taxes are also completely neglected in investment decisions. However, we exclude this possibility for the following reasons: (i) participants have to answer comprehension questions with respect to the tax rules to ensure that all have understood the tax rules before they make their investment decisions; (ii) taxation is very salient during the investment choice. To ensure this, participants receive a detailed overview of the investment decision. This overview contains information about the invested income, the return on assets, the taxation on returns under deferred taxation, the costs, and finally, the payouts depending on the state of the risky asset (see Figure 3.18 in Section 3.11 (Appendix D)). The overview is displayed for a minimum of 90 seconds. After expiration of time, participants must decide either to change their investment decision or to accept the input. Most participants (55%) decide to check their initial investment choice at least once under deferred taxation; (iii) although taxes are at least partially considered in the production decision in the third round, the risk allocation does not change compared to treatment *NoTaxGross*. Therefore, there must be another explanation in this context. We will discuss this in greater detail in Section 3.7.

In sum, we find that deferred taxation significantly reduces subjects' willingness to take risks. The percentage invested in risky assets decreased by 8.95 percentage points (15.59%) compared to a net-equivalent no-tax treatment. Our analyses suggest that this risk reduction effect is not due to the lower actual after-tax income induced by overproduction but instead to the higher cognitive load under deferred taxation. Thus, we confirm hypothesis 2.

3.5 Interventions to Reduce Tax Misperceptions

3.5.1 Accountability Report

We run two additional experiments to examine potential interventions to reduce tax misperceptions under deferred taxation and shed light on the determinants of these misperceptions. If misperceptions are mainly caused by a low effort level among the subjects, then a debiasing tool known to increase effort should be effective. In accordance with this

reasoning, we test whether introducing accountability reports reduces overproduction, as this has been shown to be an effective intervention in other contexts (Kennedy 1993). In the *AccountabilityReport* treatment, after subjects finish their production, they have to write brief accountability reports. There, they are asked to name the number of solved puzzles and justify their decision to stop working. The handwritten reports have to be given to the experimenter at the end of the experiment.

A total of 68 subjects took part in this treatment. Of the subjects, 47.1% were male, and their average age was 25.03 years (SD 5.73). Subjects earned an average of €14.46 in approximately 90 minutes (approximately €9.64 per hour), with a minimum of €3.00 and a maximum of €27.90.

We find that the production behavior in the first round and in the third round remains unchanged compared to the *Deferred* treatment (Round 1: $p = 0.302$; Round 3: $p = 0.506$). Figure 3.3 shows a graphical presentation of the results. Thus, accountability does not improve decision performance, and we cannot confirm hypothesis 4.

An analysis of the accountability reports reinforces our argument that most subjects do not account for taxes in their production decisions. Among the participants who chose their optimum in the third round according to the choice bracketing theory, only 3% mentioned taxes in their reports.[14] In the group with optimal production, however, taxes were mentioned in 90% of cases.[15] In sum, these findings of the *AccountabilityReport* treatment suggest that the misperceptions are not due to low effort levels but to cognitive constraints.

3.5.2 Accounting Information

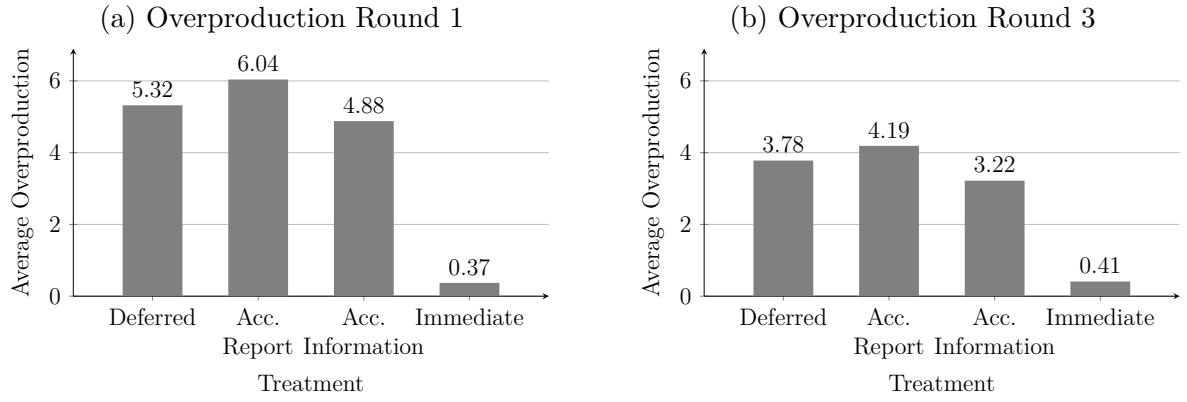
To test whether tax misperceptions can be reduced by increasing tax salience (hypothesis 5), we increase the visibility of deferred taxation in another treatment: After every successfully solved math puzzle, the participants are presented with not only the number of solved puzzles and production income but also the future taxes due on the investment amount. This *AccountingInformation* treatment mirrors the salient presentation of deferred taxes and should raise awareness of future taxation. After every unit is produced, subjects are reminded of the later taxes due and thus should take them into account while working.

A total of 69 subjects took part in this treatment. Of the subjects, 49.3% were male, and their average age was 24.81 years (SD 5.19). Subjects earned an average of €13.62 in approximately 90 minutes (approximately €9.08 per hour), with a minimum of €3.50 and a maximum of €25.70.

[14] We evaluated the reports of all three rounds. According to our definition, taxes were mentioned when the word "taxes" or the amount of taxation (40% or 0.4) was mentioned or was taken into account in a calculation.

[15] The evaluation of the reports shows again that the production causes partly nonmonetary costs or benefits. For example, one respondent received headaches from math puzzles, while another respondent "had fun finding solutions".

Figure 3.3: Interventions against Tax Misperceptions



Note. This figure presents the average overproduction for the additional experiments regarding the interventions against tax misperceptions. The treatment variables are dummy variables equal to one if the observation belongs to the respective treatment. The variable *Overproduction* measures the difference between the number of math puzzles solved and the rational choice optimum rounded down (rounded up) in the case of a positive (negative) difference.

The production behavior remains statistically unchanged compared to the system without accounting information (see Figure 3.3; Round 1: $p = 0.545$; Round 3: $p = 0.407$). Thus, we cannot confirm hypothesis 5, which suggests that tax misperceptions are not primarily due to the low tax salience of deferred taxation. That we have successfully manipulated the salience in the *AccountingInformation* treatment can be derived from differences in the decision-making process between subjects in the *AccountingInformation* treatment and *Deferred* treatment: (i) We asked the participants after each round whether their payoff after taxes and costs in the respective round met their expectations, as indicated on a 5-point scale from 1 = higher than expected to 5 = lower than expected. We find that the after-tax payoff is more in line with expectations for the participants in the *AccountingInformation* treatment than for the subjects in treatment *Deferred* ($p = 0.064$). (ii) The participants also had to give a reason if they wanted to change their asset allocation decision. In treatment *Deferred*, the reason that taxes were not considered in the asset allocation decision was given significantly more often in the first round ($p = 0.016$) than in the *AccountingInformation* treatment.

3.5.3 Immediate Taxation

To test our last hypothesis, we conduct another experiment in which the tax on production income is not deferred but immediate (*Immediate*). Hence, the income earned in the production task is immediately taxed, but investment income is tax free. We use the same tax rate as in the *Deferred* treatment. Thus, both tax treatments lead to the same tax burden and after-tax income but differ only in the timing of taxation. Rational choice theory, therefore, predicts no behavioral differences.

A total of 86 subjects took part in this treatment. Of the subjects, 57.0% were male, and their average age was 24.5 years (SD 6.13). Subjects earned an average of €13.70 in approximately 90 minutes (approximately €9.13 per hour), with a minimum of €3.20 and a maximum of €25.00.

Compared to deferred taxation, Figure 3.3 shows that there is nearly no difference in overproduction under immediate taxation (*Deferred* vs. *Immediate*: Round 1 and 3: $p < 0.001$). In line with hypothesis 6, the comparison with the net equivalent treatment *NoTaxNet* also shows that there is no *tax misperception effect* in the production decision (Round 1: $p = 0.526$; Round 3: $p = 0.331$). These results are in conflict with the usually assumed neutrality regarding the timing of taxation as long as tax rates do not vary over time (Warren Jr 1986) and suggest that the misperception of deferred taxes is mainly caused by the choice bracketing and myopic behavior of subjects and not by confirmation bias or anchoring on pre-tax values.

3.6 Robustness Analyses

3.6.1 Panel Regression

In the previous analyses, we completely neglected the second round. To take all rounds into account, we run a multivariate random-effects panel regression. We cluster the robust standard errors at the participant level and use the round as the time variable. All reported results remain qualitatively unchanged, even when considering the second round (see Models (1) and (3) in Table 3.9 in Section 3.8 (Appendix A)). In addition, we run a regression with overproduction as the dependent variable with an interaction term between the round and treatment indicator variable (see Model (2)). The result shows that the participants did not learn significantly until the third round, since only in this round did the overproduction under deferred taxation decrease significantly relative to the *NoTaxGross* treatment.

3.6.2 Fairness

The participants subject to the deferred taxation system could perceive the remuneration per math puzzle solved as fairer (€3.00) than their counterparts in the *NoTaxNet* treatment (€1.80). This should especially be the case if taxes are neglected in the production decision. The impact of perceived payment fairness on work and production effort is broadly examined in the literature. In the context of gift exchanges and reciprocity Akerlof (1982), Akerlof (1984), Fehr et al. (1998), Riedl and Tyran (2005), and Dohmen et al. (2009) find that the payment's perceived fairness is positively correlated with work effort. Hence, the fairer subjects perceive their pay to be, the more effort they will devote to their labor supply.

In the experiment, we collect data on the perception of payment fairness twice: The first time, the participants are asked about their perceived fairness directly after the production task. They indicate on a 9-point scale from 1 = "not fair at all" to 9 = "totally fair" how they perceive the fairness of the production task compensation (considering the costs) for the required task in the production phase. We then ask the participants the same question at the end of the investment stage.

We find no differences in the perceived fairness between the *Deferred* (6.81) and *NoTaxNet* (6.51) treatments after the production task in the first round ($p = 0.325$). We therefore conclude that the overproduction is not due to higher perceived fairness of the payment in the *Deferred* treatment. In addition, we include the perceived fairness in the regression in Section 3.4.1 as a control variable. All reported results remain qualitatively unchanged.

Furthermore, we investigated the extent to which the perceived fairness changes after the investment decision, since at this point in time, the payoff from the investment was taxed. The perceived fairness decreases significantly in treatment *Deferred* after the investment phase (5.18; $p < 0.001$). In this context, it is interesting that there is now a difference in perceived fairness between the *Deferred* (5.18) and *NoTaxNet* (6.10) treatments ($p = 0.003$). Moreover, there is no significant difference in fairness perceptions between the two treatments after the production phase in the third round (*Deferred* = 5.86 vs. *NoTaxNet* = 6.03, $p = 0.548$). Once again, we attribute this to the fact that taxes are largely ignored in the production decision and to learning effects in the third round.

3.6.3 Tobit

Since our dependent variable *Risk Taking* is a left-censored (0%) and right-censored (100%) variable, we additionally run a censored regression (tobit) model to account for the censoring. The results of the analyses regarding risk allocation remain unchanged.

3.7 Discussion

While widely used to encourage economic activities such as investments or retirement savings, the above analyses reveal one important disadvantage of deferred taxation. Many individuals underweight or even tend to ignore the deferred tax burden when making current decisions. In a number of experiments, we demonstrate that deferred taxation can thus result in significant overproduction and reduced risk taking. The observed tax misperceptions are reduced by learning through experience but remain substantial even after learning has occurred. Moreover, positive learning effects are mainly limited to individuals with high cognitive capacity. Because neither increasing the incentive to exert effort nor increasing tax salience reduces observed tax misperceptions, we conclude that the underweighting of deferred taxes is primarily caused by choice bracketing and myopic behavior. In line with this, we find that replacing deferred taxation with economically

equivalent immediate taxation nearly completely eliminates overproduction and risk distortions.

Table 3.5: Tax Effects on Production

Effects	Round 1		Round 3	
	Difference in Production	p-value	Difference in Production	p-value
Unbiased Tax Effect (UTE)				
$No\ Tax_{Gross}$ - $No\ Tax_{Net}$	6.63	0.000	7.58	0.000
Tax Misperception Effect (TME)				
$Deferred$ - $No\ Tax_{Net}$	5.62	0.000	3.96	0.000
Real Tax Effect (RTE)				
$No\ Tax_{Gross}$ - $Deferred$	1.01	0.122	3.62	0.000

Note. This table presents pairwise treatment comparisons for *Production* in Rounds 1 and 3. The variable *Production* is the number of math puzzles solved. The p-values are calculated according to the 2-sided t-test.

Table 3.6: Tax Effects – Risky Investments

Effects	Round 1		Round 3	
	Difference in Risk Taking	p-value	Difference in Risk Taking	p-value
Unbiased Tax Effect (UTE)				
$No\ Tax_{Net}$ - $No\ Tax_{Gross}$	12.02	0.032	11.01	0.043
Tax Misperception Effect (TME)				
$Deferred$ - $No\ Tax_{Net}$	-8.95	0.102	-13.60	0.011
Real Tax Effect (RTE)				
$Deferred$ - $No\ Tax_{Gross}$	3.08	0.541	2.59	0.616

Note. This table presents pairwise treatment comparisons for *Risk Taking* in Rounds 1 and 3. *Risk Taking* is the percentage of the production income that the participant invested in the risky asset. The p-values are calculated according to the 2-sided t-test.

Our results underline the importance of considering behavioral deviations from rational choice predictions in tax research and tax policy. To illustrate this, we summarize the main results in Table 3.5 and Table 3.6. Concerning production, rational choice theory predicts a decrease due to the introduction of deferred taxes amounting to 8 units (see

Section 3.9.3 (Appendix B)). Comparing the difference in production between treatments *NoTaxGross* and *NoTaxNet* reveals that this difference is already very close to the rational choice prediction in the first round. Moreover, in the third round, we no longer observe any significant deviation from the rational choice prediction ($p = 0.323$). Thus, without tax misperceptions, the rational choice predictions perform quite well in our setting. However, once we introduce a treatment in which tax misperceptions can occur (*Deferred*), this picture changes. Due to the *tax misperception effect* (the difference in production between treatments *Deferred* and *NoTaxNet*), the *real tax effect* of introducing a deferred tax (the difference in production between treatments *NoTaxGross* and *Deferred*) is much lower (amounting to only 13%) than predicted by rational choice theory. Similarly, we obtain that deferred taxation should encourage risk taking without tax misperception (*unbiased tax effect* in Table 3.6). However, this positive effect is almost fully offset by the tax-induced reductions in the willingness to take risks (*tax misperception effect*). Thus, the *real tax effect* of introducing deferred taxes is not significantly different from zero, and once again, the rational choice predictions turn out to be entirely misleading. In sum, if the aim of tax policy is to incentivize specific behavioral responses such as an increase in risky investments or retirement savings, the design of tax incentives requires considering potential *tax misperception effects* to ensure its effectiveness.

The question remains what tax policy can do to reduce the misperception of deferred taxes, in particular, because changing the timing of taxation and thus switching to immediate taxation is not always a meaningful alternative. One idea would be to change the form of tax incentives in the direction of providing matching contributions. In the case of deferred pension taxation, there is evidence that matching contributions are more effective in increasing savings than traditional deferred taxed pension plans (Blaufus and Milde 2020). In the setting discussed in this paper, the advantage of providing matching contributions (equal to the size of the tax benefit of tax-free production income) could be that entrepreneurs still have to face a tax on their current profits so that overproduction does not occur, as is the case under immediate taxation. Future research might also investigate alternative forms of tax incentive design that help tax policy to increase its effectiveness by overcoming the disadvantages of conventional deferred-tax instruments. Moreover, we analyzed overproduction from an individual business viewpoint. Future research might investigate the societal perspective. A societal viewpoint would have to include tax distortions, the economic reasons for the nondeductibility of certain cost categories, production externalities, and the theory of the second-best.

3.8 Appendix A: Additional Tables

Table 3.7: Overview of Production categorized by Treatment

	Round 1			Round 3		
Treatment	Deferred	No Tax Net	No Tax Gross	Deferred	No Tax Net	No Tax Gross
Panel A: Overproduction						
Mean	5.3	0.1	-1.2	3.8	0.1	-0.3
Median	7.0	0.0	0.0	6.0	0.0	0.0
Standard deviation	4.2	2.4	4.1	4.3	1.4	3.6
Minimum	-4.0	-6.0	-13.0	-7.0	-6.0	-11.0
Maximum	18.0	12.0	13.0	14.0	5.0	18.0
Panel B: Production						
Mean	17.4	11.8	18.4	15.7	11.8	19.3
Median	19.0	11.0	19.0	18.0	11.0	19.0
Standard deviation	4.5	2.6	4.3	4.6	1.7	4.0
Minimum	7.0	6.0	6.0	5.0	5.0	8.0
Maximum	31.0	24.0	33.0	26.0	18.0	40.0
No. of subjects	99	88	86	99	88	86

Note. This table presents key figures of the variables *Overproduction* and *Production* depending on the treatments. The variable *Overproduction* measures the difference between the number of math puzzles solved and the rational choice optimum rounded down (rounded up) in the case of a positive (negative) difference. The variable *Production* is the number of math puzzles solved.

Table 3.8: Multinomial Logistic Regressions - Round 1

VARIABLES	(1) Group.Overproduction	(2) Group.Underproduction
Male	0.681	-0.577
	(0.826)	(1.099)
Economist	1.826	0.700
	(1.137)	(1.517)
Low Income	0.657	-0.134
	(0.788)	(0.978)
High Age	0.436	0.0358
	(0.811)	(1.021)
Risk Attitude	0.143	0.215*
	(0.103)	(0.122)
Tax Knowledge	-0.547***	-0.265
	(0.212)	(0.209)
CRT	-1.120***	-0.481
	(0.368)	(0.480)
Procrastination	0.0225	-0.145
	(0.0808)	(0.121)
GlobalLearner	0.302	-0.470
	(0.758)	(1.025)
Constant	2.865	1.517
	(2.382)	(2.544)
Observations	99	99

Note. This table reports the results of multinomial logistic regressions. Dependent variables are displayed in the header. *Group.Overproduction* (*Group.Underproduction*) equals on if the participants *Overproduction* is greater (less) than zero. The variable *Overproduction* measures the difference between the number of math puzzles solved and the rational choice optimum rounded down (rounded up) in the case of a positive (negative) difference. *Male*, *Economist*, and *Global Learner* are dummy variables that takes a value of one if the subject is male, is studying at the Faculty of Economics or is a global learner (measured according to Felder et al. (1988)). *High Age* (*Low Income*) is a binary variable that takes on a value of one if the participant's age (income) is above (below) the median of all observations. *Risk Attitude* is measured by a short incentivized lottery-choice task where subjects must select 20 times either a certain increasing payoff or a fixed gamble. The degree of risk taking is measured by the point at which the participant switches from gamble to safe payoff. *Tax Knowledge*, *CRT*, and *Procrastination* are the answers to the underlying questions. We present standard errors in parentheses. ***, **, and * denote significance at the 1%, 5%, and 10% levels, respectively.

Table 3.9: Random-Effects Regressions

VARIABLES	(1) Overproduction	(2) Overproduction	(3) Risk Taking
NoTaxNet	-4.333***	-5.195***	10.36**
	(0.391)	(0.499)	(4.275)
NoTaxGross	-5.346***	-6.505***	-0.397
	(0.522)	(0.629)	(4.167)
Round 2	-0.546**	-1.222**	-0.186
	(0.244)	(0.552)	(1.374)
Round 3	-0.293	-1.545***	0.781
	(0.274)	(0.587)	(1.675)
NoTaxNet x Round 2		1.063*	
		(0.609)	
NoTaxNet x Round 3		1.523**	
		(0.636)	
NoTaxGross x Round 2		1.059	
		(0.654)	
NoTaxGross x Round 3		2.418***	
		(0.738)	
Controls	YES	YES	YES
Observations	819	819	819
Number of ID	273	273	273
R^2	0.296	0.304	0.226

Note. This table presents regression results of random-effects models explaining subjects' production behavior and risk allocation over time. The variable *Overproduction* measures the difference between the number of math puzzles solved and the rational choice optimum rounded down (rounded up) in the case of a positive (negative) difference. *Risk Taking* is the percentage of the production income that the participant invested in the risky asset. The treatment variables are dummy variables equal to one if the observation belongs to the respective treatment. *Round* is an indicator variable measuring the round in the experiment. Additionally, we include interactions terms of *Treatment* and *Round*. In all models, we use *Male*, *Economist*, *Low Income*, *High Age*, *Risk Attitude*, *Tax Knowledge*, *CRT*, *Procrastination*, and *Global Learner* as control variables (see Section 3.3.2). We cluster the standard errors at the level of the subject and report these in parentheses. ***, **, and * denote significance at the 1%, 5%, and 10% levels, respectively.

3.9 Appendix B: Theory

3.9.1 Baseline Model

Optimal Output and Asset Allocation of Risk-Averse Entrepreneurs

Following rational choice theory, we assume that the entrepreneur maximizes the expected utility of his or her future income $\widetilde{FV}$ by choosing the optimal output level x and the percentage of riskily invested income $\alpha \in [0, 1]$. We denote random variables using a tilde. If p denotes the price for one unit of output, $e(x)$ the entrepreneur's effort to produce the output with $e'(x), e''(x) > 0$, τ the tax rate, $\tilde{r}$ the return of the risky investment, and r_f the risk-free investment return with $E[\tilde{r}] > r_f$, we obtain the following equation for future income $\widetilde{FV}$:

$$\widetilde{FV} = (1 - \tau)px(1 + r_f + \alpha(\tilde{r} - r_f)) - e(x). \tag{3.6}$$

The risk-averse entrepreneur maximizes expected utility with U denoting the utility function and $U' > 0$, $U'' < 0$:

$$Max\ E[U(\widetilde{FV})]. \tag{3.7}$$

Optimal asset allocation

Differentiating equation (3.7) with respect to the riskily invested percentage of income α, leads to the following first-order condition:

$$\frac{dEU}{d\alpha} = E[U'(\widetilde{FV}) \cdot (1 - \tau)px \cdot (\tilde{r} - r_f)] = 0, \tag{3.8}$$

that can be simplified to

$$E[U'(\widetilde{FV}) \cdot (\tilde{r} - r_f)] = 0. \tag{3.9}$$

Thus, the optimal risk allocation requires that the expected value of the excess returns weighted with the marginal utility equals zero.

Optimal output

Similarly, differentiating equation (3.7) with respect to the output x, leads to the following first-order condition:

$$\frac{dEU}{dx} = E[U'(\widetilde{FV}) \cdot [(1 - \tau)p(1 + \alpha(\tilde{r} - r_f)) - e'(x)]] = 0, \tag{3.10}$$

that can be rearranged to

$$\frac{dEU}{dx} = (1-\tau)p \cdot E[U'(\widetilde{FV})] + (1-\tau)p\alpha \cdot \underbrace{E[U'(\widetilde{FV})(\tilde{r} - r_f)]}_{=0} - e'(x)E[U'(\widetilde{FV})] = 0. \quad (3.11)$$

Using equation (3.9) and dividing by $E[U'(\widetilde{FV})]$, we obtain

$$(1-\tau)p - e'(x) = 0. \quad (3.12)$$

Thus, the entrepreneur's optimal output x^* is given by the condition that marginal effort equals after-tax income.

Optimal Output and Asset Allocation of Risk-Neutral Entrepreneurs

Given that the expected risky return exceeds the risk-free return ($E[\tilde{r}] > r_f$), a risk-neutral entrepreneur will always choose $\alpha = 1$ and equation (3.10) simplifies to

$$E[(1-\tau)p(1 + (\tilde{r} - r_f)) - e'(x)] = 0. \quad (3.13)$$

Thus, the optimal output is given by

$$(1-\tau)p(1 + E[\tilde{r}] - r_f) - e'(x) = 0. \quad (3.14)$$

The effect of increasing tax rates

Increasing tax rates reduce optimal output. This follows directly from equations (3.12) and (3.14). To determine the effect of increasing tax rates on asset allocation for risk-averse entrepreneurs, we rearrange the total differential of the first-order condition (equation (3.9)) with respect to α and τ. We obtain:

$$\frac{d\alpha}{d\tau} = \frac{\alpha}{1-\tau} + \frac{1+r_f}{1-\tau} \cdot \frac{E[U''(\widetilde{FV}) \cdot (\tilde{r} - r_f)]}{E[U''(\widetilde{FV}) \cdot (\tilde{r} - r_f)^2]}. \quad (3.15)$$

Using the definition of the absolute risk aversion $ARA = -\dfrac{U''}{U'}$, we rearrange equation (3.15) to

$$\frac{d\alpha}{d\tau} = \frac{\alpha}{1-\tau} - \frac{1+r_f}{1-\tau} \cdot \frac{E[ARA(\widetilde{FV}) \cdot U'(\widetilde{FV}) \cdot (\tilde{r} - r_f)]}{E[U''(\widetilde{FV}) \cdot (\tilde{r} - r_f)^2]}. \quad (3.16)$$

Optimal asset allocation requires $E[U'(\widetilde{FV}) \cdot (\tilde{r} - r_f)] = 0$ (see equation (3.9)). Thus, with constant absolute risk aversion (CARA), we obtain $\dfrac{d\alpha}{d\tau} = \dfrac{\alpha}{1-\tau} > 0$. However, with decreasing absolute risk aversion (DARA), we have $E[ARA(\widetilde{FV}) \cdot U'(\widetilde{FV}) \cdot (\tilde{r} - r_f)] < 0$. Because the denominator of the second fraction in equation (3.16) is also negative, the sign of the second fraction is positive. Thus, in case of decreasing absolute risk aversion, the

effect of increasing tax rates on asset allocation is ambiguous and depends on whether the substitution effect (first fraction in equation (3.16)) outweights the income effect (second fraction in equation (3.16)). On the one hand, taxes reduce private risk by reducing the volatility of the investment return, on the other hand taxes reduce income and with DARA this reduces the willingness to take risks.[16]

3.9.2 Choice Bracketing and Overproduction

Optimal output

Due to choice bracketing, the entrepreneur decides upon the output level maximizing the following objective function (neglecting the subsequent asset allocation decision):

$$\pi = px - e(x), \tag{3.17}$$

with π denoting the entrepreneur's profit. Thus, the optimal output x is given by:

$$p - e'(x) = 0. \tag{3.18}$$

From comparing the rational choice optimum and the choice bracketing optimum, it follows that entrepreneurs who make the output choice and the risk allocation choice each in isolation will increase their output above the rational choice level, i.e., they engage in overproduction because they neglect the deferred taxation of their production income.

Optimal asset allocation

This overproduction affects the subsequent risk allocation of risk-averse entrepreneurs. To derive the effect of overproduction, we rearrange the total differential of the first-order condition (equation (3.9)) with respect to α and x. We obtain:

$$\frac{d\alpha}{dx} = -\frac{\alpha}{x} + \frac{E[U''(\widetilde{FV}) \cdot (\tilde{r} - r_f)] \cdot [e'(x) - (1-\tau)p(1+r_f)]}{(1-\tau)px \cdot E[U''(\widetilde{FV}) \cdot (\tilde{r} - r_f)^2]}. \tag{3.19}$$

Using the definition of the absolute risk aversion $ARA = -\dfrac{U''}{U'}$, we rearrange equation (3.19) to

$$\frac{d\alpha}{dx} = -\frac{\alpha}{x} - \frac{E[ARA(\widetilde{FV}) \cdot U'(\widetilde{FV}) \cdot (\tilde{r} - r_f)] \cdot [e'(x) - (1-\tau)p(1+r_f)]}{(1-\tau)px \cdot E[U''(\widetilde{FV}) \cdot (\tilde{r} - r_f)^2]}. \tag{3.20}$$

Optimal asset allocation requires $E[U'(\widetilde{FV}) \cdot (\tilde{r} - r_f)] = 0$ (see equation (3.9)). Thus,

[16] Note that the derived result for the case of deferred taxation differs from the traditional analysis of income tax effects on risk-taking that shows an unambiguously positive effect of taxes in the case $r_f = 0$ (e.g., Buchholz, Wolfgang and Konrad, Kai A. (2014), Taxes on Risky Returns — An Update. Working Paper of the Max Planck Institute for Tax Law and Public Finance No. 2014-10, Available at SSRN: https://ssrn.com/abstract=2469268.).

with constant absolute risk aversion (CARA), we obtain $\frac{d\alpha}{dx} = -\frac{\alpha}{x} < 0$. Moreover, with decreasing absolute risk aversion (DARA), we have $E[ARA(\widetilde{FV}) \cdot U'(\widetilde{FV}) \cdot (\tilde{r} - r_f)] < 0$. The denominator of the second fraction in equation (3.19) is also negative. Therefore, if in case of overproduction $e'(x) - (1-\tau)p(1+r_f) > 0$ holds, we also obtain $\frac{d\alpha}{dx} < 0$. In sum, overproduction results in reduced risk-taking if we assume constant or decreasing absolute risk aversion.

3.9.3 Optimal Choice in the Experiment

In the experiment, we have $p = 3$, $\tau = 0.4$, $E[\tilde{r}] = 0.1$, $r_f = 0$, $e(x) = 0.15 \cdot \frac{x(x+1)}{2}$.

Baseline Model

The rational choice optimal output for risk-averse investors according to equation (3.12) can be calculated as follows:

$$(1-\tau)p = 0.15x^* + 0.075. \tag{3.21}$$

Solving with respect to x^*, we obtain

$$x^* = \frac{(1-\tau)p - 0.075}{0.15} = 11.5. \tag{3.22}$$

Similarly, we obtain for risk-neutral investors according to equation (3.14):

$$x^* = \frac{(1-\tau)p(1+E[\tilde{r}] - r_f) - 0.075}{0.15} = 12.7. \tag{3.23}$$

If the tax rate τ amounts to zero (No Tax Gross Treatment), we obtain $x^* = 19.5$ (for risk-averse entrepreneurs) and $x^* = 21.5$ (for risk-neutral entrepreneurs).

Choice Bracketing

Making the output decision in isolation of the subsequent asset allocation results in the following optimal output according to equation (3.18):

$$x^* = \frac{p - 0.075}{0.15} = 19.5. \tag{3.24}$$

Under choice bracketing, individuals fully ignore the subsequent asset allocation choice. Thus, the optimal output does not differ between risk-averse and risk-neutral entrepreneurs.

3.10 Appendix C: Instructions

The instructions consists of four parts. The first part was already on the participants work place at the beginning of the experiment and contains general information. The instructions for each round were given to the participants before the respective round. Distinct instructions were prepared for each treatment. In the following, the different variations are combined. The different version for the treatments *Deferred*, *Immediate*, *NoTaxNet*, *NoTaxGross*, *AccountignInformation*, *AccountabilityReport* are marked by square brackets. Next, the instructions (originally written in German) are presented.

3.10.1 Part 1 - General Information

Welcome to our experiment!

Thank you for participating at this experiment. The experiment will last approximately 90 minutes and contains two tasks. By participating in this experiment, you have the possibility of earning money. How much money you earn depends on your decisions in each task. The instructions handed out after completing the first task will show you how to influence the amount of money you earn in the second task. Please read the instructions carefully and attentively.

Before the experiment begins, we want to raise some points:

- You are not allowed to talk to the other participants or to leave your seat during the experiment.
- Please turn off your cell phone and store them in your bag.
- It is important that you understand the instructions. Thus, do not hesitate to ask questions. If you have any questions, please raise your hand. We will come to your seat to answer your questions. Please do not ask your questions loudly.
- You can highlight and write on the instructions. You can use the pen in front of you.
- Please do not take the instructions with you, but return them to us after the experiment.
- The program with which the experiment is executed – the grey screen – may not be closed. Please do also not open any other programs as this may lead to a truncation of the whole experiment.
- You received a table tennis ball with an identification number to start the experiment. Please carefully keep the ball with you. You need the ball to identify yourself as soon as the compensation is paid.

This experiment contains of two tasks. The first task will be explained to you on your screen. Once all participants have completed the first task, we will hand out the written instructions for the second task.

3.10.2 Part 2 - Instructions for Task 2 - Round 1

Task 2

1. Design of the Experiment

The second task consists of a total of **three rounds** and a **questionnaire** before and after the task.

[*Deferred*: Each round consists of **two phases**: Each round starts with a working phase in which you earn your **income**. Note that additional costs are incurred during the work phase (see Point 5). In the second phase, you decide how you intend to invest your income. The return on any investment and the invested amount must be taxed. Therefore, the experimenter will withhold the tax. The tax rate is 40% (see Point 7). For the second task, you receive as compensation the payoffs from the investment less taxes and costs.]

[*Immediate*: Each round consists of **two phases**: Each round starts with a working phase in which you earn your **income**. This income is taxed immediately. Therefore, the experimenter will withhold the tax. The tax rate is 40% (see Point 7). Note that additional costs are incurred during the work phase (see Point 5). In the second phase, you decide how you intend to invest your income. For the second task, you receive as compensation the payoffs from the investment less costs.]

[*NoTax*: Each round consists of **two phases**: Each round starts with a working phase in which you earn your **income**. Note that additional costs are incurred during the work phase (see Point 5). In the second phase, you decide how you intend to invest your income. For the second task, you receive as compensation the payoffs from the investment less costs.]

After the first or the second round has been completed, the second or the third round starts. These are identical regarding to the procedure. **Please note that only one of the three rounds will be paid at the end of the experiment** (see Point 7).

The second task starts and ends with a short questionnaire, which is needed to evaluate the experimental results. We would like to emphasize that all answers will be kept anonymous. After each participant has completed both tasks you will receive your remuneration successively, and then you can leave the lab.

2. Comprehension Test

Before the actual experiment starts, we ask you to complete a short questionnaire. Then you have to answer some comprehension questions about the second task to make sure

you understand the second task. However, these are not relevant to payoff. To check your answers, click "Verify".

For questions, please raise your hand. We will help you then. When all comprehension questions have been answered correctly, the actual experiment starts.

3. Working Phase

In the working phase, you earn your income. How high the income is, you will be told in Point 4. The job is to solve math puzzles. You are shown nine different numbers between 0 and 10. It is your task to find two numbers that add up to ten and to mark these with a checkmark. To confirm your input click "OK". Then your input is checked. In the case of an incorrect answer, you must check your input which does not lead to additional costs.

After each correctly solved math puzzle, you receive an overview of your earned income [*Immediate*: earned income and the corresponding taxes] [*AccountingInformation*: earned income, the corresponding investment amount, and future taxes on the investment amount]. Furthermore, you have to decide either to make another puzzle or to stop working. Note, however, that costs are incurred for generating a math puzzle. How high these costs are you learn in Point 5.

The working phase is unlimited in time, which means that you can solve as many math puzzles as you like. To finish the work task, click on the red button "Finish".

After finishing the work phase, you have to decide how to invest your income.

[*Deferred*: **4. The Amount and the Tax Exemption of the Income**

For each correctly solved math puzzle you earn a fixed **income** amounting to 3.00 € (see also the sheet "Overview Round 1"). You are told about the amount of the income for Round 2 and 3 later in separate instructions. The income is **not subject to any taxation**.]

[*Immediate*: **4. The Amount and the Taxation of the Income**

For each correctly solved math puzzle you earn a fixed **income** amounting to 3.00 € (see also the sheet "Overview Round 1"). You are told about the amount of the income for Round 2 and 3 later in separate instructions. The total income is **subject to taxation of 40%**. All tax payments in this experiment accrue to the Leibniz University Hannover and are used for further research projects.]

[*NoTaxNet*: **4. The Amount of the Income**

For each correctly solved math puzzle you earn a fixed **income** amounting to 1.80 € (see also the sheet "Overview Round 1"). You are told about the amount of the income for Round 2 and 3 later in separate instructions.]

[*NoTaxGross*: **4. The Amount of the Income**

For each correctly solved math puzzle you earn a fixed **income** amounting to 3.00 € (see also the sheet "Overview Round 1"). You are told about the amount of the income for Round 2 and 3 later in separate instructions.]

5. Generation Cost of a Math Puzzle

The generation of a math puzzle leads to cost. The cost to generate the first math puzzle in Round 1 amounts to 0.15 € and increases each time for an additional math puzzle by 0.15 €. Hence, the generation cost for the second math puzzle amounts to 0.30 €, for the third math puzzle 0.45 €, and so on (see also the sheet "Overview Round 1"). You are told about the costs for Round 2 and 3 later in separate instructions.

[*AccountabilityReport*: **6. Accountability Report**

After you have finished the work phase, you have to write a report in which you explain why you have solved exactly the number of math puzzles you have chosen. You have to hand in the report to the experimenter at the end of the experiment when you are paid.]

6. Investment Phase

At the beginning of the investment phase, you will again be provided with an overview that shows how many math puzzles you have solved and what your [*Immediate*: after-tax] income and costs are. In this phase of the experiment, you decide how to invest your [*Immediate*: after-tax] income. The [*Immediate*: after-tax] income is the amount you earned [*Immediate*: after taxes but] before deducting costs (see Point 4).

There are two alternative investment options available to you in which you must invest your entire income.

1. **Investment A**

   The rate of return (interest) of the invested capital amounts to 0 %. For example, if you invest 1.00 €, the payoff from the investment amounts to 1.00 €.

2. **Investment B**

   The return (interest) of the invested capital depends on your dice luck. For this investment, **two states** can be occurred, which influences your return. To determine the relevant state, you must roll a dice at the end of the experiment.

   State 1: If you roll a 1, a 2 or a 3 (probability of occurrence = 50%), you lose one-fifth of the invested capital in this investment. Hence, the rate of return (interest) of the invested capital amounts to -20 %. For example, if you invest 1.00 €, the payoff from the investment amounts to 0.80 €.

   State 2: If you roll a 4, a 5 or a 6 (probability of occurrence = 50 %), you receive 1.4-times the invested capital in this investment. Hence, the rate of return (interest) of the invested capital amounts to 40 %. For example, if you invest 1.00 €, the payoff from the investment amounts to 1.40 €.

You can split up the income [*Immediate*: income after taxes] between the two investment alternatives. Therefore, please enter in the appropriate box **what proportion** of your income [*Immediate*: income after taxes] you would like to invest in **Investment B**. **The other share is automatically invested in Investment A**.

[*Deferred*: All payoffs you receive from the investment are **subject to taxation** (see Point 7).]
[*Immediate*: All payoffs you receive from the investment are **not subject to any taxation** (see Point 7).]

[*Deferred*: **7. Taxation of the Payoffs from the Investment**
All payoffs you receive from the investment are **subject to taxation of 40 %**. All tax payments in this experiment accrue to the Leibniz University Hannover and are used for further research projects.]

[*Immediate*: **7. Tax Exemption of the Payoffs from the Investment**
All payoffs you receive from the investment are **not subject to any taxation**.]

8. Remuneration at the End of the Experiment
After each participant has completed **both** tasks, you will be asked to come to the front desk to receive your remuneration, which depends on your working and investment decisions. To determine your return on investment from the second task you roll a dice twice.

The first roll of the dice determines which of the total of three rounds is relevant for payoff. **Hence, only one decision round is relevant for payoff purposes!** If you roll a 1 or a 2, Round 1 is paid out. If you roll a 3 or a 4, Round 2 is relevant and if you roll a 5 or a 6, Round 3 is paid out.

The second roll of the dice determines the occurring state of the investment (see Point 6). The payment from Investment A is independently from the diced state. Depending on how you have invested your income, the corresponding return takes place.

For participation, each participant also receives a participation fee of 1.50 €. You will also receive the payout from the first task. The resulting remuneration will be paid to you in cash at the end of the experiment.

If no further questions remain, please start working. To do this click "Next". Thank you for participating!

Overview Round 1

Rounding Code: 3108

No. Math Puzzle	Wage per Math Puzzle	Total Wage	Costs per Math Puzzle	Total Costs
1	3.00 €	3.00 €	0.15 €	0.15 €
2	3.00 €	6.00 €	0.30 €	0.45 €
3	3.00 €	9.00 €	0.45 €	0.90 €
4	3.00 €	12.00 €	0.60 €	1.50 €
5	3.00 €	15.00 €	0.75 €	2.25 €
6	3.00 €	18.00 €	0.90 €	3.15 €
7	3.00 €	21.00 €	1.05 €	4.20 €
8	3.00 €	24.00 €	1.20 €	5.40 €
9	3.00 €	27.00 €	1.35 €	6.75 €
10	3.00 €	30.00 €	1.50 €	8.25 €
11	3.00 €	33.00 €	1.65 €	9.90 €
12	3.00 €	36.00 €	1.80 €	11.70 €
13	3.00 €	39.00 €	1.95 €	13.65 €
14	3.00 €	42.00 €	2.10 €	15.75 €
15	3.00 €	45.00 €	2.25 €	18.00 €
16	3.00 €	48.00 €	2.40 €	20.40 €
17	3.00 €	51.00 €	2.55 €	22.95 €
18	3.00 €	54.00 €	2.70 €	25.65 €
19	3.00 €	57.00 €	2.85 €	28.50 €
20	3.00 €	60.00 €	3.00 €	31.50 €
21	3.00 €	63.00 €	3.15 €	34.65 €
22	3.00 €	66.00 €	3.30 €	37.95 €
23	3.00 €	69.00 €	3.45 €	41.40 €
24	3.00 €	72.00 €	3.60 €	45.00 €
25	3.00 €	75.00 €	3.75 €	48.75 €
26	3.00 €	78.00 €	3.90 €	52.65 €
27	3.00 €	81.00 €	4.05 €	56.70 €
28	3.00 €	84.00 €	4.20 €	60.90 €
29	3.00 €	87.00 €	4.35 €	65.25 €
30	3.00 €	90.00 €	4.50 €	69.75 €
31	3.00 €	93.00 €	4.65 €	74.40 €
32	3.00 €	96.00 €	4.80 €	79.20 €
33	3.00 €	99.00 €	4.95 €	84.15 €
34	3.00 €	102.00 €	5.10 €	89.25 €
35	3.00 €	105.00 €	5.25 €	94.50 €
36	3.00 €	108.00 €	5.40 €	99.90 €
37	3.00 €	111.00 €	5.55 €	105.45 €
38	3.00 €	114.00 €	5.70 €	111.15 €
39	3.00 €	117.00 €	5.85 €	117.00 €
40	3.00 €	120.00 €	6.00 €	123.00 €
41	3.00 €	123.00 €	6.15 €	129.15 €
42	3.00 €	126.00 €	6.30 €	135.45 €
43	3.00 €	129.00 €	6.45 €	141.90 €
44	3.00 €	132.00 €	6.60 €	148.50 €
45	3.00 €	135.00 €	6.75 €	155.25 €
...	...	...	...	...

3.10.3 Part 3 - Instructions for Task 2 - Round 2

Round 2

In this part of the instructions, you will receive information regarding the second round. This round corresponds to the procedure - with some exceptions - of the first round. In the second round, there are the following changes:

[*Deferred*: **1. The Amount and the Tax Exemption of the Income**
For each correctly solved math puzzle you earn now a fixed **income** amounting to 2.50 € (see also the sheet "Overview Round 2"). The income is still **not subject to any taxation**.]

[*Immediate*: **1. The Amount and the Taxation of the Income**
For each correctly solved math puzzle you earn now a fixed **income** amounting to 2.50 € (see also the sheet "Overview Round 2"). The total income is still **subject to taxation of 40%**.]

2. Generation Cost of a Math Puzzle
The generation of a math puzzle leads still to cost which increases evenly with each additional math puzzle. The cost to generate the first math puzzle in Round 2 amounts to 0.10 € and increases each time for an additional math puzzle by 0.10 €. Hence, the generation cost for the second math puzzle amounts to 0.20 €, for the third math puzzle 0.30 €, and so on (see also the sheet "Overview Round 2").

Overview Round 2

Rounding Code: 1407

No. Math Puzzle	Wage per Math Puzzle	Total Wage	Costs per Math Puzzle	Total Costs
1	2.50 €	2.50 €	0.10 €	0.10 €
2	2.50 €	5.00 €	0.20 €	0.30 €
3	2.50 €	7.50 €	0.30 €	0.60 €
4	2.50 €	10.00 €	0.40 €	1.00 €
5	2.50 €	12.50 €	0.50 €	1.50 €
6	2.50 €	15.00 €	0.60 €	2.10 €
7	2.50 €	17.50 €	0.70 €	2.80 €
8	2.50 €	20.00 €	0.80 €	3.60 €
9	2.50 €	22.50 €	0.90 €	4.50 €
10	2.50 €	25.00 €	1.00 €	5.50 €
11	2.50 €	27.50 €	1.10 €	6.60 €
12	2.50 €	30.00 €	1.20 €	7.80 €
13	2.50 €	32.50 €	1.30 €	9.10 €
14	2.50 €	35.00 €	1.40 €	10.50 €
15	2.50 €	37.50 €	1.50 €	12.00 €
16	2.50 €	40.00 €	1.60 €	13.60 €
17	2.50 €	42.50 €	1.70 €	15.30 €
18	2.50 €	45.00 €	1.80 €	17.10 €
19	2.50 €	47.50 €	1.90 €	19.00 €
20	2.50 €	50.00 €	2.00 €	21.00 €
21	2.50 €	52.50 €	2.10 €	23.10 €
22	2.50 €	55.00 €	2.20 €	25.30 €
23	2.50 €	57.50 €	2.30 €	27.60 €
24	2.50 €	60.00 €	2.40 €	30.00 €
25	2.50 €	62.50 €	2.50 €	32.50 €
26	2.50 €	65.00 €	2.60 €	35.10 €
27	2.50 €	67.50 €	2.70 €	37.80 €
28	2.50 €	70.00 €	2.80 €	40.60 €
29	2.50 €	72.50 €	2.90 €	43.50 €
30	2.50 €	75.00 €	3.00 €	46.50 €
31	2.50 €	77.50 €	3.10 €	49.60 €
32	2.50 €	80.00 €	3.20 €	52.80 €
33	2.50 €	82.50 €	3.30 €	56.10 €
34	2.50 €	85.00 €	3.40 €	59.50 €
35	2.50 €	87.50 €	3.50 €	63.00 €
36	2.50 €	90.00 €	3.60 €	66.60 €
37	2.50 €	92.50 €	3.70 €	70.30 €
38	2.50 €	95.00 €	3.80 €	74.10 €
39	2.50 €	97.50 €	3.90 €	78.00 €
40	2.50 €	100.00 €	4.00 €	82.00 €
41	2.50 €	102.50 €	4.10 €	86.10 €
42	2.50 €	105.00 €	4.20 €	90.30 €
43	2.50 €	107.50 €	4.30 €	94.60 €
44	2.50 €	110.00 €	4.40 €	99.00 €
45	2.50 €	112.50 €	4.50 €	103.50 €
...	...	...	...	...

3.10.4 Part 4 - Instructions for Task 2 - Round 3

Round 3

In this part of the instructions, you will receive information regarding the third round. This round corresponds exactly to the procedure of the **first round**. In the third round, the income and the costs are as follows:

[*Deferred*: **1. The Amount and the Tax Exemption of the Income**
For each correctly solved math puzzle you earn again a fixed **income** amounting to 3.00 € (see also the sheet "Overview Round 1"). The income is still **not subject to any taxation**.]

[*Immediate*: **1. The Amount and the Taxation of the Income**
For each correctly solved math puzzle you earn again a fixed **income** amounting to 3.00 € (see also the sheet "Overview Round 1"). The total income is still **subject to taxation of 40%**.]

2. Generation Cost of a Math Puzzle
The generation of a math puzzle leads still to cost which increases evenly with each additional math puzzle. The cost to generate the first math puzzle in Round 3 again amounts to 0.15 € and increases each time for an additional math puzzle by 0.15 €. Hence, the generation cost for the second math puzzle amounts to 0.30 €, for the third math puzzle 0.45 €, and so on (see also the sheet "Overview Round 1").

3.11 Appendix D: Screenshots

Figure 3.4: Information Working Phase - Deferred Taxation

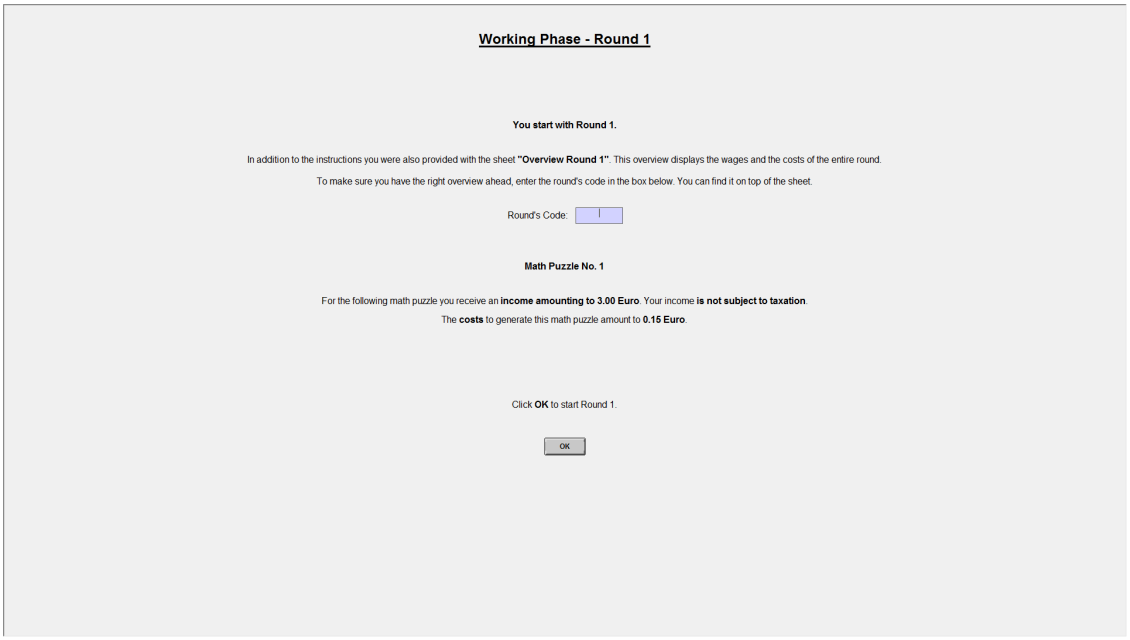


Figure 3.5: Information Working Phase - Immediate Taxation

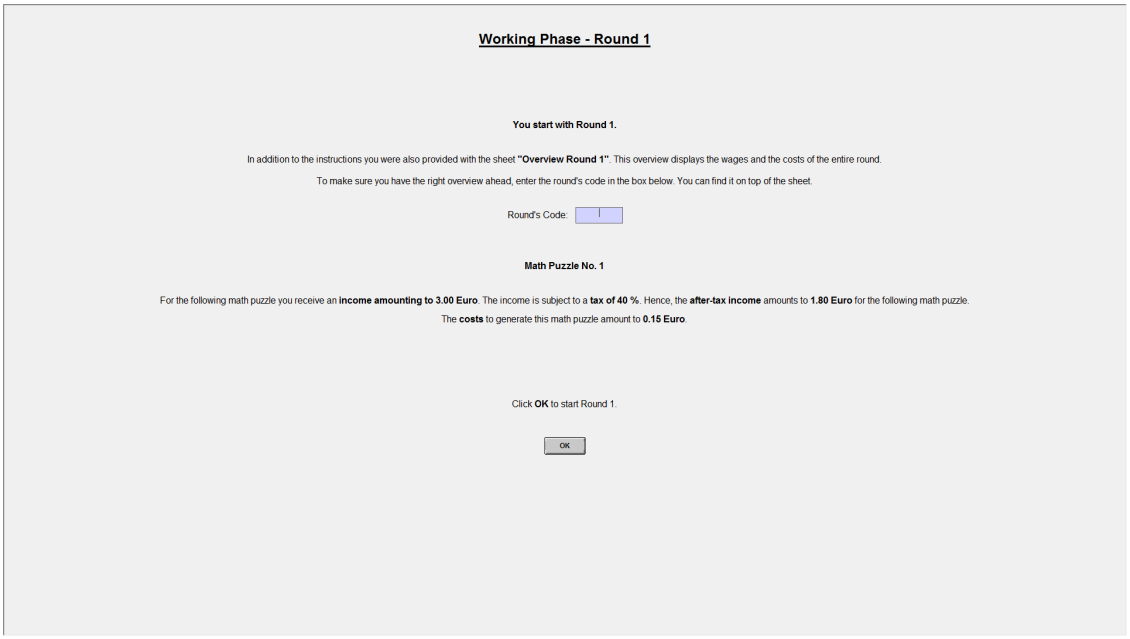


Figure 3.6: Information Working Phase - NoTaxNet

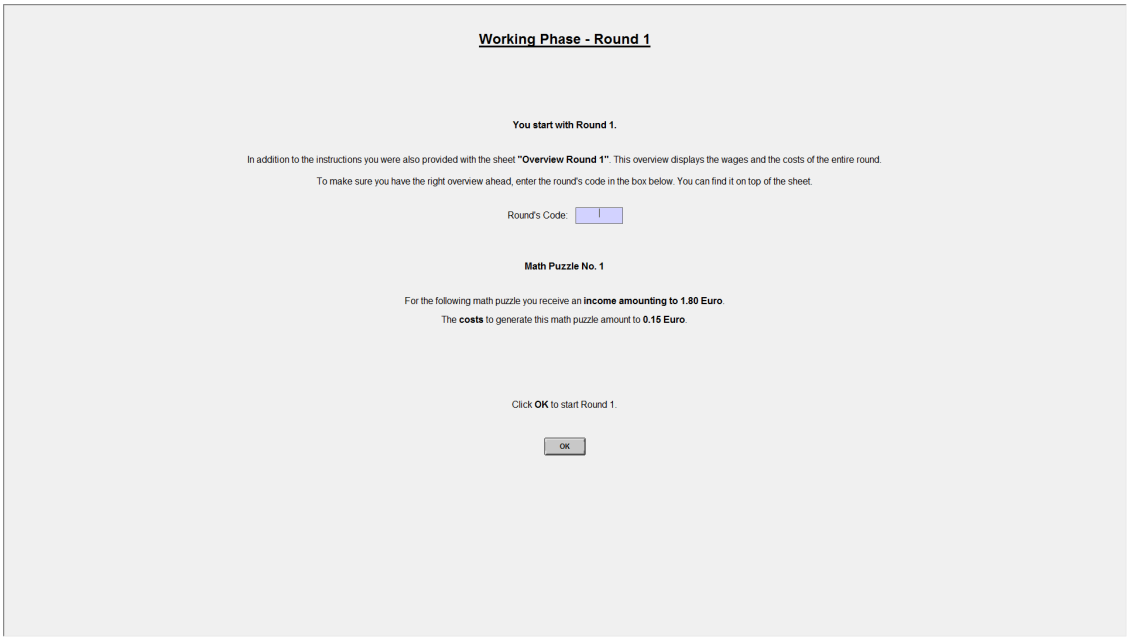


Figure 3.7: Information Working Phase - NoTaxGross

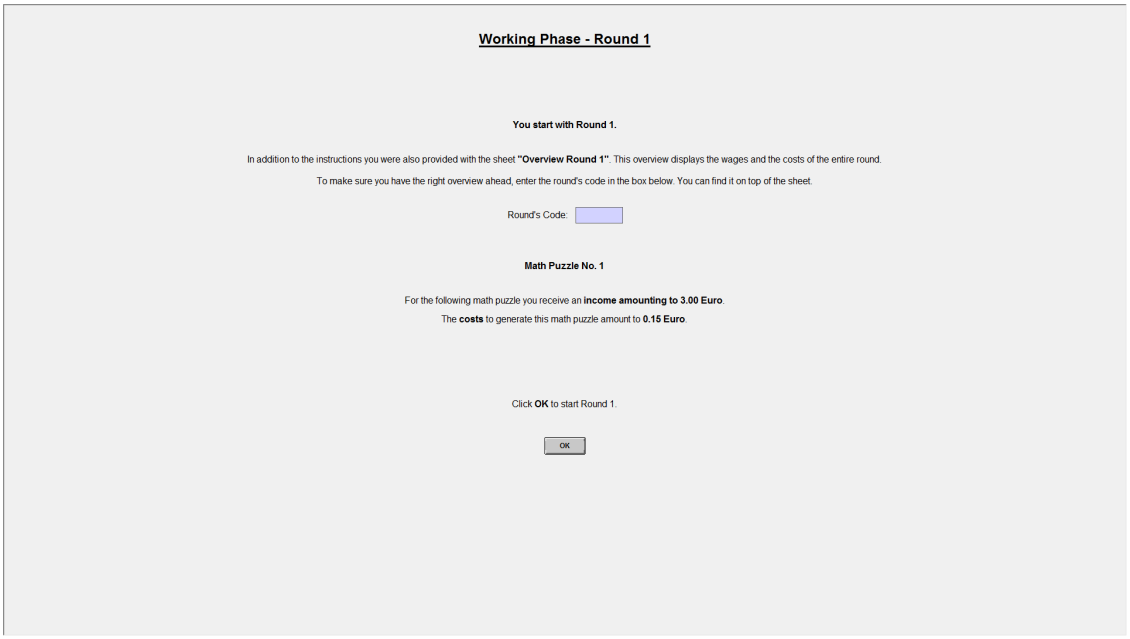


Figure 3.8: Work Task

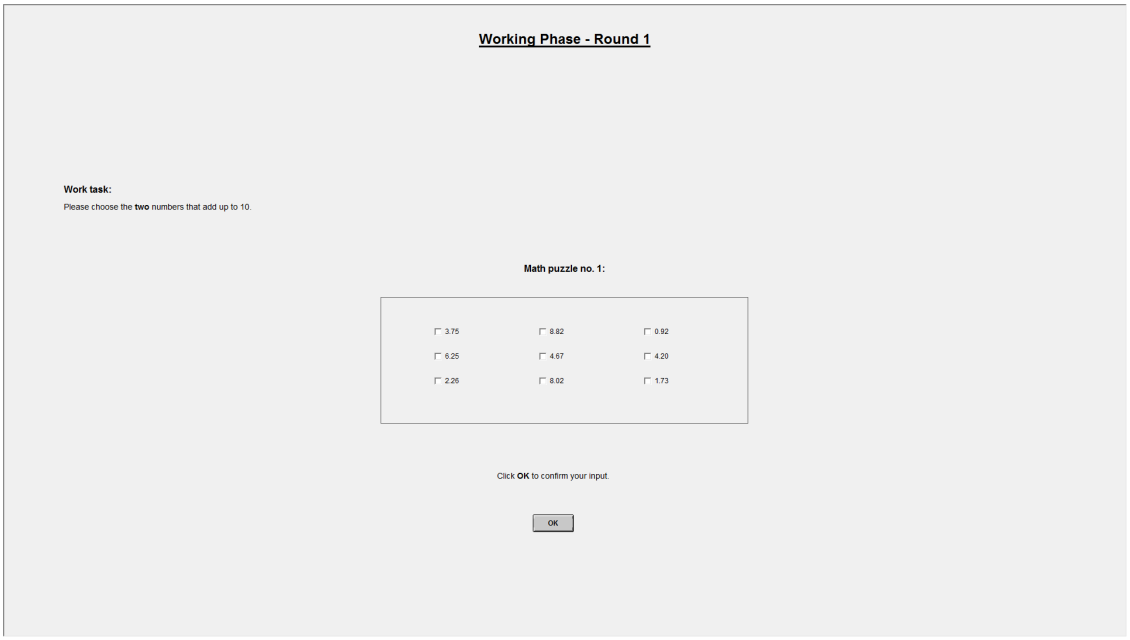


Figure 3.9: Working Decision - Deferred Taxation

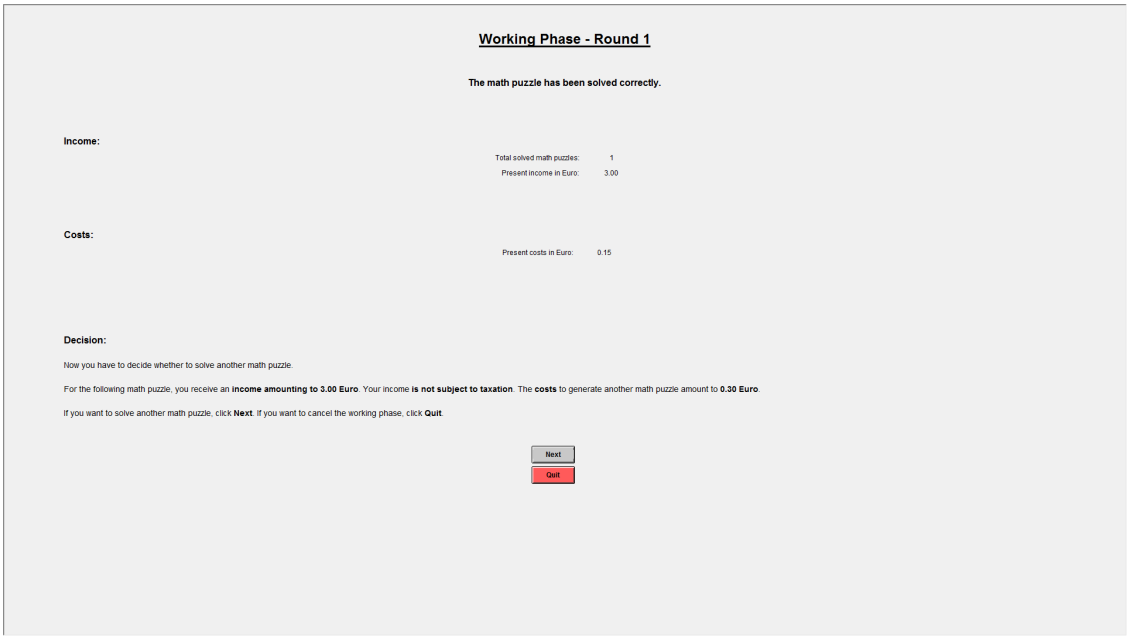


Figure 3.10: Working Decision - Accounting Information

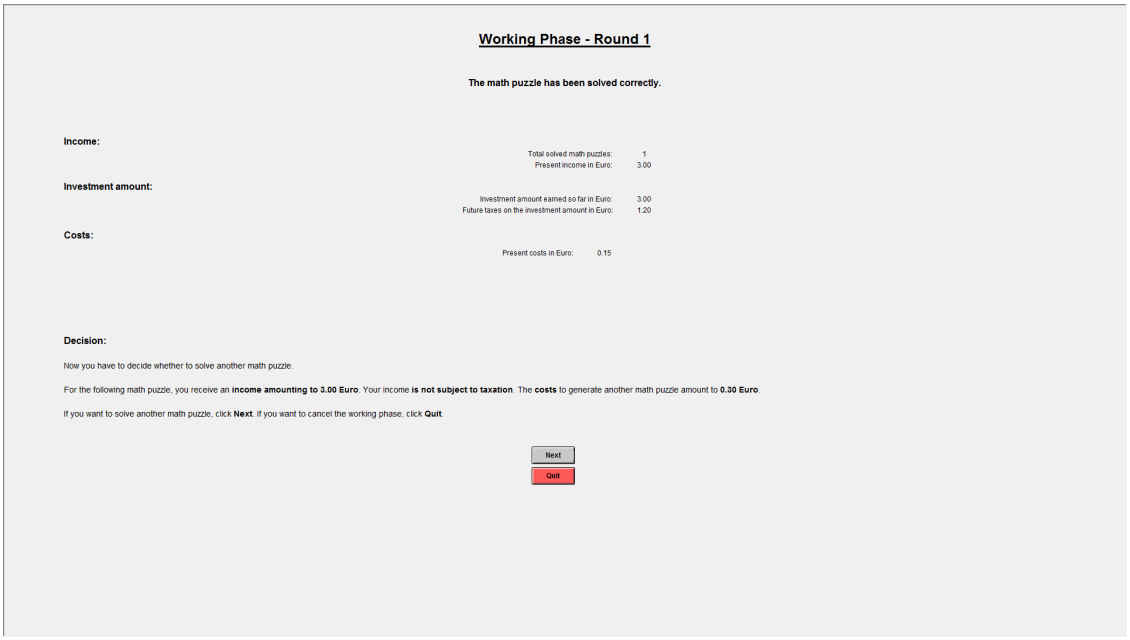


Figure 3.11: Working Decision - Immediate Taxation

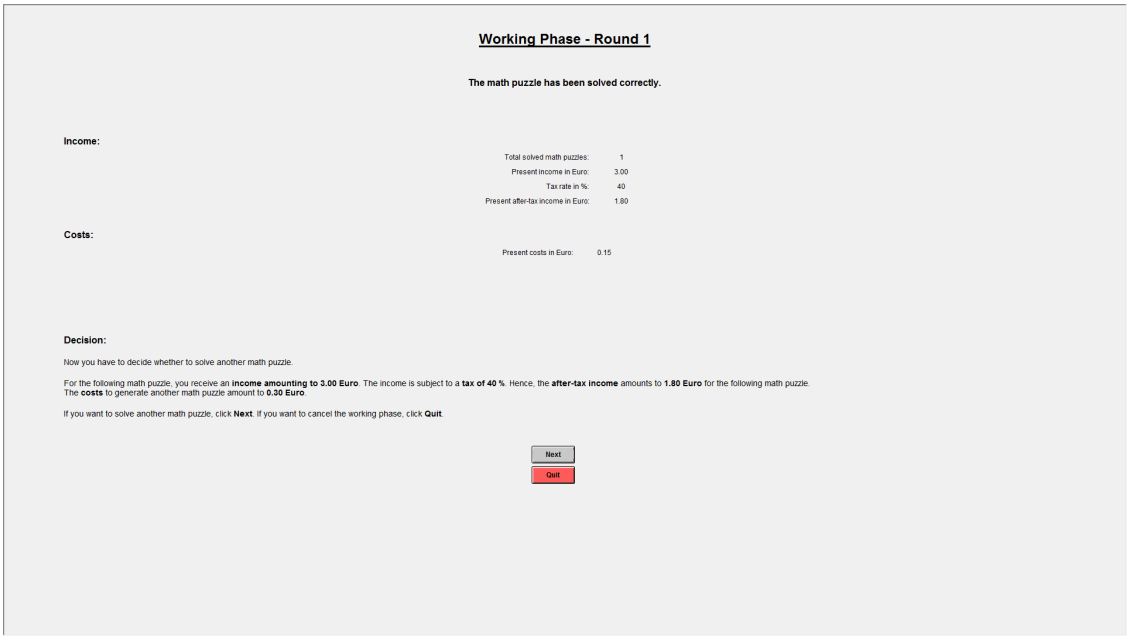


Figure 3.12: Working Decision - NoTaxNet

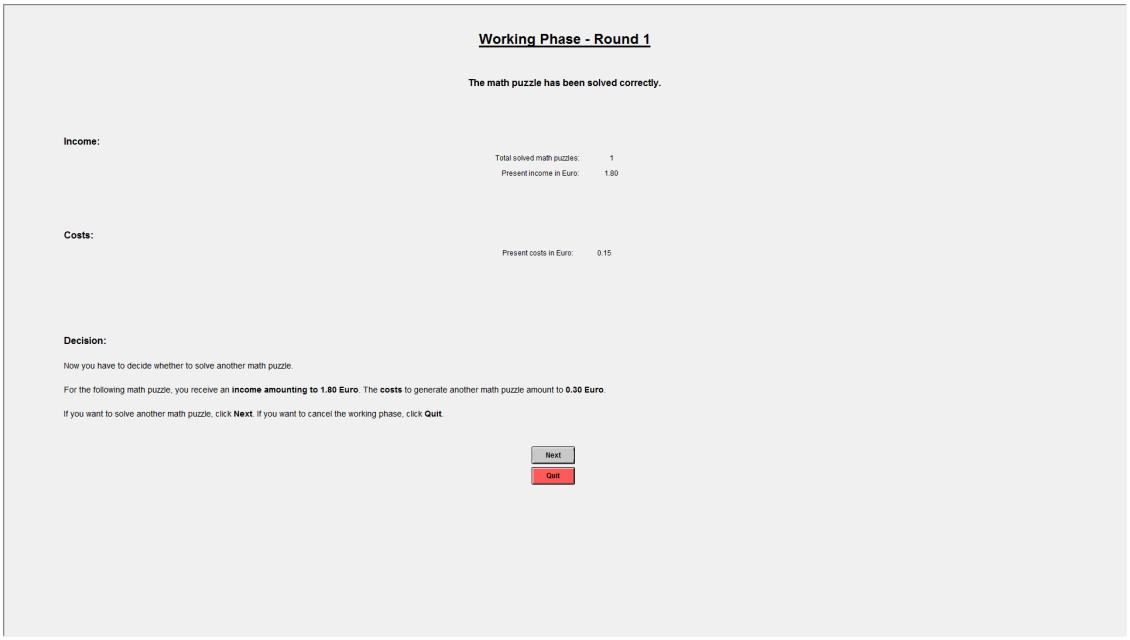


Figure 3.13: Working Decision - NoTaxGross

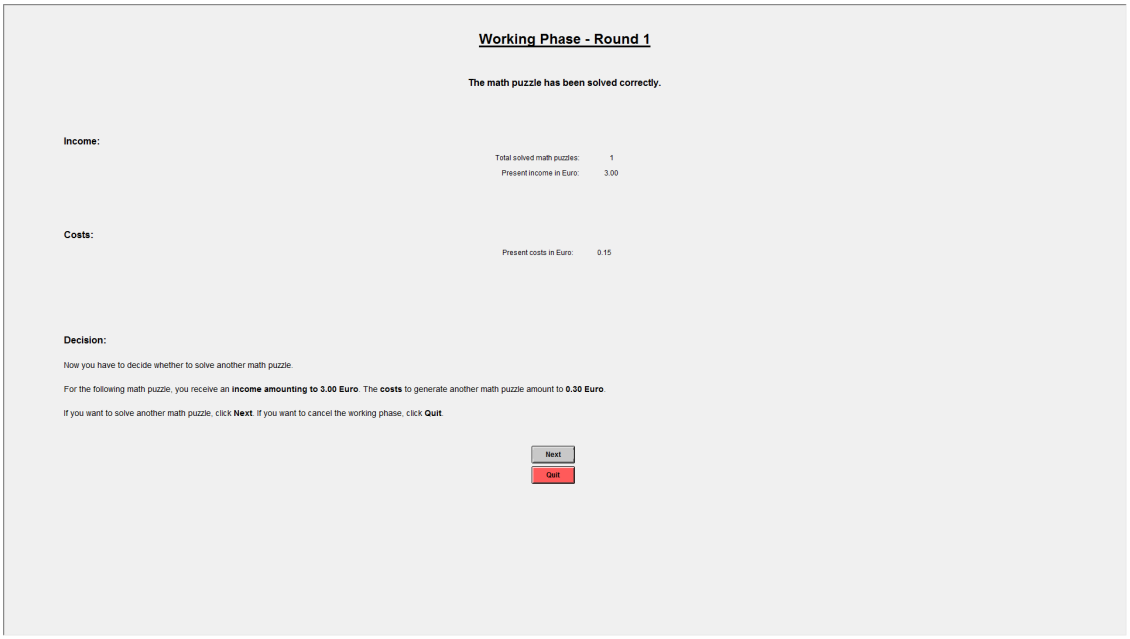
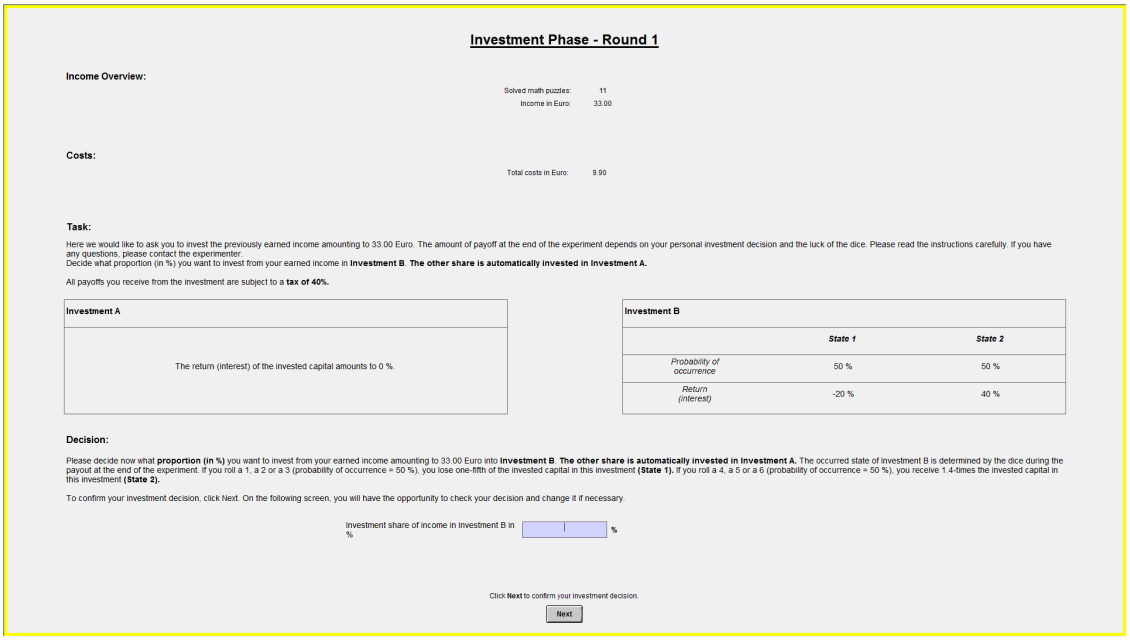


Figure 3.14: Investment Decision - Deferred Taxation



Investment Phase - Round 1

Income Overview:

Solved math puzzles: 11
Income in Euro: 33.00

Costs:

Total costs in Euro: 9.90

Task:

Here we would like to ask you to invest the previously earned income amounting to 33.00 Euro. The amount of payoff at the end of the experiment depends on your personal investment decision and the luck of the dice. Please read the instructions carefully. If you have any questions, please contact the experimenter.
Decide what proportion (in %) you want to invest from your earned income in **Investment B**. **The other share is automatically invested in Investment A.**

All payoffs you receive from the investment are subject to a **tax of 40%.**

Investment A
The return (interest) of the invested capital amounts to 0 %.

Investment B		
	State 1	***State 2***
Probability of occurrence	50 %	50 %
Return (interest)	-20 %	40 %

Decision:

Please decide now what **proportion (in %)** you want to invest from your earned income amounting to 33.00 Euro into **Investment B**. **The other share is automatically invested in Investment A.** The occurred state of investment B is determined by the dice during the payout at the end of the experiment. If you roll a 1, a 2 or a 3 (probability of occurrence = 50 %), you lose one-fifth of the invested capital in this investment **(State 1).** If you roll a 4, a 5 or a 6 (probability of occurrence = 50 %), you receive 1.4-times the invested capital in this investment **(State 2).**

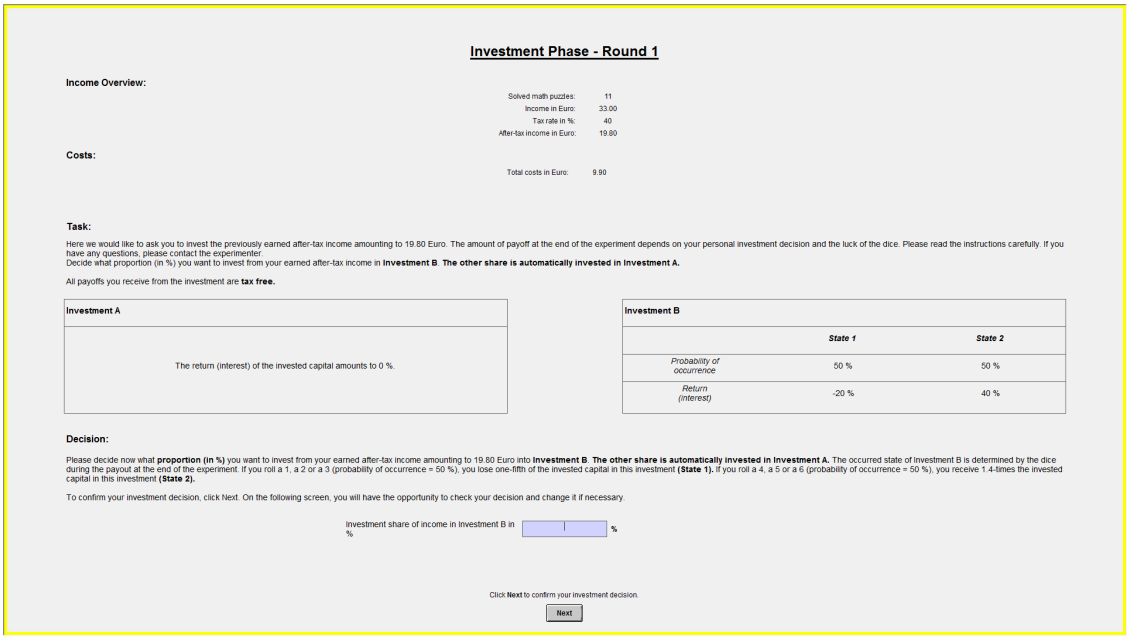
To confirm your investment decision, click Next. On the following screen, you will have the opportunity to check your decision and change it if necessary.

Investment share of income in Investment B in % [ ] %

Click **Next** to confirm your investment decision.

Next

Figure 3.15: Investment Decision - Immediate Taxation



Investment Phase - Round 1

Income Overview:

Solved math puzzles: 11
Income in Euro: 33.00
Tax rate in %: 40
After-tax income in Euro: 19.80

Costs:

Total costs in Euro: 9.90

Task:

Here we would like to ask you to invest the previously earned after-tax income amounting to 19.80 Euro. The amount of payoff at the end of the experiment depends on your personal investment decision and the luck of the dice. Please read the instructions carefully. If you have any questions, please contact the experimenter.
Decide what proportion (in %) you want to invest from your earned after-tax income in **Investment B**. **The other share is automatically invested in Investment A.**

All payoffs you receive from the investment are **tax free.**

Investment A
The return (interest) of the invested capital amounts to 0 %.

Investment B		
	State 1	***State 2***
Probability of occurrence	50 %	50 %
Return (interest)	-20 %	40 %

Decision:

Please decide now what **proportion (in %)** you want to invest from your earned after-tax income amounting to 19.80 Euro into **Investment B**. **The other share is automatically invested in Investment A.** The occurred state of investment B is determined by the dice during the payout at the end of the experiment. If you roll a 1, a 2 or a 3 (probability of occurrence = 50 %), you lose one-fifth of the invested capital in this investment **(State 1).** If you roll a 4, a 5 or a 6 (probability of occurrence = 50 %), you receive 1.4-times the invested capital in this investment **(State 2).**

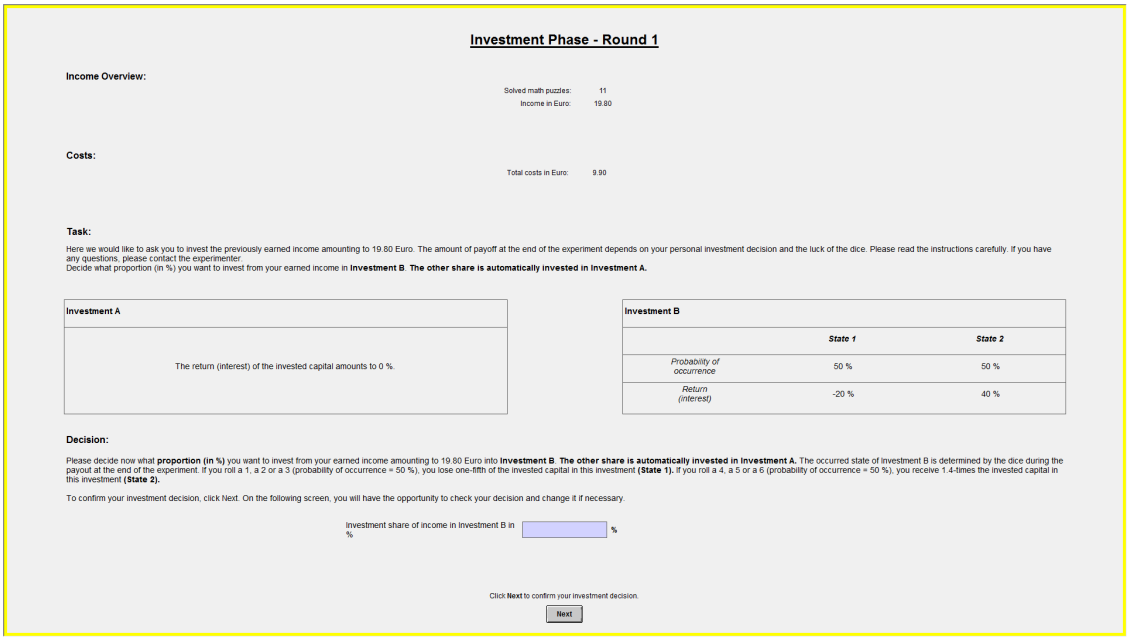
To confirm your investment decision, click Next. On the following screen, you will have the opportunity to check your decision and change it if necessary.

Investment share of income in Investment B in % [ ] %

Click **Next** to confirm your investment decision.

Next

Figure 3.16: Investment Decision - NoTaxNet



Investment Phase - Round 1

Income Overview:

Solved math puzzles: 11
Income in Euro: 19.80

Costs:

Total costs in Euro: 9.90

Task:

Here we would like to ask you to invest the previously earned income amounting to 19.80 Euro. The amount of payoff at the end of the experiment depends on your personal investment decision and the luck of the dice. Please read the instructions carefully. If you have any questions, please contact the experimenter.
Decide what proportion (in %) you want to invest from your earned income in **Investment B**. **The other share is automatically invested in Investment A.**

Investment A
The return (interest) of the invested capital amounts to 0 %.

Investment B		
	State 1	***State 2***
Probability of occurrence	50 %	50 %
Return (interest)	-20 %	40 %

Decision:

Please decide now what **proportion (in %)** you want to invest from your earned income amounting to 19.80 Euro into **Investment B**. **The other share is automatically invested in Investment A.** The occurred state of investment B is determined by the dice during the payout at the end of the experiment. If you roll a 1, a 2 or a 3 (probability of occurrence = 50 %), you lose one-fifth of the invested capital in this investment **(State 1).** If you roll a 4, a 5 or a 6 (probability of occurrence = 50 %), you receive 1.4-times the invested capital in this investment **(State 2).**

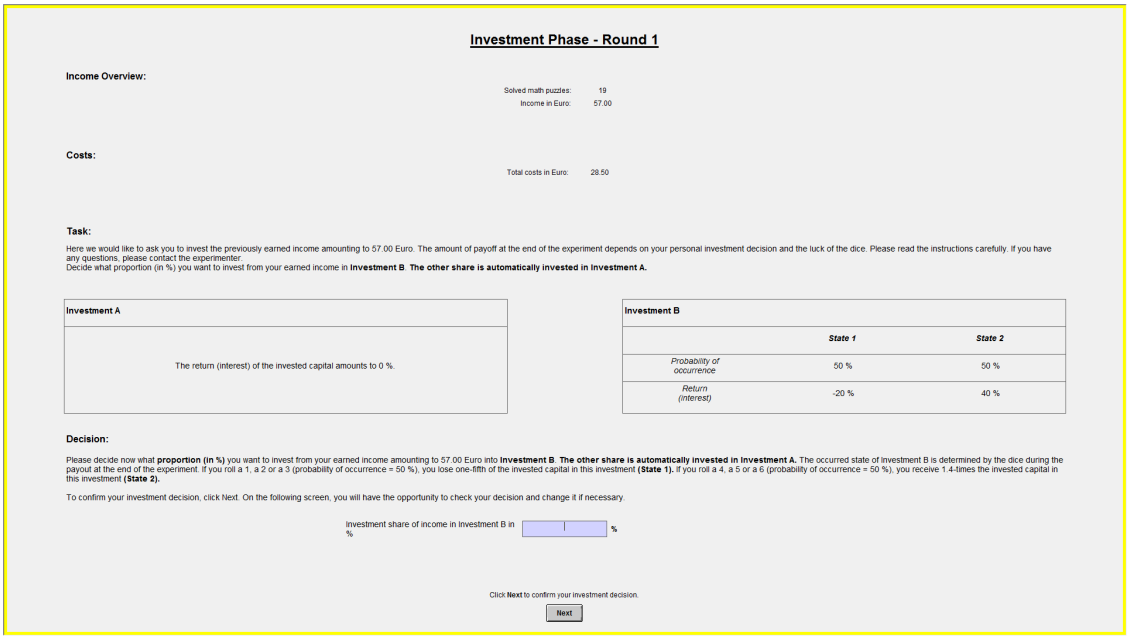
To confirm your investment decision, click Next. On the following screen, you will have the opportunity to check your decision and change it if necessary.

Investment share of income in Investment B in % [ ] %

Click **Next** to confirm your investment decision.

Next

Figure 3.17: Investment Decision - NoTaxGross



Investment Phase - Round 1

Income Overview:

Solved math puzzles: 19
Income in Euro: 57.00

Costs:

Total costs in Euro: 28.50

Task:

Here we would like to ask you to invest the previously earned income amounting to 57.00 Euro. The amount of payoff at the end of the experiment depends on your personal investment decision and the luck of the dice. Please read the instructions carefully. If you have any questions, please contact the experimenter.
Decide what proportion (in %) you want to invest from your earned income in **Investment B**. **The other share is automatically invested in Investment A.**

Investment A
The return (interest) of the invested capital amounts to 0 %.

Investment B		
	State 1	***State 2***
Probability of occurrence	50 %	50 %
Return (interest)	-20 %	40 %

Decision:

Please decide now what **proportion (in %)** you want to invest from your earned income amounting to 57.00 Euro into **Investment B**. **The other share is automatically invested in Investment A.** The occurred state of investment B is determined by the dice during the payout at the end of the experiment. If you roll a 1, a 2 or a 3 (probability of occurrence = 50 %), you lose one-fifth of the invested capital in this investment **(State 1).** If you roll a 4, a 5 or a 6 (probability of occurrence = 50 %), you receive 1.4-times the invested capital in this investment **(State 2).**

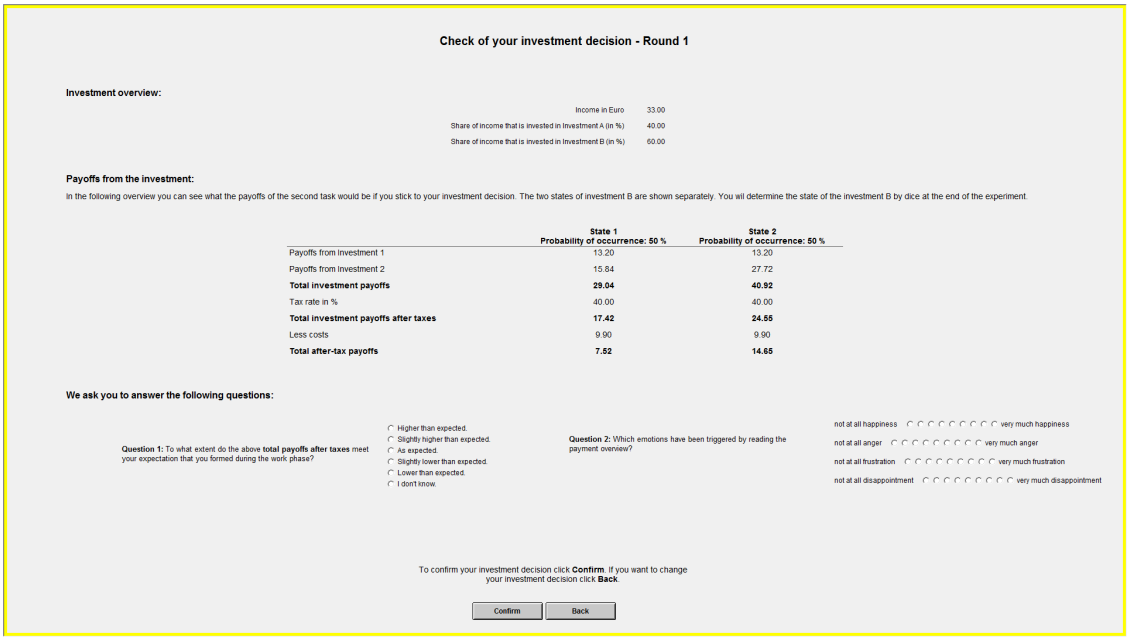
To confirm your investment decision, click Next. On the following screen, you will have the opportunity to check your decision and change it if necessary.

Investment share of income in Investment B in % [ ] %

Click **Next** to confirm your investment decision.

Next

Figure 3.18: Check of Investment Decision - Deferred Taxation



Check of your investment decision - Round 1

Investment overview:

Income in Euro	33.00
Share of income that is invested in Investment A (in %)	40.00
Share of income that is invested in Investment B (in %)	60.00

Payoffs from the investment:

In the following overview you can see what the payoffs of the second task would be if you stick to your investment decision. The two states of investment B are shown separately. You will determine the state of the investment B by dice at the end of the experiment.

	State 1 Probability of occurrence: 50 %	State 2 Probability of occurrence: 50 %
Payoffs from Investment 1	13.20	13.20
Payoffs from Investment 2	15.84	27.72
Total investment payoffs	**29.04**	**40.92**
Tax rate in %	40.00	40.00
Total investment payoffs after taxes	**17.42**	**24.55**
Less costs	9.90	9.90
Total after-tax payoffs	**7.52**	**14.65**

We ask you to answer the following questions:

Question 1: To what extent do the above **total payoffs after taxes** meet your expectation that you formed during the work phase?

- Higher than expected.
- Slightly higher than expected.
- As expected.
- Slightly lower than expected.
- Lower than expected.
- I don't know.

Question 2: Which emotions have been triggered by reading the payment overview?

not at all happiness ○ ○ ○ ○ ○ ○ ○ ○ very much happiness

not at all anger ○ ○ ○ ○ ○ ○ ○ ○ very much anger

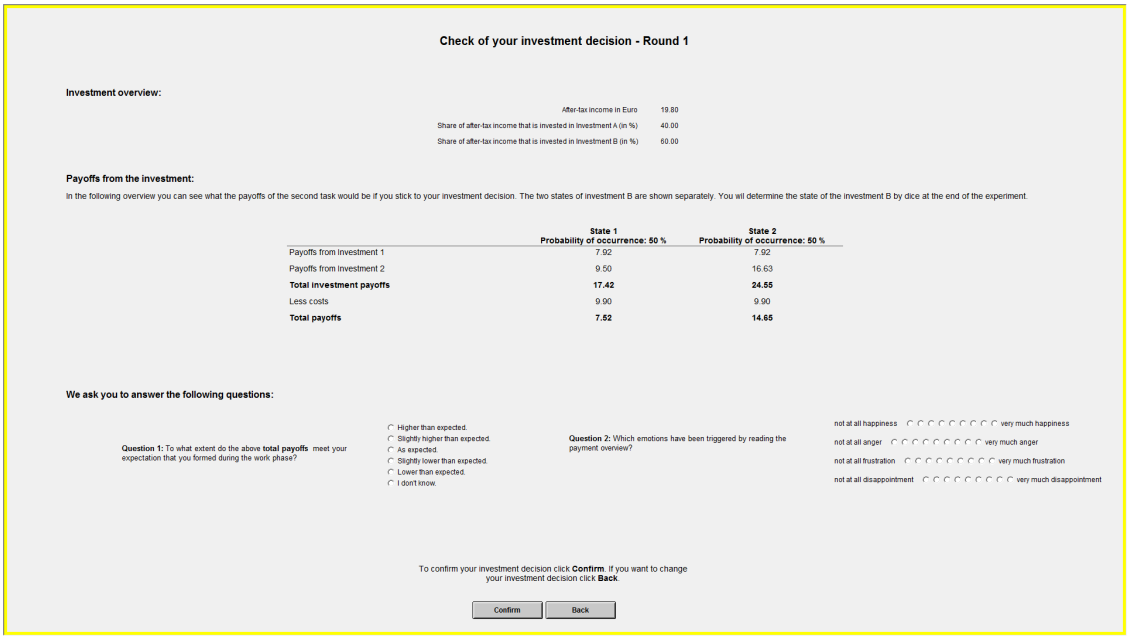
not at all frustration ○ ○ ○ ○ ○ ○ ○ ○ very much frustration

not at all disappointment ○ ○ ○ ○ ○ ○ ○ ○ very much disappointment

To confirm your investment decision click **Confirm**. If you want to change your investment decision click **Back**.

Confirm Back

Figure 3.19: Check of Investment Decision - Immediate Taxation



Check of your investment decision - Round 1

Investment overview:

After-tax income in Euro	19.80
Share of after-tax income that is invested in Investment A (in %)	40.00
Share of after-tax income that is invested in Investment B (in %)	60.00

Payoffs from the investment:

In the following overview you can see what the payoffs of the second task would be if you stick to your investment decision. The two states of investment B are shown separately. You will determine the state of the investment B by dice at the end of the experiment.

	State 1 Probability of occurrence: 50 %	State 2 Probability of occurrence: 50 %
Payoffs from Investment 1	7.92	7.92
Payoffs from Investment 2	9.50	16.63
Total investment payoffs	**17.42**	**24.55**
Less costs	9.90	9.90
Total payoffs	**7.52**	**14.65**

We ask you to answer the following questions:

Question 1: To what extent do the above **total payoffs** meet your expectation that you formed during the work phase?

- Higher than expected.
- Slightly higher than expected.
- As expected.
- Slightly lower than expected.
- Lower than expected.
- I don't know.

Question 2: Which emotions have been triggered by reading the payment overview?

not at all happiness ○ ○ ○ ○ ○ ○ ○ ○ very much happiness

not at all anger ○ ○ ○ ○ ○ ○ ○ ○ very much anger

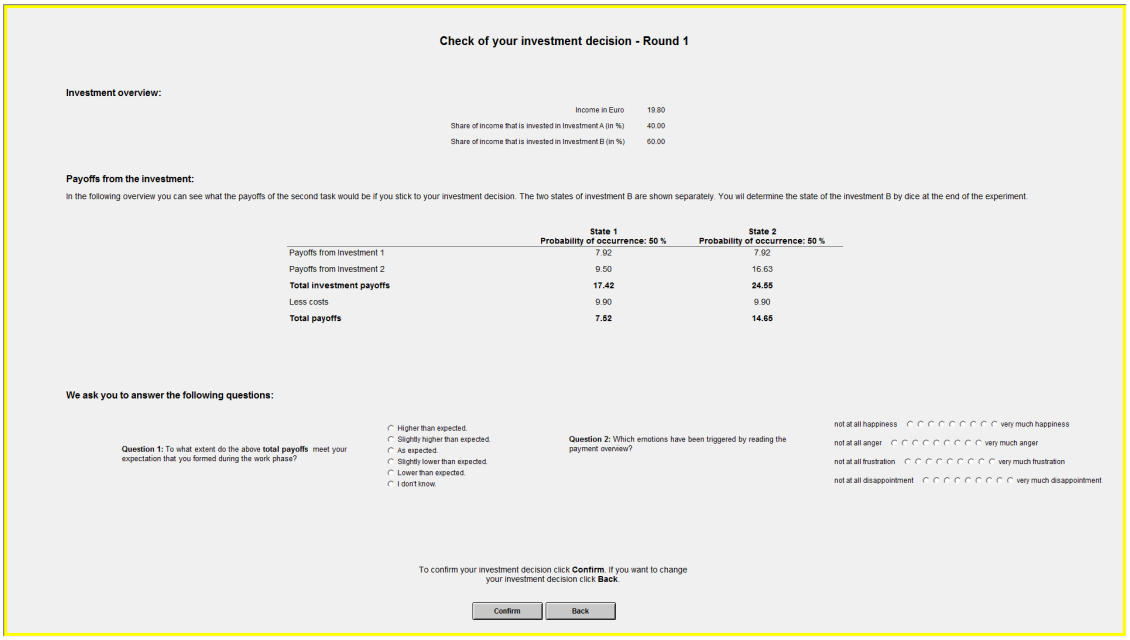
not at all frustration ○ ○ ○ ○ ○ ○ ○ ○ very much frustration

not at all disappointment ○ ○ ○ ○ ○ ○ ○ ○ very much disappointment

To confirm your investment decision click **Confirm**. If you want to change your investment decision click **Back**.

Confirm Back

Figure 3.20: Check of Investment Decision - NoTaxNet



Check of your investment decision - Round 1

Investment overview:

Income in Euro	19.80
Share of income that is invested in Investment A (in %)	40.00
Share of income that is invested in Investment B (in %)	60.00

Payoffs from the investment:

In the following overview you can see what the payoffs of the second task would be if you stick to your investment decision. The two states of investment B are shown separately. You will determine the state of the investment B by dice at the end of the experiment.

	State 1 Probability of occurrence: 50 %	State 2 Probability of occurrence: 50 %
Payoffs from Investment 1	7.92	7.92
Payoffs from Investment 2	9.50	16.63
Total investment payoffs	**17.42**	**24.55**
Less costs	9.90	9.90
Total payoffs	**7.52**	**14.65**

We ask you to answer the following questions:

Question 1: To what extent do the above **total payoffs** meet your expectation that you formed during the work phase?

- Higher than expected.
- Slightly higher than expected.
- As expected.
- Slightly lower than expected.
- Lower than expected.
- I don't know.

Question 2: Which emotions have been triggered by reading the payment overview?

not at all happiness ○ ○ ○ ○ ○ ○ ○ ○ very much happiness

not at all anger ○ ○ ○ ○ ○ ○ ○ ○ very much anger

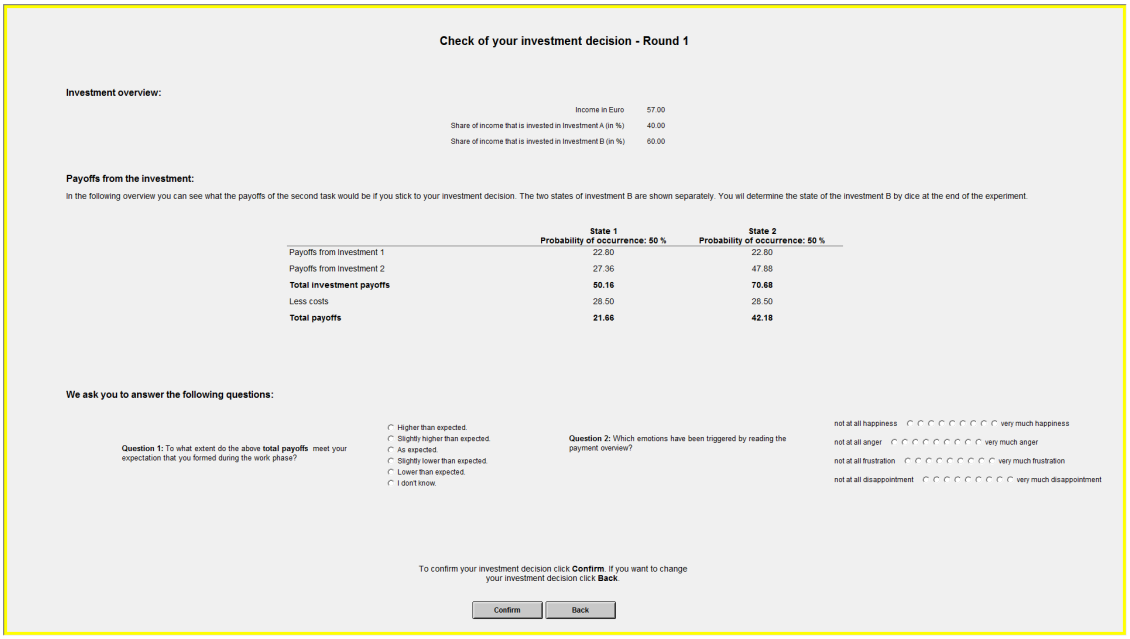
not at all frustration ○ ○ ○ ○ ○ ○ ○ ○ very much frustration

not at all disappointment ○ ○ ○ ○ ○ ○ ○ ○ very much disappointment

To confirm your investment decision click **Confirm**. If you want to change your investment decision click **Back**.

Confirm Back

Figure 3.21: Check of Investment Decision - NoTaxGross



Check of your investment decision - Round 1

Investment overview:

Income in Euro	57.00
Share of income that is invested in Investment A (in %)	40.00
Share of income that is invested in Investment B (in %)	60.00

Payoffs from the investment:

In the following overview you can see what the payoffs of the second task would be if you stick to your investment decision. The two states of investment B are shown separately. You will determine the state of the investment B by dice at the end of the experiment.

	State 1 Probability of occurrence: 50 %	State 2 Probability of occurrence: 50 %
Payoffs from Investment 1	22.80	22.80
Payoffs from Investment 2	27.36	47.88
Total investment payoffs	**50.16**	**70.68**
Less costs	28.50	28.50
Total payoffs	**21.66**	**42.18**

We ask you to answer the following questions:

Question 1: To what extent do the above **total payoffs** meet your expectation that you formed during the work phase?

- Higher than expected.
- Slightly higher than expected.
- As expected.
- Slightly lower than expected.
- Lower than expected.
- I don't know.

Question 2: Which emotions have been triggered by reading the payment overview?

not at all happiness ○ ○ ○ ○ ○ ○ ○ ○ very much happiness

not at all anger ○ ○ ○ ○ ○ ○ ○ ○ very much anger

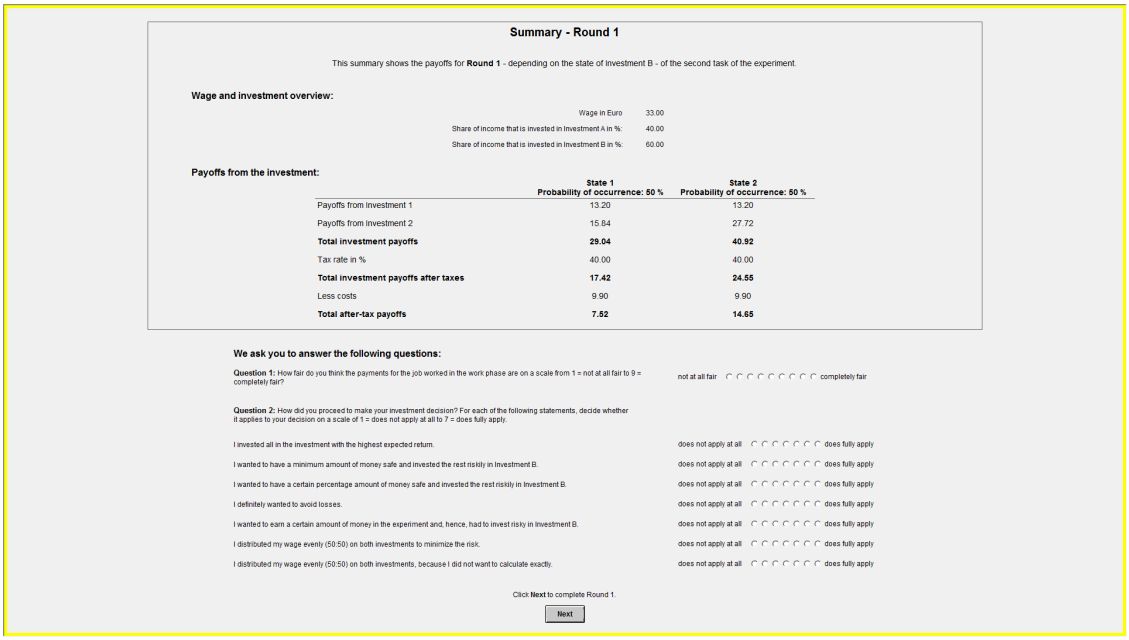
not at all frustration ○ ○ ○ ○ ○ ○ ○ ○ very much frustration

not at all disappointment ○ ○ ○ ○ ○ ○ ○ ○ very much disappointment

To confirm your investment decision click **Confirm**. If you want to change your investment decision click **Back**.

Confirm Back

Figure 3.22: Summary of Round 1 - Deferred Taxation



Summary - Round 1

This summary shows the payoffs for **Round 1** - depending on the state of investment B - of the second task of the experiment.

Wage and investment overview:

Wage in Euro	33.00
Share of income that is invested in Investment A in %:	40.00
Share of income that is invested in Investment B in %:	60.00

Payoffs from the investment:

	State 1 Probability of occurrence: 50 %	State 2 Probability of occurrence: 50 %
Payoffs from investment 1	13.20	13.20
Payoffs from investment 2	15.84	27.72
Total investment payoffs	**29.04**	**40.92**
Tax rate in %	40.00	40.00
Total investment payoffs after taxes	**17.42**	**24.55**
Less costs	9.90	9.90
Total after-tax payoffs	**7.52**	**14.65**

We ask you to answer the following questions:

Question 1: How fair do you think the payments for the job worked in the work phase are on a scale from 1 = not at all fair to 9 = completely fair?

not at all fair ○ ○ ○ ○ ○ ○ ○ ○ ○ completely fair

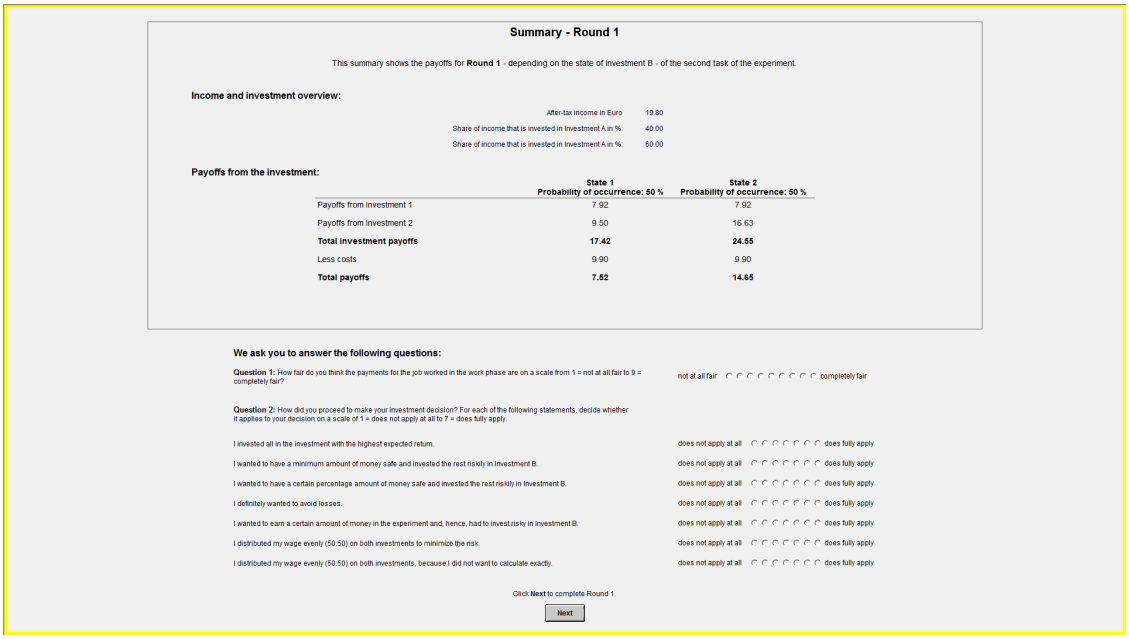
Question 2: How did you proceed to make your investment decision? For each of the following statements, decide whether it applies to your decision on a scale of 1 = does not apply at all to 7 = does fully apply.

I invested all in the investment with the highest expected return.	does not apply at all ○ ○ ○ ○ ○ ○ ○ does fully apply
I wanted to have a minimum amount of money safe and invested the rest riskily in Investment B.	does not apply at all ○ ○ ○ ○ ○ ○ ○ does fully apply
I wanted to have a certain percentage amount of money safe and invested the rest riskily in Investment B.	does not apply at all ○ ○ ○ ○ ○ ○ ○ does fully apply
I definitely wanted to avoid losses.	does not apply at all ○ ○ ○ ○ ○ ○ ○ does fully apply
I wanted to earn a certain amount of money in the experiment and, hence, had to invest risky in Investment B.	does not apply at all ○ ○ ○ ○ ○ ○ ○ does fully apply
I distributed my wage evenly (50:50) on both investments to minimize the risk.	does not apply at all ○ ○ ○ ○ ○ ○ ○ does fully apply
I distributed my wage evenly (50:50) on both investments, because I did not want to calculate exactly.	does not apply at all ○ ○ ○ ○ ○ ○ ○ does fully apply

Click **Next** to complete Round 1.

Next

Figure 3.23: Summary Round 1 - Immediate Taxation



Summary - Round 1

This summary shows the payoffs for **Round 1** - depending on the state of investment B - of the second task of the experiment.

Income and investment overview:

After-tax income in Euro	19.80
Share of income that is invested in Investment A in %:	40.00
Share of income that is invested in Investment A in %:	60.00

Payoffs from the investment:

	State 1 Probability of occurrence: 50 %	State 2 Probability of occurrence: 50 %
Payoffs from investment 1	7.92	7.92
Payoffs from investment 2	9.50	16.63
Total investment payoffs	**17.42**	**24.55**
Less costs	9.90	9.90
Total payoffs	**7.52**	**14.65**

We ask you to answer the following questions:

Question 1: How fair do you think the payments for the job worked in the work phase are on a scale from 1 = not at all fair to 9 = completely fair?

not at all fair ○ ○ ○ ○ ○ ○ ○ ○ ○ completely fair

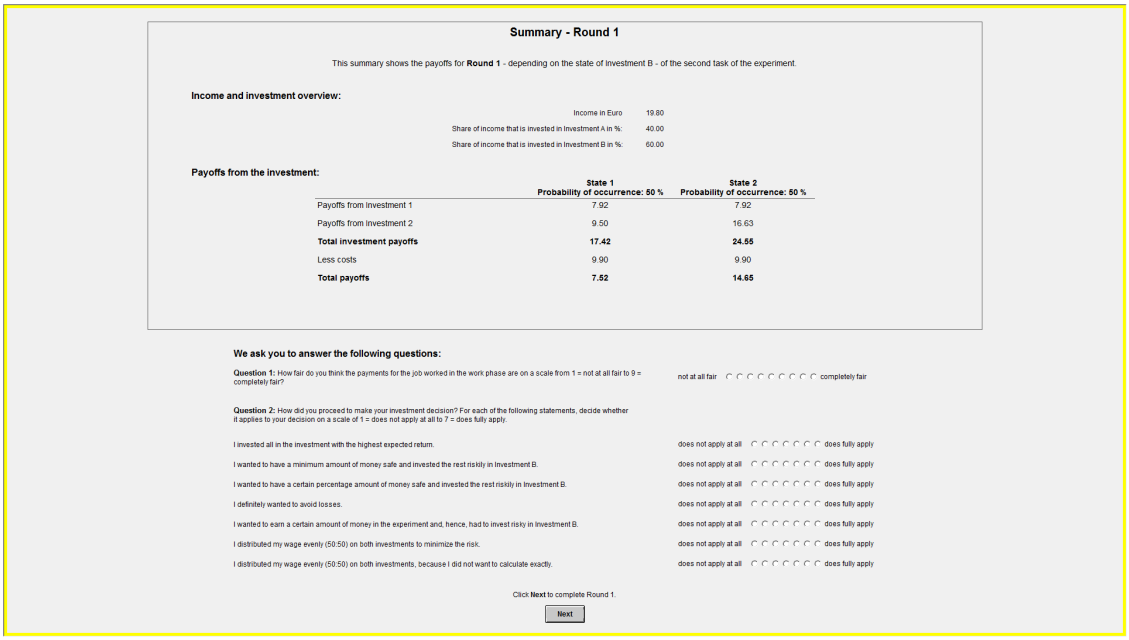
Question 2: How did you proceed to make your investment decision? For each of the following statements, decide whether it applies to your decision on a scale of 1 = does not apply at all to 7 = does fully apply.

I invested all in the investment with the highest expected return.	does not apply at all ○ ○ ○ ○ ○ ○ ○ does fully apply
I wanted to have a minimum amount of money safe and invested the rest riskily in Investment B.	does not apply at all ○ ○ ○ ○ ○ ○ ○ does fully apply
I wanted to have a certain percentage amount of money safe and invested the rest riskily in Investment B.	does not apply at all ○ ○ ○ ○ ○ ○ ○ does fully apply
I definitely wanted to avoid losses.	does not apply at all ○ ○ ○ ○ ○ ○ ○ does fully apply
I wanted to earn a certain amount of money in the experiment and, hence, had to invest risky in Investment B.	does not apply at all ○ ○ ○ ○ ○ ○ ○ does fully apply
I distributed my wage evenly (50:50) on both investments to minimize the risk.	does not apply at all ○ ○ ○ ○ ○ ○ ○ does fully apply
I distributed my wage evenly (50:50) on both investments, because I did not want to calculate exactly.	does not apply at all ○ ○ ○ ○ ○ ○ ○ does fully apply

Click **Next** to complete Round 1.

Next

Figure 3.24: Summary Round 1 - NoTaxNet



Summary - Round 1

This summary shows the payoffs for **Round 1** - depending on the state of investment B - of the second task of the experiment.

Income and investment overview:

Income in Euro	19.80
Share of income that is invested in Investment A in %:	40.00
Share of income that is invested in Investment B in %:	60.00

Payoffs from the investment:

	State 1 Probability of occurrence: 50 %	State 2 Probability of occurrence: 50 %
Payoffs from investment 1	7.92	7.92
Payoffs from investment 2	9.50	16.63
Total investment payoffs	**17.42**	**24.55**
Less costs	9.90	9.90
Total payoffs	**7.52**	**14.65**

We ask you to answer the following questions:

Question 1: How fair do you think the payments for the job worked in the work phase are on a scale from 1 = not at all fair to 9 = completely fair?

not at all fair ○ ○ ○ ○ ○ ○ ○ ○ ○ completely fair

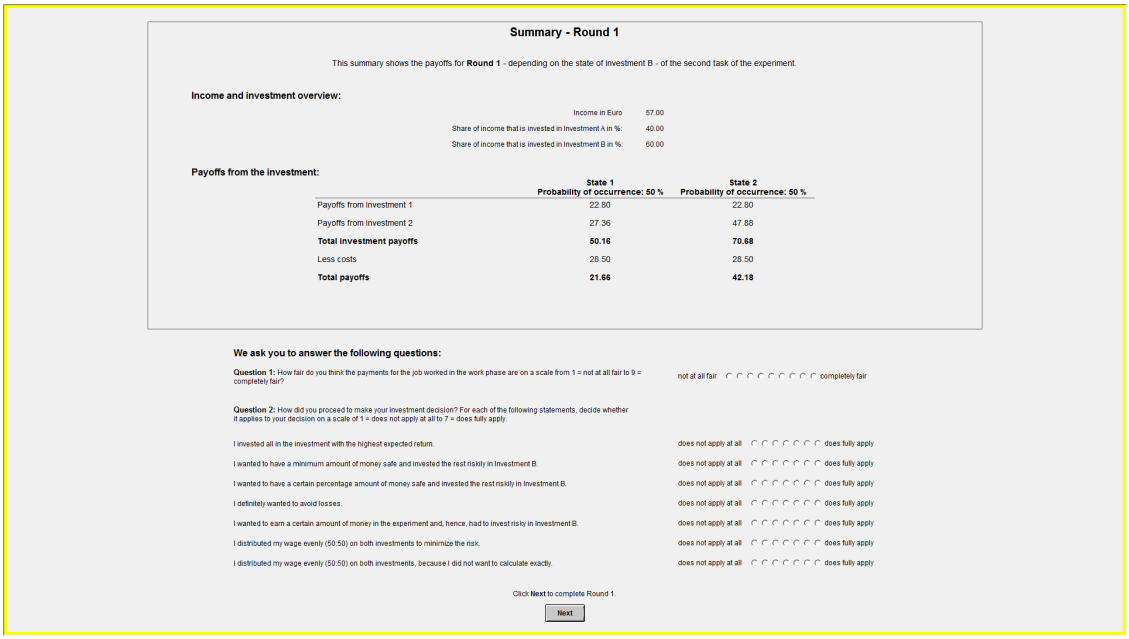
Question 2: How did you proceed to make your investment decision? For each of the following statements, decide whether it applies to your decision on a scale of 1 = does not apply at all to 7 = does fully apply.

I invested all in the investment with the highest expected return.	does not apply at all ○ ○ ○ ○ ○ ○ ○ does fully apply
I wanted to have a minimum amount of money safe and invested the rest riskily in Investment B.	does not apply at all ○ ○ ○ ○ ○ ○ ○ does fully apply
I wanted to have a certain percentage amount of money safe and invested the rest riskily in Investment B.	does not apply at all ○ ○ ○ ○ ○ ○ ○ does fully apply
I definitely wanted to avoid losses.	does not apply at all ○ ○ ○ ○ ○ ○ ○ does fully apply
I wanted to earn a certain amount of money in the experiment and, hence, had to invest risky in Investment B.	does not apply at all ○ ○ ○ ○ ○ ○ ○ does fully apply
I distributed my wage evenly (50:50) on both investments to minimize the risk.	does not apply at all ○ ○ ○ ○ ○ ○ ○ does fully apply
I distributed my wage evenly (50:50) on both investments, because I did not want to calculate exactly.	does not apply at all ○ ○ ○ ○ ○ ○ ○ does fully apply

Click **Next** to complete Round 1.

Next

Figure 3.25: Summary Round 1 - NoTaxGross



Summary - Round 1

This summary shows the payoffs for **Round 1** - depending on the state of investment B - of the second task of the experiment.

Income and investment overview:

Income in Euro	57.00
Share of income that is invested in Investment A in %:	40.00
Share of income that is invested in Investment B in %:	60.00

Payoffs from the investment:

	State 1 Probability of occurrence: 50 %	State 2 Probability of occurrence: 50 %
Payoffs from investment 1	22.80	22.80
Payoffs from investment 2	27.36	47.88
Total investment payoffs	**50.16**	**70.68**
Less costs	28.50	28.50
Total payoffs	**21.66**	**42.18**

We ask you to answer the following questions:

Question 1: How fair do you think the payments for the job worked in the work phase are on a scale from 1 = not at all fair to 9 = completely fair?

not at all fair ○ ○ ○ ○ ○ ○ ○ ○ ○ completely fair

Question 2: How did you proceed to make your investment decision? For each of the following statements, decide whether it applies to your decision on a scale of 1 = does not apply at all to 7 = does fully apply.

I invested all in the investment with the highest expected return.	does not apply at all ○ ○ ○ ○ ○ ○ ○ does fully apply
I wanted to have a minimum amount of money safe and invested the rest riskily in Investment B.	does not apply at all ○ ○ ○ ○ ○ ○ ○ does fully apply
I wanted to have a certain percentage amount of money safe and invested the rest riskily in Investment B.	does not apply at all ○ ○ ○ ○ ○ ○ ○ does fully apply
I definitely wanted to avoid losses.	does not apply at all ○ ○ ○ ○ ○ ○ ○ does fully apply
I wanted to earn a certain amount of money in the experiment and, hence, had to invest risky in Investment B.	does not apply at all ○ ○ ○ ○ ○ ○ ○ does fully apply
I distributed my wage evenly (50:50) on both investments to minimize the risk.	does not apply at all ○ ○ ○ ○ ○ ○ ○ does fully apply
I distributed my wage evenly (50:50) on both investments, because I did not want to calculate exactly.	does not apply at all ○ ○ ○ ○ ○ ○ ○ does fully apply

Click **Next** to complete Round 1.

Next

3.12 Appendix E: Questionnaire

Question before the Working Phase

Question: What do you think about the following statements? Please choose only one answer for each question.
If both answers seem to apply to you, choose the one that applies more frequently.

1. I tend to
☐ understand details of a subject but may be fuzzy about its overall structure.
☐ udnerstand the overall structure but may be fuzzy about the details.

2. Once I understand
☐ all the parts, I understand the whole thing.
☐ the whole thing, I see how the parts fit.

3. When I solve math problems
☐ I usually work my way to the solutions one step at a time.
☐ I often just see the solutions but then have to struggle to figure out the steps to get to them.

4. When I'm analyzing a story or a novel
☐ I think of the incidents and try to put them together to figure out the themes.
☐ I know just what the themes are when I finish reading and then I have to go back and find the incidents that demonstrate them.

5. It is more important to me that an instructor
☐ lay out the material in clear sequential steps.
☐ give me an overall picture and relate the material to other subjects.

6. I learn
☐ at a fairly regular pace. If I study hard, I'll "get it".
☐ in fits and starts. I'll be totally confused and then suddenly it all "clicks".

7. When considering a body of information, I am more likely to
☐ focus on details and miss the big picture.
☐ try to understand the big picture before getting into the details.

8. When writing a paper, I am more likely to
☐ work on (think about or write) the beginning of the paper and progress forward.
☐ work on (think about or write) different parts of the paper and then order them.

9. When I am learning a new subject, I prefer to
☐ stay focused on that subject, learning as much about it as I can.
☐ try to make connections between that subject and related subjects.

10. Some teachers start their lectures with an outline of what they will cover. Such outlines are
☐ somewhat helpful to me.
☐ very helpful to me.

11. When solving problems in a group, I would be more likely to
☐ think of the steps in the solution process.
☐ think of possible consequences or application of the solution in a wide range of areas.

Questions after each Working Phase

Question 1: Why have you finished the working phase now? Please choose the answer that is most likely to apply.

I have finished the working phase because ...

☐ I have earned enough.
☐ the cost for another math puzzle were too high.
☐ the working task was too exhausting.

Question 2: How did you find the previous working task on a scale from 1 = very unpleasant to 9 = very pleasant?

very unpleasant ☐—☐—☐—☐—☐—☐—☐—☐—☐ very pleasant

Question 3: How do you perceive the fairness of the working task compensation (considering the costs) for the required task in the working phase on a scale from 1 = not fair at all to 9 = totally fair?

not fair at all ☐—☐—☐—☐—☐—☐—☐—☐—☐ totally fair

Questions at the first review of the investment decision

Question 1: To what extend do the above **total investment payoffs after taxes** correspond to your expectation you have formed during the working phase?

☐ Higher than expected.
☐ Slightly higher than expected.
☐ As expected.
☐ Slightly lower than expected.
☐ Lower than expected.
☐ I don't know.

Question 2: Which feelings came up when you read the payoff overview?

no happiness at all	☐	☐	☐	☐	☐	☐	☐	☐	☐	very much happiness
no anger at all	☐	☐	☐	☐	☐	☐	☐	☐	☐	very much anger
no frustration at all	☐	☐	☐	☐	☐	☐	☐	☐	☐	very much frustration
no disappointment at all	☐	☐	☐	☐	☐	☐	☐	☐	☐	very much disappointment

Questions before the Check of the Investment Decision

Question 1: Why do you want to change your investment decision? Decide for each of the following statements, whether it applies to your decision to finish the working phase on a scale from 1 = does not apply at all to 7 = fully applies.
I would like to change my investment decision because...

	does not apply at all								fully applies
... I did not consider the taxation.	☐	☐	☐	☐	☐	☐	☐	☐	☐
... I did not consider the costs.	☐	☐	☐	☐	☐	☐	☐	☐	☐
... I was not clear about the calculation of the returns.	☐	☐	☐	☐	☐	☐	☐	☐	☐
... I was not clear about the payoff mechanism in the two states.	☐	☐	☐	☐	☐	☐	☐	☐	☐

Question after summarizing each round

Question 1: How do you perceive the fairness of the working task compensation (considering the costs) for the required task in the working phase on a scale from 1 = not fair at all to 9 = totally fair?

not fair at all ☐—☐—☐—☐—☐—☐—☐—☐—☐ totally fair

Question 2: How did you proceed with your investment decision? Decide for each of the following statements, whether it applies to your decision on a scale from 1 = does not apply at all to 7 = fully applies.

	does not apply at all						fully applies
I have invested everything in the investment with the highest expected return.	☐	☐	☐	☐	☐	☐	☐
I wanted to have a minimum amount for sure and invested the rest riskily in Investment B.	☐	☐	☐	☐	☐	☐	☐
I wanted to have a specific percentage amount for sure and invested the rest riskily in Investment B.	☐	☐	☐	☐	☐	☐	☐
I wanted to avoid losses in any case.	☐	☐	☐	☐	☐	☐	☐
I wanted to earn a certain amount of money in the experiment and, hence, had to invest risky in Investment B.	☐	☐	☐	☐	☐	☐	☐
I have split my income [*Immediate*: income after taxes] equally (50:50) into both investments to minimize the risk.	☐	☐	☐	☐	☐	☐	☐
I have split my income [*Immediate*: income after taxes] equally (50:50) into both investments because I did not want to calculate exactly.	☐	☐	☐	☐	☐	☐	☐

Questionnaire

Question 1: Are you male or female?

☐ male

☐ female

Question 2: How old are you?

☐

Question 3: How would you assess your tax knowledge on a scale from 1 = not any to 9 = expert?

not any ☐—☐—☐—☐—☐—☐—☐—☐—☐ expert

Question 4: How do you assess your personal knowledge and experience of investments in financial assets (e.g. securities, bonds, bank accounts) on a scale from 1 = no experience to 9 = much experience?

no experience ☐—☐—☐—☐—☐—☐—☐—☐—☐ much experience

Question 5: Are you generally a person who is willing to take risks or do you try to avoid taking risks? Please tick a box on the scale, the value 0 means not at all willing to take risks and the value 10 means very willing to take risks.

not at all willing to take risks ☐—☐—☐—☐—☐—☐—☐—☐—☐—☐—☐ very willing to take risks

Question 6: Are you in order to financial investments a person who is willing to take risks or do you try to avoid taking risks? Please tick a box on the scale, the value 0 means not at all willing to take risks and the value 10 means very willing to take risks.

not at all willing to take risks ☐—☐—☐—☐—☐—☐—☐—☐—☐—☐—☐ very willing to take risks

Question 7: How complicated did you find the taxation in this experiment from 1 = very easy to 9 = very complicated?

very easy ☐—☐—☐—☐—☐—☐—☐—☐—☐ very complicated

Question 8: Decide for each of the following statements whether this is personally uncharacteristic or characteristic for you on a scale from 1 = very uncharacteristic to 5 = very characteristic.

	very uncharacteristic				very characteristic
In principle I do everything at the last moment.	☐	☐	☐	☐	☐
Usually, I promptly answer on telephone calls.	☐	☐	☐	☐	☐
I always get birthday and Christmas gifts at the last minute.	☐	☐	☐	☐	☐
When I receive an invoice of a small amount, I pay it immediately.	☐	☐	☐	☐	☐
I always start with the exam preparation just before the exams.	☐	☐	☐	☐	☐

Question 9: Imagine that you have just inherited some money that you are planning to invest. You are deciding between two different bond options. The first bond is expected to pay € 400 per year, but you will also be taxed € 100 on these earnings each year. The second bond's return is lower, € 300 per year, but it will not be taxed. Which bond would you invest in?

☐ I would put my money in the first bond.

☐ I would put my money in the second bond.

Question 10: How did you feel about that you had to pay taxes in the experiment, which are used for further scientific projects on a scale from 1 = very negative to 7 = very positive?

very negative ☐—☐—☐—☐—☐—☐—☐—☐—☐ very positive

Question 11: Read each of the following statements and decide how much you agree with each according to your beliefs and experiences. Please respond according to the following scale. Please respond on a scale from 1 = strongly disagree to 7 = strongly agree.

	strongly disagree					strongly agree
I dislike it when a person's statement could mean many different things.	☐	☐	☐	☐	☐	☐
After I have made up my mind about something, I think it is a waste of time to consider different opinions.	☐	☐	☐	☐	☐	☐
I dislike unpredictable situations.	☐	☐	☐	☐	☐	☐
I enjoy the uncertainty of going into a new situation without knowing what might happen.	☐	☐	☐	☐	☐	☐
When trying to solve a problem, seeing many different options only creates confusion.	☐	☐	☐	☐	☐	☐
Generally, I do not look for alternative solutions after I have made up my mind about a problem.	☐	☐	☐	☐	☐	☐
I prefer to socialize with familiar friends because I know what to expect from them.	☐	☐	☐	☐	☐	☐
I would quickly become impatient and irritated if I would not find a solution to a problem immediately.	☐	☐	☐	☐	☐	☐
I prefer tasks that are completely clear to me what exactly and how it has to be done.	☐	☐	☐	☐	☐	☐
When thinking about a problem, in general, I don't waste time by considering all different opinions on the issue.	☐	☐	☐	☐	☐	☐
I like questions which could be answered in many different ways.	☐	☐	☐	☐	☐	☐
I like unpredictable situations and dislike routine aspects of my daily life.	☐	☐	☐	☐	☐	☐
I would rather know bad news than stay in a state of uncertainty.	☐	☐	☐	☐	☐	☐

	strongly disagree					strongly agree
I don't like to go into a situation without knowing what I can expect from it.	☐	☐	☐	☐	☐	☐
I feel irritated when one person disagrees with what everyone else in a group believes.	☐	☐	☐	☐	☐	☐
When faced with a problem I prefer to take the first solution that comes to mind, instead of thinking about all the possible alternatives.	☐	☐	☐	☐	☐	☐

Question 12: Which faculty are you enrolled for?

- ☐ Architecture and landscape
- ☐ Construction engineering and geodesy
- ☐ Electrical engineering and computer science
- ☐ Law
- ☐ Mechanical engineering
- ☐ Mathematics and physics
- ☐ Natural sciences
- ☐ Philosophy
- ☐ Business Management and Economics
- ☐ other
- ☐ I am not a student.

Question 13: What degree are you aiming for?

- ☐ Bachelor
- ☐ Master
- ☐ Diplom
- ☐ Magister
- ☐ 1. state examination
- ☐ 2. state examination
- ☐ doctorate
- ☐ other

Question 14: Which academic semester are you in?

Question 15: How many courses on business taxation you have participated at during your studies?

Question 16: What is you marital status?

☐ married/ long-term relationship
☐ single
☐ divorced/widowed

Question 17: Do you have children?

☐ Yes
☐ No

Question 18: What is your monthly disposable income (after rent)?

☐ $<$ 500 €
☐ 501 € - 1,000 €
☐ 1,001 € - 1,500 €
☐ 1,501 € - 2,000 €
☐ $>$ 2,001 €

Question 19: Did you use the calculator in the experiment?

☐ Yes
☐ No

Question 20: What has burdened you more in the experiment - 1 € costs or 1 € taxes? If you choose the left box, 1 € costs has burdened you more. If you choose the middle (fifth) box, costs and taxes have burdened you equally. If you choose the right box, 1 € taxes has burdened you more. With the values in between you can grade your burden.

1 € costs ☐—☐—☐—☐—☐—☐—☐—☐—☐—☐ 1 € taxes

CRT-Questions at the end of the experiment

Question 1: A bat and a ball cost 1,10 €. The bat costs 1,00 € more than the ball. How much does the ball cost?

euro

Question 2: If it takes 5 machines 5 minutes to make 5 widgets, how long would it take 100 machines to make 100 widgets?

minutes

Question 3: In a lake, there is a patch of lily pads. Every day, the patch doubles in size. If it takes 48 days for the patch to cover the entire lake, how long would it take for the patch to cover half of the lake?

days

Task 1

Task: Please always choose the one of the options A or B that you prefer. One of the 20 decisions that you chose will be picked randomly and the relevant result will be paid out to you.

Decision	Option A			Option B
1	0.50 € safe	☐	☐	3.50 € or 0.50 € (Probability 50:50)
2	0.60 € safe	☐	☐	3.50 € or 0.50 € (Probability 50:50)
3	0.70 € safe	☐	☐	3.50 € or 0.50 € (Probability 50:50)
4	0.80 € safe	☐	☐	3.50 € or 0.50 € (Probability 50:50)
5	0.90 € safe	☐	☐	3.50 € or 0.50 € (Probability 50:50)
6	1.00 € safe	☐	☐	3.50 € or 0.50 € (Probability 50:50)
7	1.10 € safe	☐	☐	3.50 € or 0.50 € (Probability 50:50)
8	1.20 € safe	☐	☐	3.50 € or 0.50 € (Probability 50:50)
9	1.30 € safe	☐	☐	3.50 € or 0.50 € (Probability 50:50)
10	1.40 € safe	☐	☐	3.50 € or 0.50 € (Probability 50:50)
11	1.50 € safe	☐	☐	3.50 € or 0.50 € (Probability 50:50)
12	1.60 € safe	☐	☐	3.50 € or 0.50 € (Probability 50:50)
13	1.70 € safe	☐	☐	3.50 € or 0.50 € (Probability 50:50)
14	1.80 € safe	☐	☐	3.50 € or 0.50 € (Probability 50:50)
15	1.90 € safe	☐	☐	3.50 € or 0.50 € (Probability 50:50)
16	2.00 € safe	☐	☐	3.50 € or 0.50 € (Probability 50:50)
17	2.10 € safe	☐	☐	3.50 € or 0.50 € (Probability 50:50)
18	2.20 € safe	☐	☐	3.50 € or 0.50 € (Probability 50:50)
19	2.30 € safe	☐	☐	3.50 € or 0.50 € (Probability 50:50)
20	2.40 € safe	☐	☐	3.50 € or 0.50 € (Probability 50:50)

Chapter 4

Negotiating with the Tax Auditor: Determinants of Tax Auditors' Negotiation Strategy Choice and the Effect on Firms' Tax Adjustments*

Abstract

Using a survey among German tax auditors, we empirically investigate which factors determine tax auditors' choice of negotiation strategies during tax audits and analyze the effect of their chosen strategy on the audit outcome. On the one hand, the results show that, compared to a cooperative auditor negotiation strategy, a competitive auditor negotiation strategy is associated with significantly higher additional assessed taxes. On the other hand, the competitive strategy is associated with a lower probability that the negotiation partners will reach an agreement. This indicates an advantage of combining competitive and cooperative tactics (i.e., using a "mixed strategy"). We find that although this mixed strategy does not lead to significantly less additional taxes, the strategy results in a higher agreement probability. Regarding the determinants of the auditor's strategy choice, our results reveal that the tax auditor's audit experience, the availability of higher authority, time pressure, the quality of the taxpayer's financial accounting system, and the perceived negotiation behavior of the tax advisor are important predictors. In sum, our study provides new insights into how firms' tax burden is affected by negotiations between tax auditors and the firms' tax advisors; how these negotiations affect firms' tax burden is of relevance for both tax policy and firms.

Keywords: Tax Avoidance · Tax Compliance · Tax Audit · Negotiation Strategies

* This chapter is co-authored by Kay Blaufus (Leibniz University Hannover), Daniela Lorenz (Universität Würzburg), Benjamin Peuthert (Berlin Revenue Agency), and Alexander N. Schwäbe (Leibniz Universität Hannover).

4.1 Introduction

Carrying out tax audits is one of the most important tasks of any tax authority. In many countries, the additional assessments from tax audits are more than 5% of total revenue collections, and the audit function employs, on average, 30% of tax administration staff (OECD 2019, p. 89). For firms, tax audits often result in considerable additional tax payments. According to a survey of German inbound investors, tax audits result, on average, in additional taxes of 49% of the relevant group's average German income tax expense per year (Deloitte 2010). Moreover, a firm's failure to reach an agreement with the tax auditor can result in significant legal costs and uncertainty because tax court decisions are hard to predict (Blaufus et al. 2016). Accordingly, tax advisory firms regularly advertise their services by highlighting their negotiation experience with the tax administration to help firms "to negotiate with the tax auditor in such a way as to assert your company's interest while reaching a result the tax office can agree to" (Deloitte 2018). For both the firms' tax advisors and the tax auditors, tax audit negotiations play an important role in their daily work.

Against this background, this study examines which factors determine tax auditors' use of different negotiation strategies and how these strategies affect tax audit outcomes. Hoopes et al. (2012) cite a report by PricewaterhouseCoopers (2004) on tax risk management; this report states that "in a number of countries the final agreement of a tax return often ends in a 'horse trade' between the taxpayer and the relevant revenue authority." The tax audit negotiation is a form of a pretrial negotiation (Antle and Nalebuff 1991). In Germany, where we conduct our study, a typical tax audit scenario starts with the tax authority, which determines the scope of the tax audit; the tax authority also notifies the taxpayer about the initiation of the tax audit, the taxes and periods to be covered, the contemplated date of the first visit, and the name of the tax auditor (Fischer 2018, p. 196). Tax audits are conducted as field audits. In a field audit, the Revenue Agency conducts a detailed examination of a taxpayer's records, commonly at the taxpayer's place of business. During the audit, the auditor usually identifies certain items he or she disagrees with concerning the taxpayer's chosen tax treatment. In a final audit meeting, the auditor discusses face-to-face with the firm (usually represented by a tax advisor) unclear issues and items where the respective tax treatment is unclear due to tax law ambiguity. If the auditor and taxpayer do not reach an agreement during this negotiation, the Revenue Agency will issue a tax assessment note based on the auditors' opinion regarding the correct tax treatment. The taxpayer has the right to appeal this tax assessment by filing an objection letter. If the Appeals Department rejects the objection, taxpayers must file a lawsuit in tax court if they wish to contest the imposition of the additional tax payments.

Usually, however, both negotiation parties are interested in reaching an agreement to avoid tax court disputes. For taxpayers, the potential advantages of avoiding litigation

risk may be obvious, but this risk also affects tax auditors' behavior because German tax auditors are usually required to conduct a certain number of tax audits per year. Therefore, auditors are motivated to avoid the additional effort that an appeal would require. Moreover, if a dispute leads to litigation and the Revenue Agency loses in tax court, the auditor's local tax office is charged with legal expenses related to the litigation. A court defeat may harm an auditor's professional reputation; thus, auditors fear that litigation could indirectly affect their professional career. Hence, most tax audits close with an agreement between auditors and taxpayers.

Although both negotiation opponents are, generally, interested in reaching an agreement, their negotiation objectives differ. Taxpayers aim at avoiding additional tax payments. In contrast, tax auditors have an implicit incentive to assess additional taxes because the audit department's performance is evaluated with respect to collected additional taxes (Alissa et al. 2014). In principle, tax audit negotiations are, therefore, so-called distributive negotiations, which prior research has described as win-lose or zero-sum games (e.g., Walton and McKersie 1965; Kersten 2001). A gain for one party (one additional dollar in tax revenues for the auditor) is a loss for the other party (one additional dollar in taxes to be paid by the taxpayer). However, gains and losses are not necessarily valued equivalently by both parties.[1] Thus, while tax audit negotiations are mainly distributive, they may also contain some integrative elements.

The tax auditors' choice of negotiation strategy is important because the strategy conditions how the negotiation with the taxpayer is carried out and is assumed to affect the negotiation outcome, i.e., the assessed additional taxes and the probability of an agreement (Gibbins et al. 2010). In this paper, we distinguish among a cooperative, competitive (Brett and Thompson 2016), and mixed negotiation strategy (which combines the use of cooperative and competitive negotiation tactics (e.g., Lawler and MacMurray 1980; Pruitt 1983)).

Building on general negotiation research and, in particular, financial auditing research,[2] we hypothesize that audit experience, time pressure, the availability of a higher authority, the quality of the taxpayer's financial accounting system, and the perceived tax advisors' negotiation strategy are important determinants of tax auditors' strategy choice. Regarding

[1] For example, one can imagine that taxpayers place less importance on issues that result in temporary adjustments than on those that result in permanent adjustments. If tax auditors do not differentiate to the same extent between permanent and nonpermanent adjustments (because they perceive that this differentiation is less relevant for their performance evaluation), logrolling may increase joint negotiation outcomes. Logrolling means that negotiators create value by making trade-offs among issues so that each party receives his/her preferred alternative on issues of higher priority while compromising on less important issues (e.g., Trotman et al. 2009)

[2] In auditing financial statements, financial and tax auditors use Generally Accepted Accounting Principles (GAAP) and tax law, respectively, as standards for compliance. However, we acknowledge that the decision environment, which differs by auditor type, may influence the choice of negotiation strategies and their effectiveness. Tax auditors are state employees or civil servants and are, therefore, fully independent of the audited firm. Financial auditors, on the other hand, have an economic interest in maintaining a good relationship with the audited company, as they wish to continue to receive audit engagements in the future.

the effect on negotiation outcomes, we apply general negotiation research to the tax audit context and hypothesize that, compared to a cooperative strategy, a competitive negotiation strategy results in higher additional taxes but a lower agreement rate.

To test our hypotheses, we conduct a survey of 610 German tax auditors. We ask auditors to describe their last two cases. We collect information regarding tax cases, tax auditor characteristics and negotiation tactics that were used. Our final sample includes 572 audited firms, which were mostly family-owned, small and medium-sized enterprises with an average additional tax of € 340,840. In all sample cases, a face-to-face negotiation during a final audit meeting took place. In our tests, we employ a multinomial logit regression to examine the determinants of the tax auditor's negotiation strategy choice and linear (binary logistic) regressions to study the effect of negotiation strategy on additional taxes (agreement rate). We recognize that the auditor's strategy is a choice variable. To account for a potential selection bias, we additionally conduct an endogenous multinomial treatment effect (Deb and Trivedi 2006a,b).

Our findings reveal that tax auditors' audit experience, the availability of higher authority, and a perceived competitive negotiation behavior by the tax advisor increase the probability of using competitive negotiation tactics either alone (a competitive strategy) or in combination with cooperative tactics (a mixed strategy), whereas time pressure, the quality of the taxpayer's financial accounting system, and a perceived cooperative negotiation behavior by the tax advisor increase the probability of using cooperative negotiation tactics either alone (a cooperative strategy) or in combination with competitive tactics (a mixed strategy). As expected, tax auditors' choice of negotiation strategy affects the negotiation outcome. Compared to using a cooperative strategy (but not compared to using a mixed strategy), using a competitive negotiation strategy is associated with significantly higher additional taxes. Moreover, compared to using a competitive strategy, using a cooperative or mixed strategy leads to a significantly higher probability that the parties will reach an agreement. Therefore, tax auditors who use the mixed strategy can avoid the drawback of the lower agreement rate that results from using a purely competitive approach without giving up significantly additional taxes.

Our study makes several contributions. First, we extend prior tax research. The few prior studies that investigate the determinants of tax audit adjustments focus on the effect of taxpayer characteristics (such as profitability, firm size, foreign income, public listing, and book-tax differences (Mills 1998; Mills and Sansing 2000; Chan and Lan Mo 2000; Chan and Mo 2002) or tax auditor characteristics (such as experience (Alissa et al. 2014)) but neglect the negotiation aspect.[3] Second, we contribute to financial auditing research. In contrast to studies that rely on nonincentivized computer-based experiments, which dominate research on negotiations in financial auditing, our study relies on real cases and, thus, avoids artificial experimental settings. Any similar findings that we obtain, for

[3] Bobek et al. (2019) examine persuasive tactics used by the tax preparer in relation to the taxpayer to resolve contentious issues. Tax audit negotiations are not investigated.

example, regarding the effect of experience or time pressure on auditors' strategy choice, show the external validity of prior findings. Moreover, we also extend previous auditing research by showing that the quality of financial accounting affects auditors' strategy choice and by showing the effects of negation strategy on the probability that the negotiation partners will reach an agreement. Third, we contribute to the debate in general negotiation research concerning the conflict between the reciprocation theory (Osgood 1962) and the level-of-aspiration theory (Siegel and Fouraker 1960) by investigating how tax auditors respond to the perceived negotiation strategies of their opponent.

In addition to the discussed research implications, our study is of relevance for tax policy and for firms that prepare for tax audits. Regarding tax policy, our study shows the importance of professional negotiation training, as strategy choice significantly affects the audit outcome. Moreover, we highlight that our results show that tax administrations should be aware of the potentially detrimental effects of their performance evaluation system. Our findings clearly show that perceiving time pressure to meet set targets reduces the negotiation outcome. With respect to firms, we contribute to discussions among tax practitioners about whether cooperation or confrontation is the better approach to tax audit negotiation (e.g., Fischer 2018) by showing that the perceived competitive negotiation behavior of the tax advisor is positively (negatively) associated with additional taxes (the probability of reaching an agreement).

The remainder of this paper is organized as follows: In the next section, we develop our hypotheses. In Section 4.3, we present the sample selection, estimation method, and variable measurement. The results are described in Section 4.4. Section 4.5 concludes and discusses implications for future research and tax policy.

4.2 Theoretical Background and Hypotheses Development

4.2.1 Competitive and Cooperative Negotiation Strategies

Following the dual-concern model, negotiation research differentiates between five negotiation strategies that vary in the extent to which negotiators are concerned with their own outcome and the outcome of the other party (Filley 1975; Ruble and Thomas 1976). Previous studies often aggregate strategies based on competitive and cooperative behavior (Brett and Thompson 2016, p 72). In this study, we also focus only on the difference between cooperative and competitive behavior. However, in addition, we look at a strategy that combines competitive and cooperative tactics (a mixed strategy).

Competitive negotiation behavior is assertive and uncooperative, i.e., a power-oriented mode (Thomas 2008). Negotiators using a competitive strategy try to persuade the other party to accept alternatives that favor the negotiators' own interests at the expense of the

other party by using pressure tactics, such as threatening sanctions or imposing deadlines (e.g., Pruitt 1983). In contrast, cooperative behavior implies that the negotiator is also concerned with the other party's interests. Negotiators using a cooperative strategy use tactics such as exchanging truthful information about needs and priorities, seeking the other party's reaction to each offer and making larger concessions on items of lower priority (e.g., Carnevale and Isen 1986; Carnevale and Pruitt 1992).[4] Within the context of a tax auditor–taxpayer negotiation, the tax auditor, for example, may offer to waive small audit adjustments or adjustments with high litigation risk to promote a cooperative environment that encourages the taxpayer to accept a larger audit adjustment. Such a concession tactic is based on the assumption of reciprocity as a general societal norm (Sanchez et al. 2007; Hatfield et al. 2008).

As recognized early in the psychological negotiation literature, competitive and cooperative tactics can also be combined. It is argued that competitive behavior is often a necessary precursor to successful cooperative solutions (Pruitt 1983). The initial competitive behavior generates respect and signals that one cannot be easily exploited. After this initial phase, a cooperative strategy ensures that an agreement can be reached (Lawler and MacMurray 1980).

In sum, in reference to competitive and cooperative tactics, we distinguish between the following strategies:

- Competitive Strategy: Auditors use competitive but no cooperative tactics.
- Cooperative Strategy: Auditors use cooperative but no competitive tactics.
- Mixed Strategy: Auditors use cooperative *and* competitive tactics.
- Neutral Strategy: Auditors use neither cooperative nor competitive tactics.

Before we hypothesize about the effectiveness of these negotiation strategies, we first derive our predictions about the determinants of tax auditors' negotiation strategy choice.

[4] In the dual-concern framework, cooperative strategies can be further differentiated as collaborative, accommodating (also called conceding), and compromising strategies. When using a collaborative strategy, negotiators attempt to work with the other party to find a solution that fully satisfies the concerns of both. When using an accommodating strategy, negotiators neglect their own concerns to satisfy the concerns of the opponent. The strategy is used by negotiators, for example, when they realize that their own position is wrong, to show that they are reasonable or to maintain a cooperative relationship (Thomas 2008). The compromising strategy lies between the competitive and the accommodating strategy and includes tactics such as splitting the difference or exchanging concessions. Moreover, the dual-concern framework includes an additional avoiding strategy that aims at avoiding any conflicts, for example, by postponing issues (Thomas 2008). Since we believe that avoiding conflict is not a reasonable negotiation strategy in a tax audit context and our data does not allow for a clear distinction between the remaining strategies, we restrict our analysis to comparing competitive and cooperative behavior, the latter including collaborative, accommodating and compromising strategies.

4.2.2 Determinants of Negotiation Strategy Choice

Audit Experience

Experience has been studied widely in the financial auditing literature as a key auditor characteristic that is assumed to affect the judgment performance of auditors (Libby and Luft 1993). However, the effect of audit experience on the choice of negotiation strategy has so far been hardly investigated. General negotiation research focuses on the effect of experience in integrative negotiations. Researchers show that logrolling skills improve with increased experience and negotiators become more integrative because experience improves the assessment of the other parties' interests (Loewenstein and Thompson 2006). Moreover, experience leads to improved negotiation outcomes, more-demanding positions and fewer concessions (Thompson 1990).

In contrast to the focus on integrative negotiations in general negotiation research, tax audit negotiations are mainly distributive. Most prior auditing research indicates that audit experience affects negotiation outcome also in distributive settings (Brown and Johnstone 2009; Trotman et al. 2009; Fu et al. 2011).[5] Overall, these studies indicate that higher auditor experience results in fewer concessions to the client because less-experienced subjects are more vulnerable with respect to client pressure or a contentious negotiation style. However, the studies leave open the question of how experience affects the concrete choice of the auditors' negotiation strategy.

The only study we are aware of that addresses this question is by McCracken et al. (2008). The authors compare the intended use of two integrative (Expanding the Agenda and Problem Solving) and three distributive (Contending, Compromising, and Conceding) negotiation strategies between partners and managers of an international public accounting firm. Subjects had to indicate the likelihood of employing different negotiation tactics that characterize the five negotiation strategies. The authors find that partners are more likely to intend to use the contending strategy and managers are more likely to intend to use the compromising, concessionary and integrative strategies. This finding indicates that increasing experience increases the probability of using competitive negotiation tactics. However, audit partners and managers differ not only in their level of experience but also in status power and their exposure to economic risk; consequently, it is hard to disentangle the separate effect of experience (McCracken et al. 2008). By contrast, an increasing level of tax audit experience leads to neither difference in status power nor exposure to economic risk; therefore, we are able to clearly identify the effect of tax audit experience on the choice of the negotiation strategy. In accord with the above presented results, we state our first hypothesis as follows:

[5] In contrast, Hatfield et al. (2010) find no evidence for an effect of auditor experience (measured as rank or years of experience) on the outcome of a negotiation. Similarly, Bergner et al. (2016) report that experience did not affect auditors' planned likelihood of waiving material audit adjustments.

H1: *Audit experience increases the probability of using competitive tactics either alone (a competitive strategy) or in combination with cooperative tactics (a mixed strategy).*

Time Pressure

Next, we hypothesize on the effect of time pressure on tax auditors' use of negotiation strategy. General negotiation research has shown that high time pressure increases the probability of concession making and compromising, thereby making agreements more likely (Stuhlmacher et al. 1998; Druckman 1994). The rationale for these findings is that time pressure increases the importance and salience of reaching an agreement (Bennett et al. 2015).

In the context of auditor-client negotiations, the effect of time pressure is examined only by Bennett et al. (2015). The authors show that, under increased time pressure, auditors decrease their planned use of competitive negotiation tactics more than clients. Moreover, auditors (clients) make more (do not change) concessions under high time pressure. The authors explain the change in auditor behavior with the increased time that is needed to successfully employ a competitive negotiation strategy, i.e., to demonstrate to the client that one is standing firm.

In contrast to the general negotiation context and the study of Bennett et al. (2015), there is usually no deadline or other time constraint that induces time pressure on both negotiation parties during tax audits. However, the used performance evaluation criteria for tax auditors may increase pressure to agree at the end of the year. Tax auditors are usually required to conduct a certain number of tax audits in a given year. At the end of the year, tax auditors have to report to the head of the audit department on the number of completed audit cases. We argue that this end-of-the-year report increases the importance and awareness of the tax auditors of their own case completion rate. Thus, we expect a perceived increase in time pressure on tax auditors at the end of a year but no comparable effect on taxpayers. In accord with prior findings in the general negotiation research and the study of Bennett et al. (2015), we hypothesize as follows:

H2: *Increasing the time pressure on tax auditors increases the probability of using cooperative tactics either alone (a cooperative strategy) or in combination with competitive tactics (a mixed strategy).*

Availability of Higher Authority

Another important characteristic of negotiations is that the negotiation partners may appeal to a higher authority (Kipnis et al. 1980; Malhotra and Bazerman 2008). In an auditing context, tax auditors may refer to the opinion of a technical expert to enhance their negotiation power. In particular, auditors may decide to request the opinion of a specialized auditor regarding foreign relations, firm reorganization, valuations of firms and buildings, or actuarial mathematics. By referring to the expert's opinion, tax auditors

increase their perceived negotiation power. According to general negotiation research, the increase in power should lead to an increase in the use of competitive negotiation tactics, such as the communication of threats (de Dreu 1995). In accord with this reasoning, Perreault and Kida (2011) find that clients make similar concessions if the auditor provides the opinion of a technical expert instead of threatening to qualify the audit opinion. Thus, we formulate our next hypothesis as follows:

H3: *The availability of an expert opinion increases the probability of using competitive tactics either alone (a competitive strategy) or in combination with cooperative tactics (a mixed strategy).*

Professional Accounting

Relying on the social exchange theory, trust in the other negotiating party has been identified as one important determinant of negotiation strategy choice (Kong et al. 2014). General negotiation research shows that trust increases (decreases) the use of a cooperative (competitive) negotiation strategy (Kimmel et al. 1980; Gunia et al. 2011). In particular, the perceived integrity of the opponent is strongly related to distributive behavior (Kong et al. 2014).

We expect that the quality of financial statements determines the trustworthiness of the taxpayers' accounting system. Higher trustworthiness of the taxpayers' documents accompanied with probably a higher accounting professionalism should, in turn, increase the trust in the taxpayer and, thus, the probability of tax auditors' using cooperative negotiation tactics. However, a more professional accounting system might also be related to higher tax planning ability, which would decrease the probability of tax auditors' using cooperative negation tactics. Assuming that the trust-increasing effect dominates, our next hypothesis is as follows:

H4: *As accounting quality increases, the probability of using cooperative tactics either alone (a cooperative strategy) or in combination with competitive tactics (a mixed strategy) increases.*

The Perceived Tax Advisors' Negotiation Strategy

The last factor that we assume to significantly affect the auditors' strategy choice is the perceived strategy of the negotiation opponent, i.e., the tax advisor. General negotiation research suggests that the perceived negotiation strategy of the opponent significantly affects the auditors' choice of negotiation strategy (e.g., Stuhlmacher et al. 1998). There are mainly two theories that predict responses to the opponents' negotiation strategy. First, the reciprocation theory (Osgood 1962) predicts that negotiation partners will reciprocate the opponent's strategy. Reciprocity is seen "as one of the universal 'principal components' of moral codes"; this view implies that repaying for benefits received is a moral duty (Gouldner 1960). The reciprocity theory suggests that auditors behave more cooperatively

(competitively) if they perceive that the tax advisor is adopting a cooperative (competitive) negotiation strategy.

In an auditing context, evidence has been found in support of the reciprocity theory. Ng and Tan (2003) provide experimental evidence that a cooperative tactic by the client increases auditors' planned propensity to make concessions to the client. Gibbins et al. (2010) report that when auditors perceived clients to be competitive (inflexible), the partner was more likely to use contending tactics and less likely to use conceding and compromising tactics. Hatfield et al. (2010) find that auditors propose smaller adjustments when the client conceded on a prior audit issue. In addition, Brown-Liburd and Wright (2011) find that auditors plan to negotiate more competitively if the past client-relationship is described as contentious and the audit committee is perceived as strong. Furthermore, (Sanchez et al. 2007) find that the use of a cooperative negotiation strategy increases the cooperation of the client.

However, there is also opposing evidence that accords with the second theoretical explanation, the level-of-aspiration theory (Siegel and Fouraker 1960). According to the level-of-aspiration theory, negotiators enter a negotiation with a certain level of aspiration. An initial cooperative behavior by the opponent should increase the negotiator's level of aspiration and, thus, cause him or her to respond more competitively (Lawler and MacMurray 1980). Thus, the theory predicts that auditors behave more cooperatively (competitively) if they perceive that the tax advisor is adopting a competitive (cooperative) negotiation strategy. In an audit context, there is also support for the level-of-aspiration theory. Hatfield et al. (2008) show that auditors are more likely to use a cooperative strategy when the client's negotiating style is described as competitive and client retention risk is high. Similarly, Fu et al. (2011) find that a competitive client's negotiation strategy increases planned concessions by inexperienced auditors. Accordingly, Bergner et al. (2016) find that auditors respond more cooperatively (plan to concede more) if the client uses a competitive negotiation tactic. In sum, theory provides two opposing hypotheses. Based on the reciprocation theory, our next hypothesis is as follows:

H5a: *A perceived use of a competitive (cooperative) negotiation strategy by the tax advisor increases the probability that the auditor will use a competitive (cooperative) negotiation strategy.*

By contrast, from the level-of-aspiration theory, the following hypothesis is derived:

H5b: *A perceived use of a competitive (cooperative) negotiation strategy by the tax advisor increases the probability that the auditor will use a cooperative (competitive) negotiation strategy.*

4.2.3 Effectiveness of Tax Auditors' Negotiation Strategies

We continue hypothesizing on the effectiveness of auditors' negotiation strategies and distinguish two kinds of negotiation outcomes: (i) additional taxes that are assessed during

the tax audit and (ii) whether the two parties have agreed on the additional tax burden.

Prior financial auditing research also examines the effect of different negotiation strategies and tactics on audit adjustments. However, we are unaware of any study that directly compares the effect of cooperative and competitive auditor strategies on audit adjustments. Hatfield et al. (2008) find that a reciprocity-based strategy of waiving inconsequential items increased the auditors' envisaged amount of adjustments, their minimum required adjustment, and their counteroffers to the client. Similarly, Sanchez et al. (2007) find that clients' willingness to post income-increasing adjustments rises if auditors disclose inconsequential audit differences and subsequently waive these adjustments. Perreault and Kida (2011) report that threatening to qualify the audit opinion or simply informing the client that other companies have handled the accounting issue in a way consistent with the auditor's preference both result in significant client concessions of approximately the same level. Perreault et al. (2017) observe that a simultaneous strategy leads to a significantly greater number of total concessions than a sequential strategy.

Overall, financial auditing research provides convincing evidence that negotiation strategies significantly affect audit adjustments. However, previous results do not allow for a clear prediction about the relative advantage of competitive over cooperative negotiation strategies or vice versa. Therefore, we base our hypotheses development on the results of general negotiation research concerning distributive negotiations.

General negotiation research shows that in distributive negotiations, competitive negotiation strategies result mostly in higher economic outcomes than cooperative strategies (Allen et al. 1990). Furthermore, (Jeong et al. 2019) report that negotiators with a tough and firm communication style achieved better economic outcomes than negotiators with a warm and friendly communication style. Additionally, in a meta-analysis of 34 negotiation studies, Hüffmeier et al. (2014) confirm that competitive strategies lead to higher individual payoffs, but the authors also show that cooperative strategies lead to higher socioemotional outcomes, e.g., regarding the perception of the relationship between the negotiating parties.

Moreover, Hüffmeier et al. (2014) find that the effectiveness of competitive strategies increases when visual contact is possible among negotiators. Our inclusion of only face-to-face negotiations should increase the positive effect of competitive tactics. In addition, prior research shows that the effectiveness of competitive tactics, such as the use of threats, depends on the credibility of threats and threat capacity (Pruitt 1981, pp. 71, 85). Tax auditors can choose from a variety of different threat instruments, and the use by tax auditors of these instruments is credible because the auditors do not fear negative economic consequences that are comparable, for example, to the financial accounting auditors' risk of client loss. Thus, the high threat capacity of tax auditors should increase the effectiveness of competitive strategies. Moreover, research finds that negotiators with more power use more competitive tactics, such as threats, and obtain larger shares of the total payoffs

(Brett and Thompson 2016). Although the tax auditor and the taxpayer are interested in reaching an agreement, the costs of an impasse are higher for the taxpayer. The taxpayer has an immediate negative cash flow effect due to the additional taxes and the costs of an appeal. Thus, the tax auditor is, in general, the party with the greater negotiation power; having such power should again increase the effectiveness of competitive tactics.

In sum, we expect that a competitive strategy can be highly effective in a tax audit setting. This expectation leads to the following hypothesis:

H6: *Compared to using a neutral or cooperative strategy, using a competitive negotiation strategy results in higher additional taxes.*

However, negotiation research also provides evidence that a combination of cooperative and competitive tactics might be the most effective strategy (Lawler and MacMurray 1980). Lawler and MacMurray (1980) argue that using competitive tactics "in the early phases of bargaining or until an impasse is created will generate respect and avoid exploitation. Beyond the initial phases of bargaining, however, a reciprocal (i.e., matching) concession stance will extract the largest concessions from the opponent." This finding leads to the following hypothesis:

H7: *Compared to using a neutral, competitive or cooperative strategy, using a mixed negotiation strategy results in higher additional taxes.*

During a negotiation, tax auditors and taxpayers have to trade off the amount of additional taxes and the probability of an impasse leading to a tax dispute at the Appeals' Department or the tax court; consequently, there is uncertainty and additional effort for both parties. Since cooperative (competitive) tactics create mutual trust and evoke, in general, higher (lower) socioemotional outcomes (Hüffmeier et al. 2014), we present the following hypothesis:

H8: *The use of cooperative tactics either alone (a cooperative strategy) or in combination with competitive tactics (a mixed strategy) increases the probability of an agreement.*

4.3 Sample Selection, Estimation Method, Variable Measurement, and Descriptive Statistics

4.3.1 Sample Selection

We used an advanced tax law training course for tax auditors to conduct our survey.[6] The course was obligatory for all tax auditors working in Berlin, which is the capital of and largest city in Germany. One of the authors taught this course and distributed the questionnaires to participants. Participation in the survey was voluntary. In sum, 646 tax auditors attended the course; of these, 610 participated in our survey. Thus, we achieved

[6] The course took place between October 2010 and February 2011. Appendix A in Section 4.6 displays the questionnaire.

a high response rate of 94%. Our questionnaire consisted of two parts. In the first part, auditors described their last two cases in detail.[7] In the second part, the auditors answered several sociodemographic questions. On average, the participants needed approximately thirty minutes to complete the questionnaire.

Altogether, we received information from approximately 1,244 unique audit cases; i.e., the data set is free of duplicate entries.[8] From these cases, we eliminated cases with nonbusiness income, with missing data in all negotiation variables, without information about taxes, with a negative tax burden assessed in the audit, and without a final audit meeting. Moreover, due to outliers with respect to additional taxes, we truncated our data set to 98% in each size category. The final sample includes 572 cases (Table 4.1). In Section 4.7 (Appendix B) we compare the additional tax burden of all audits completed in Berlin (official statistics of the Revenue Agency) to our sample by size category. We find that the mean of additional taxes in each size class is quite similar. This similarity indicates that our sample is a good approximation of all tax audits completed. However, our sample does not necessarily represent the total population of firms (audited and unaudited). Thus, our interpretation of a negotiation strategy depends on a firm being audited.

Table 4.1: Sample Selection

Sample selection step	Remaining number of cases
Original sample	1244
Less "nonbusiness cases" (e.g., nonprofit, charitable trust, agriculture and nonbusiness income)	1059
Less cases with missing data in all negotiation variables	931
Less cases without information on taxes or additional taxes less than 0	895
Less cases without audit meeting (meetings in which the examination report is negotiated face-to-face)	587
Less outliers (98% truncation)	572

Note. The table reports the sample selection process.

[7] Before developing the questionnaire, we conducted several presurvey interviews to collect information about firm characteristics that auditors are usually aware of after having completed a case. We found that auditors generally remember central key characteristics of a case, e.g., the audit result (additional tax burden), the firm's size (profit and sales), the audited tax years, and the firm's industry. The questionnaire was pretested by two auditors who did not participate in the final survey and one head of a local tax audit department to ensure that all questions are understandable and that the questionnaire was feasible.

[8] Some auditors voluntarily reported information about further cases in an additional questionnaire that was provided on request by the author who taught the training course. Thus, we received slightly more than the expected 1,220 (= 610·2) cases.

4.3.2 Variable Measurement and Descriptive Statistics

Dependent Variables

As dependent variables, we use the tax auditors' negotiation strategies *AUD.COMP*, *AUD.COOP, AUD.MIX,* and *AUD.NEUTRAL* (hypotheses H1 – H5b); the logarithm of the additional taxes assessed in the tax audit *ADDTAXES* (hypotheses H6 and H7); and a binary variable *AGREED,* which equals one if an agreement was reached during the tax audit (hypothesis H8). As displayed in Table 4.2, the median (mean) additional taxes is € 25,000 (€ 340,840),[9] and in approximately 82% of the cases, the negotiating parties reached an agreement.

To measure tax auditors' negotiation strategies, we asked whether auditors had used specific persuasion tactics. In accord with psychology research (e.g., Pruitt 1981; Carnevale and Isen 1986) we consider the following tactics to be competitive: (1) imposing short deadlines, (2) threatening to impose a *fine for delay,* (3) threatening coercive measures (coercive fines, substitutive execution, direct enforcement), and (4) threatening to discontinue negotiations without an agreement. By contrast, the following tactics represent cooperative negotiation behavior: (1) waiving small adjustments in favor of one large adjustment, (2) waiving adjustments because the firm's "pain threshold" was reached, (3) waiving uncertain adjustments to avoid the risk of litigation, and (4) waiving adjustments because "the other side convinced me".

Table 4.3 displays the negotiation tactics used by the auditors. In 44% of all audit cases, the tax auditor imposed time pressure on the taxpayer. The second most-used tactic (used in 24% of all cases) consists of concession making - that is, the auditor waived an immaterial adjustment to agree on one large adjustment. Moreover, in approximately 15% of all cases, auditors threatened taxpayers with abruptly ending negotiations, and in another 15%, auditors waived uncertain adjustments to avoid the risk of litigation. In reference to cooperative and competitive tactics, we distinguish four types of negotiation strategies (see Section 4.2.1):

- *Competitive strategy*, measured by a binary variable *AUD.COMP*; this variable equals one if the auditor uses at least one competitive tactic and no cooperative tactics.

- *Cooperative strategy*, measured by a binary variable *AUD.COOP*; this variable equals one if the auditor uses at least one cooperative tactic and no competitive tactics.

[9] Due to the right-skewed distribution of the additional taxes, we use the logarithm of additional taxes as a dependent variable. In cases where the tax auditor adjusted the amount of the loss carryforward, we calculate the additional taxes by multiplying the adjustment with the respective tax rate. The tax rate for corporations includes corporate income tax, local trade tax, and solidarity surcharge. We use a uniform tax rate of 35% for partnerships; this rate mirrors tax auditors' practice. In the case of sole proprietorships, the individual marginal income tax rate applies; a proxy for that rate was obtained from the German income tax statistics with respect to income category and industry classification.

Table 4.2: Descriptive Statistics

Panel A: Variables	Mean	SD	Median
ADDTAXES (€)	340,84	1,974,404	25
ADDTAXES	10.370	1.758	10.127
AGREED	0.818	0.386	1
INDEPENDENT VARIABLES			
AUD.COMP	0.315	0.465	0
AUD.COOP	0.147	0.354	0
AUD.MIX	0.252	0.434	0
AUD.NEUTRAL	0.287	0.453	0
EXPERIENCE	12.797	6.143	12.5
PRESSURE	0.140	0.347	0
SPECIALIZED_AUD	0.135	0.342	0
PROF_ACC	0.143	0.351	0
ADV.COMP	0.252	0.434	0
ADV.COOP	0.247	0.431	0
ADV.MIX	0.287	0.453	0
ADV.NEUTRAL	0.215	0.411	0
DETECTION ABILITY			
SALARY	5.846	1.450	6
TRAINING	2.558	1.238	2
SCHOOL	0.794	0.405	1
MOTIVATION	0.551	0.498	1
HEAD	0.262	0.440	0
KNOWN_FIRM	0.184	0.387	0
INEFFICIENT	0.224	0.417	0

Panel B: Variables	Mean	SD	Median
TAX PLANNING INCENTIVES & OPPORTUNITIES			
FAMILY	0.741	0.438	1
SIZE1	0.103	0.304	0
SIZE2	0.240	0.427	0
SIZE3	0.353	0.478	0
SIZE4	0.133	0.340	0
SIZE5	0.084	0.278	0
SIZE6	0.087	0.283	0
LOSS	0.126	0.332	0
FOREIGN	0.077	0.267	0
CORP_GROUP	0.439	0.497	0
EVASION	0.105	0.307	0
IND.SERVICE	0.463	0.499	0
IND.TRADE	0.201	0.401	0
IND.CONSTRUCTION	0.184	0.387	0
INSTRUMENTS			
DISTRUST	0.000	0.795	0.099
NUM_AUDIT_FOCI	2.750	1.312	3
DISTRICT1	0.117	0.322	0
DISTRICT2	0.140	0.347	0

Note. The table reports the descriptive statistics of the sample. ADDTAXES is the logarithmic additional taxes assessed in the audit. AGREED is a dummy variable that equals one if an agreement was reached during the audit. AUD.COMP (AUD.COOP) equals one if the auditor used only competitive (cooperative) tactics, zero otherwise. AUD.MIX equals one if the auditor used cooperative and competitive tactics, zero otherwise. AUD.NEUTRAL equals one if the auditor used neither cooperative nor competitive tactics, zero otherwise. EXPERIENCE equals the number of years as an auditor. PRESSURE equals one if the audit was completed in the last quarter of the year and the auditor perceives strong pressure to meet set targets, zero otherwise. SPECIALIZED_AUD equals one if the assistance of a specialized auditor was necessary during the audit, zero otherwise. PROF_ACC equals one if the firm is required to publish a profit and loss account and the financial statement are audited by a certified public accountant. ADV.COMP (ADV.COOP) equals one if the factor score of the competitive (cooperative) component is $\geq$ the sample median and the factor score of the cooperative (competitive) component is $<$ the sample median, zero otherwise. ADV.MIX equals one if each factor is $\geq$ the sample median, zero otherwise. ADV.NEUTRAL equals one if each factor score is $<$ the sample median, zero otherwise. SALARY equals the number of the pay bracket. TRAINING equals the number of advanced training courses per year. SCHOOL equals one if the auditor has a university degree, zero otherwise. MOTIVATION equals one if the tax auditor does not consider the audit objective to be achieved by reaching the de minimis threshold, zero otherwise. HEAD equals one if the head of the audit department participated in the final audit meeting, zero otherwise. KNOWN_FIRM equals one if the auditor has audited the firm at least once before, zero otherwise. INEFFICIENT equals one if the auditor has made assessments in less than 50% of the audit foci defined at the beginning of the audit, zero otherwise. FAMILY equals one if at least 50% the firm is held by one family, zero otherwise. SIZE1 to SIZE6 are indicator variables for the six size categories of the German Tax Audit Regulations in ascending order. LOSS equals one if the firm has suffered financial losses in the audit period, zero otherwise. FOREIGN equals one if the key audit areas include the term "foreign", the firm is a member of a foreign group, or the involved tax auditor is specialized in foreign relations, zero otherwise. CORP_GROUP equals one if the company is a member of a corporate group, zero otherwise. EVASION equals one if the firm is suspected of tax evasion, zero otherwise. Of the industry variables SERVICE, TRADE and CONSTRUCTION, a variable equals one if the firm belongs to the industry that corresponds to the variable name, zero otherwise. DISTRUST measures the auditor's attitude toward the taxpayer. NUM_AUDIT_FOCI equals the number of audit foci defined at the beginning of the audit. Of the variables DISTRICT1 and DISTRICT2, the variable equals one if the auditor works at the office in the district represented by the variable, zero otherwise.

Table 4.3: Negotiation Tactics

Competitive	Percentage (N)
Imposing time pressure	44,41% (254)
Threatening to discontinue negotiations without an agreement	14.69% (84)
Imposing sanctions/threatening with sanctions	5.07% (29)
Cooperative	
I waived small adjustments in favor of one large adjustment	24.13% (138)
I waived adjustments because the firm's "pain threshold" was reached	5.77% (33)
I waived uncertain adjustments to avoid the risk of litigation	15.03% (86)
I waived adjustments because the other side convinced me	5.07% (29)

Note. The table reports the distribution of competitive and cooperative negotiation tactics.

- *Mixed strategy*, measured by a binary variable *AUD.MIX*; this variable equals one if the auditor uses at least one cooperative tactic and at least one competitive tactic.
- *Neutral strategy*, measured by a binary variable *AUD.NEUTRAL*; this variable equals one if the auditor neither uses cooperative nor competitive tactics.

As displayed in Table 4.2, in approximately one-third of all audit cases, tax auditors used a competitive negotiation strategy. In contrast, in only 15% of all cases did tax auditors prefer a purely cooperative strategy. A mixed (neutral) strategy was used in 25% (29%) of all cases.

Independent Variables

To test hypothesis H1, we measure audit experience (*EXPERIENCE*) by the number of years the participant has worked as a tax auditor. The average years of experience in the sample amounts to 12.8 years (Table 4.2).[10] Time Pressure (hypothesis H2), is measured by the dummy variable *PRESSURE,* which equals one if the audit was completed in the last quarter of the year and the auditor perceives strong pressure to meet set targets. Strong pressure is measured by the question of whether the auditor agrees or disagrees with the following statement: "There is a statistical pressure, but it does not affect me since I regularly achieve my target." We assume that the auditor perceives strong pressure to meet set targets if the answer to this question is below the median value (3 on a five-point scale with 1 = disagree and 5 = agree). According to Table 4.2, auditors perceive time pressure in 14% of all cases.

To measure the availability of higher authority (hypothesis 3), we include a binary variable *SPECIALIZED_AUD*, whose value is one if an expert opinion of a specialized auditor is available (such an opinion was available in 13.5% of all cases, Table 4.2). The variable *PROF_ACC* measures whether the taxpayer has a professional accounting system

[10] Audit experience was measured as a categorical variable. In our analyses, we use the middle of each experience category.

(hypothesis H4). *PROF_ACC* is a binary variable whose value is one if the firm is required to publish the balance sheet and a profit and loss account and the firm has a legal obligation to have the financial statement audited by a certified public accountant (14.3% of all cases, Table 4.2).

Regarding hypotheses H5a and H5b, we measure the perceived negotiation strategy of the tax advisor as follows: Our questionnaire contained items that characterized competitive or cooperative negotiation tactics and could be answered "yes" or "no" or left unanswered. To determine the perceived tax advisors' negotiation strategies, we use a binary full-information factor analysis (Reckase 2009).[11] We observe factor loadings that are at least .5 for one factor and not higher than .25 for the other. The items load as expected on a competitive and a cooperative factor. Based on these factor loadings, we use an oblimin rotation to obtain the factor scores. To distinguish between perceived high and low competitiveness and between perceived high and low cooperativeness, we use median splits for both factor scores. Corresponding to the differentiation of the four auditor negotiation strategies, we distinguish four perceived advisor strategies: (1) *ADV.COMP,* which equals one if the competitive factor score is above the sample median value and the cooperative factor is below the sample median value; (2) *ADV.COOP,* which equals one if the cooperative factor score is above the sample median value and the competitive factor is below the sample median value; (3) *ADV.MIX,* which equals one if factor scores for both factors are above the sample median value; and (4) *ADV.NEUTRAL,* which equals one if the factor scores for both factors are below the sample median.

Control Variables

To control for firms' tax planning incentives and opportunities, our first set of control variables consists of firm characteristics that explain the extent of firms' tax planning activity. In accord with prior research (Hanlon and Heitzman 2010), we control for the following firm characteristics: the binary variables *FAMILY,* (which equals one if a family holds more than 50% of the shares of the firm), *SIZE* (which indicates the six size categories of the German Tax Audit Regulations in ascending order from *SIZE1* to *SIZE6*)[12], *LOSS* (which equals one if the firm suffered losses during the audit period), *FOREIGN* (which equals one if the key audit areas include the term "foreign", the firm is a member of a foreign group, or the involved tax auditor is specialized in foreign relations), *CORP_GROUP* (a value of one indicates a member of a corporate group), and *EVASION*

[11] We use factor analysis for advisor strategies for two reasons: First, the items used to determine tax advisors' strategies are in contrast to those used to determine auditors' strategies, not mutually exclusive; therefore, the computation of common factors is feasible. Second, we are not interested in the distribution of tax advisor strategies. Thus, we can simply use a median split of factor scores to divide advisors into the four negotiation styles.

[12] The tax administration measures size categories by using industry-specific taxable income, sales and assets thresholds. For example, trading firms (banks) are classified into the largest size category (*SIZE6*) if sales (assets) exceed 39 million € (one billion €).

(which equals one if the firm is suspected of tax evasion).[13] Finally, we add the following industry indicator variables: *IND.SERVICE* (which indicates the services sector, i.e., financial, nonfinancial and freelance services), *IND.CONSTRUCTION* (which indicates the construction sector), and *IND.TRADE* (which indicates the trade sector).

The sample is dominated by small and medium-sized family firms (Table 4.2). Approximately 70% are small and medium-sized enterprises (*SIZE1* to *SIZE3*), 74.1% are family firms, 43.9% are corporate group members, and approximately 8% have foreign activities. Additionally, 10.5% of firms are suspected of tax evasion, and 12.6% have losses. More than 46% are active in the service sector, and 39% are active in the trade or construction industries.

Tax auditors differ in their detection ability (Feinstein 1991). We control for the auditors' expertise by their pay bracket (*SALARY*), whether they have a university degree (*SCHOOL*), and the number of training courses they have attended on average per year (*TRAINING*). To consider the auditors' degree of motivation, we include the binary variable *MOTIVATION*. To capture auditors' degree of motivation, we asked the auditors to indicate on a five-point scale whether they agreed or disagreed with the following statement: "Due to the statistical pressure, I consider the audit objective to be achieved by reaching the de minimis threshold." For *MOTIVATION*, a value of 1 indicates that the auditor fully disagrees.[14] We control for audits in which a head of the local audit department participated in the final audit meeting (*HEAD*) and for cases where the auditor has audited the firm at least once before (*KNOWN_FIRM*). Finally, we consider the auditors' efficiency. *INEFFICIENT* indicates an auditor who has made assessments in less than half of the audit foci defined at the beginning of the audit.[15]

Table 4.2 shows that approximately 80% of auditors have a university degree, and the average auditor takes 2.6 advanced training courses a year. Additionally, 55.1% of the auditors are motivated, 18.4% have audited the firm at least once before, and 22.4% of auditors are inefficient with respect to their choice of audit foci. Moreover, in 26.2% of all cases, the head of the audit department participated in the final audit meeting.

4.3.3 Estimation Strategy

To test the hypotheses regarding the determinants of tax auditors' negotiation strategy choice (H1 – H5), we use a multinomial logit specification with *AUD.COMP*, *AUD.COOP*, and *AUD.MIX* as dependent variables. *AUD.NEUTRAL* serves as reference category.

[13] In untabulated analyses, we exclude firms that are suspected of tax evasion. The results remain qualitatively unchanged.

[14] About 50% of auditors fully either agreed or disagreed with the statement related to *MOTIVATION*. Because of these heavy-tailed distributions, we include indicator variables instead of using continuous scales.

[15] We tested for collinearity problems by using variance inflation factors (VIFs) and could not detect any problems. All VIFs were below 3.6, which is far below the threshold of 10 suggested by Hair et al. (2013).

To examine the effect of auditors' negotiation strategies on additional taxes that are assessed in the tax audit (on the probability of an agreement), we use a linear (binary logistic) regression (H6 – H8). To account for the fact that the choice of tax auditors' negotiation strategy is nonrandom, we additionally conduct the endogenous multinomial treatment effect model (MTEM) developed by Deb and Trivedi (2006a,b).[16] In addition to addressing the potential endogeneity of strategy choice, using this model offers one further advantage. It is reasonable to assume that the choice of negotiation strategy and the negotiation outcome are determined by common unobserved variables, such as personality traits and the cognitive ability of the auditors (e.g., Sharma et al. 2013). This issue is addressed by the endogenous multinomial treatment effect model because the model jointly estimates the parameters determining the choice of negotiation strategy (treatment equation) and those determining the negotiation outcome (outcome equation) and links both equations by common latent factors that incorporate unobserved characteristics common to the auditor's strategy choice and outcome.

The choice of negotiation strategy is specified as a mixture multinomial logit model in the treatment equation. The probability function for the strategy choice is modeled as follows:

$$\Pr\left(AUD.STRAT_i|x_i, v_i, z_i, l_i\right) = \frac{exp\left(\boldsymbol{\beta x_i} + \boldsymbol{\delta v_i} + \boldsymbol{\varepsilon z_i} + l_{ij}\right)}{1 + \sum_{k=1}^{J} \exp\left(\boldsymbol{\beta x_i} + \boldsymbol{\delta v_i} + \boldsymbol{\varepsilon z_i} + l_{ik}\right)}, \tag{1}$$

where each auditor i chooses a strategy j from a set of four strategies ($j = 0, 1, 2, 3$; $J = 3$), where $j = 0$ is the control group ($AUD.NEUTRAL$). $AUD.STRAT_i$ are binary selection variables representing the observed strategy choice of an auditor with $AUD.STRAT_i = (AUD.COMP,\ AUD.COOP,\ AUD.MIX)$ and $l_i = (l_1, l_2, l_3)$, where l_{ij} are latent factors that incorporate unobserved characteristics common to auditor i's strategy choice and outcome. x_i includes the variables: auditors' experience, auditors' time pressure, the availability of higher authority, the quality of taxpayers' accounting and the perceived tax advisors' negotiation strategy. v_i includes control variables for auditors' detection ability and taxpayers' tax planning incentives and opportunities (see Section 4.3.2). The expected negotiation outcome y_i is determined as follows:

$$E\left(y_i|AUD.STRAT_i, x_i, v_i, l_i\right) = \boldsymbol{\beta x_i} + \boldsymbol{\delta v_i} + \sum_{j=1}^{J} \gamma_i AUD.STRAT_{ij} + \sum_{j=1}^{J} \lambda_j l_{ij}. \tag{2}$$

The distribution of y_i is assumed to follow a normal (logistic) distribution where $y_i = ADDTAXES$ ($y_i = AGREED$). We use robust standard errors to correct for heteroscedasticity. The model is estimated using maximum likelihood estimation. Following Deb and Trivedi (2006a), we use 2,000 Halton sequence-based quasirandom draws per observation, thereby

[16] This model has been previously used in accounting Klassen et al. (2016), health economics Deb and Trivedi (2006a), marketing Park et al. (2018), and organization science Wang and Chen (2020)

leading to sufficient stability of the gradients of the likelihood function.

z_i in equation (1) denotes a set of instruments. The parameters of the outcome equation are identified through the nonlinear functional form even if all regressors of equation (1) are included in the outcome equation. In most cases, however, nonlinearity is a poor identification strategy. Hence, we include instruments in the treatment equation to ensure a robust identification of the model. All used instruments are insignificant if included in equation (2). We use the auditors' attitude toward taxpayers and regional variation as instruments: First, *DISTRUST* measures the auditors' attitude toward taxpayers. We asked tax auditors to indicate on a five-point scale whether they agreed or disagreed with two statements: (1) "Taxpayers seek to minimize their tax burden by all permitted means" and (2) "Nearly every taxpayer would cheat on their tax declaration if there was no control by the tax authority". We aggregate both questions by using factor analysis. Higher factor scores indicate a more distrustful attitude toward the taxpayer. According to negotiation research (Gunia et al. 2011; Kong et al. 2014), distrust is positively (negatively) related to the use of competitive (cooperative) tactics, but we can assume that there is no direct effect on negotiation outcome. Second, *NUM_AUDIT_FOCI* is the number of audit foci defined at the beginning of an audit. Before an audit, auditors have limited information about their opponents. The number of audit foci mirrors the auditors' perceived uncertainty. Auditors can view competitive negotiation tactics as a tool for dealing with this uncertainty (Magee et al. 2007). Thus, we expect an effect on the strategy choice but no direct effect on the outcome. Third, *DISTRICT1* and *DISTRICT2* control for the district where the auditor works.[17] The district populations in Berlin, where we conduct our survey, differ in terms of cultural diversity and educational status. Prior research shows that culture affects the choice of negotiation strategies (for an overview see Adair and Brett (2004)). Again, we assume no direct effect on negotiation outcome given our controls for detection ability and taxpayer characteristics.

4.4 Results

4.4.1 Determinants of Negotiation Strategy Choice

The first three columns of Table 4.4 display the results of the multinomial logistic regression (hypotheses H1 - H5). First, we observe that audit experience positively affects the likelihood of using a competitive and a mixed strategy relative to a neutral strategy. To determine the effect of audit experience in the probability scale, we compute average marginal effects from the multinomial logistic regression, which are presented in Table 4.5.

[17] According to the Office for Statistics in Berlin-Brandenburg, about 26% (38%) of the citizens of district 1 (2) had a migration background in 2010, and the proportion of persons without a vocational/university degree is approximately 24% (29%). The number of auditors who work in one of the two districts represents about 50% of auditors for noncorporate firms. The audit of corporations is centralized and covers several districts.

Having ten more years of audit experience results in an average increase in the probability of using a competitive (mixed) strategy by 4.06 (6.63) percentage points. However, the increase in the probability of using a purely competitive strategy is insignificant. The probability of using a cooperative strategy is almost unaffected by the auditor's experience. In an untabulated binary logistic analysis, we examine whether audit experience affects the usage of competitive tactics. We find that the probability of using at least one competitive tactic increases significantly with increasing audit experience ($p = 0.017$). Thus, although audit experience does not increase the probability of using a purely competitive strategy, it increases the probability of using competitive tactics in combination with cooperative tactics (mixed strategy). In sum, our results are in line with our first hypothesis. Moreover, additional tests reveal that audit experience, not general job experience at the revenue agency, particularly matters. In untabulated results, we find that the number of years as an employee in the financial administration does not affect the negotiation strategy choice.

Second, we observe that time pressure positively affects the likelihood of using a cooperative or a mixed strategy relative to using a neutral strategy or using a competitive strategy (Wald tests p-values: $AUD.COOP$ vs. $AUD.COMP = 0.089$; $AUD.MIX$ vs. $AUD.COMP = 0.032$). The marginal effects of increasing time pressure show an insignificant increase in the probability of using a cooperative strategy (7.27 percentage points) and a significant increase in the probability of using a mixed strategy (11.11 percentage points). In an untabulated binary logistic analysis, we investigate whether time pressure affects the probability of using cooperative tactics. The result show that increasing time pressure leads to an increasing probability of using at least one cooperative tactic ($p = 0.002$). Thus, although time pressure does not increase the probability of using a purely cooperative strategy, it increases the probability of using cooperative tactics together with competitive tactics (mixed strategy). Thus, we confirm hypothesis H2.

Third, we find support for hypothesis 3. Relative to the neutral strategy, the probability of using a competitive strategy increases when an expert opinion is available. The average marginal effect is 14.52; i.e., the probability of using a competitive strategy increases by 14.52 percentage points when a specialized auditor is involved during the audit. This effect is large and significantly exceeds the respective effect on the cooperative strategy. However, the probability of using a mixed strategy is unaffected by the availability of a higher authority.

Fourth, a professional accounting system significantly increases the probability that the auditor will use a cooperative strategy instead of a neutral or a competitive strategy (Wald test p-value: 0.006). The average marginal effect of a professional accounting system shows an increase of 26.71 percentage points in the probability of using a cooperative strategy. However, the probability of using a mixed strategy is unaffected. In sum, we confirm hypothesis H4.

Table 4.4: Multivariate Regression Results

N = 572	Strategy Choice			Outcome			
	Multinomial Logit			OLS	MTEM	Logit	MTEM
	Dependent Variable						
VARIABLES	AUD.COMP (1)	AUD.COOP (2)	AUD.MIX (3)	ADDTAXES (4)	ADDTAXES (5)	AGREED (6)	AGREED (7)
INDEPENDENT VARIABLES							
AUD.COMP				0.314 ***	1.125***	-0.279	-0.992
				(0.119)	(0.162)	(0.347)	-1.157
AUD.COOP				0.0564	0.113	1.952***	2.290**
				(0.176)	(0.399)	(0.713)	-1.024
AUD.MIX				0.219	0.355	1.359***	1.375**
				(0.133)	(0.720)	(0.452)	(0.642)
EXPERIENCE	0.0596**	0.0372	0.0782***	0.00948	0.00599	0.0461	0.0536
	(0.0245)	(0.0290)	(0.0252)	(0.00968)	(0.0106)	(0.0285)	(0.0353)
PRESSURE	0.362	1.103**	1.093**	-0.368***	-0.327**	-0.433	-0.548
	(0.415)	(0.502)	(0.432)	(0.137)	(0.161)	(0.472)	(0.571)
SPECIALISED_AUD	0.947**	0.239	0.460	0.238	0.133	-0.236	-0.159
	(0.445)	(0.508)	(0.472)	(0.194)	(0.198)	(0.445)	(0.481)
PROF_ACC	0.0316	1.726***	-0.140	0.513**	0.545**	0.676	0.666
	(0.524)	(0.527)	(0.653)	(0.229)	(0.258)	(0.630)	(0.704)
ADV.COMP	1.744***	1.587***	2.441***	0.703***	0.562***	-1.942***	-2.006***
	(0.374)	(0.475)	(0.451)	(0.145)	(0.188)	(0.434)	(0.533)
ADV.COOP	0.293	1.107**	1.302***	0.371***	0.378*	1.512**	1.590**
	(0.339)	(0.444)	(0.425)	(0.142)	(0.198)	(0.597)	(0.653)
ADV.MIX	1.259***	1.873***	2.621***	0.553***	0.500*	-0.428	-0.421
	(0.375)	(0.456)	(0.428)	(0.135)	(0.257)	(0.425)	(0.477)
TAX PLANNING INCENTIVES & OPPORTUNITIES							
FAMILY	0.269	0.702*	0.163	-0.0890	-0.112	0.186	0.190
	(0.284)	(0.360)	(0.314)	(0.122)	(0.137)	(0.339)	(0.369)
SIZE2	-0.750	-0.153	0.142	0.391**	0.518***	-0.215	-0.347
	(0.509)	(0.672)	(0.566)	(0.170)	(0.198)	(0.508)	(0.570)
SIZE3	-1.013*	-0.923	-0.0744	0.708***	0.840***	-0.133	-0.255
	(0.521)	(0.703)	(0.566)	(0.170)	(0.196)	(0.534)	(0.597)
SIZE4	-1.492**	-0.540	-1.063	1.550***	1.737***	0.317	0.192
	(0.610)	(0.782)	(0.674)	(0.221)	(0.233)	(0.647)	(0.708)
SIZE5	-0.996	-1.440	-1.046	1.730***	1.839***	-1.209*	-1.361
	(0.728)	(0.967)	(0.859)	(0.297)	(0.325)	(0.705)	(0.836)
SIZE6	-1.228	-1.344	-0.357	2.699***	2.868***	-1.354*	-1.589
	(0.804)	-1.054	(0.903)	(0.351)	(0.366)	(0.813)	(0.988)
LOSS	-0.491	-0.986*	-0.886**	0.349**	0.363**	-0.534	-0.581
	(0.360)	(0.509)	(0.403)	(0.156)	(0.176)	(0.402)	(0.458)
FOREIGN	-0.678	-0.531	-0.549	0.536**	0.570**	-0.150	-0.205
	(0.624)	(0.663)	(0.637)	(0.234)	(0.247)	(0.570)	(0.623)
CORP_GROUP	-0.315	0.501	0.596*	0.387***	0.467***	-0.283	-0.401
	(0.319)	(0.444)	(0.352)	(0.124)	(0.171)	(0.348)	(0.438)
EVASION	0.509	-0.760	0.513	0.559***	0.480***	-1.704***	-1.785***
	(0.505)	(0.679)	(0.505)	(0.143)	(0.162)	(0.433)	(0.501)
IND.SERVICE	-0.233	-0.526	-0.321	-0.132	-0.140	-0.500	-0.538
	(0.368)	(0.442)	(0.390)	(0.145)	(0.152)	(0.404)	(0.433)
IND.TRADE	0.470	0.200	0.646	-0.407***	-0.451**	-0.149	-0.118
	(0.434)	(0.510)	(0.465)	(0.150)	(0.183)	(0.479)	(0.520)
IND.CONSTRUCTION	-0.0630	-0.644	-0.304	0.0535	0.0103	-0.265	-0.247
	(0.437)	(0.518)	(0.484)	(0.161)	(0.181)	(0.524)	(0.563)
DETECTION ABILITY							
SALARY	-0.141	0.0781	-0.146	0.0855**	0.100**	0.145	0.136
	(0.114)	(0.144)	(0.121)	(0.0425)	(0.0502)	(0.137)	(0.147)

TRAINING	0.177	0.218*	0.415***	0.00991	0.00895	0.0745	0.0754
	(0.121)	(0.126)	(0.133)	(0.0354)	(0.0484)	(0.115)	(0.127)
SCHOOL	0.407	0.865**	0.0691	-0.138	-0.158	-0.847*	-0.902*
	(0.342)	(0.412)	(0.347)	(0.123)	(0.126)	(0.454)	(0.475)
MOTIVATION	-0.0101	-0.429	-0.704**	0.186*	0.148	-0.460	-0.466
	(0.252)	(0.318)	(0.275)	(0.100)	(0.125)	(0.315)	(0.347)
HEAD	0.0141	-0.326	-0.0225	0.434***	0.428***	-0.302	-0.295
	(0.297)	(0.427)	(0.307)	(0.126)	(0.139)	(0.282)	(0.307)
KNOWN_FIRM	-0.171	0.268	0.0970	0.149	0.173	-0.0496	-0.0986
	(0.333)	(0.385)	(0.343)	(0.136)	(0.146)	(0.393)	(0.434)
INEFFICIENCY	-0.213	-0.148	-0.0766	-0.427***	-0.411***	0.601*	0.635*
	(0.302)	(0.371)	(0.331)	(0.114)	(0.118)	(0.346)	(0.382)
INSTRUMENTS							
ATTITUDE	0.136	0.178	0.532***				
	(0.171)	(0.219)	(0.181)				
NUM_AUDIT_FOCI	0.170*	0.0740	0.261**				
	(0.0960)	(0.114)	(0.103)				
DISTRICT1	0.421	1.157**	0.0648				
	(0.407)	(0.503)	(0.486)				
DISTRICT2	-0.0115	0.184	0.420				
	(0.383)	(0.519)	(0.421)				
CONSTANT	-0.972	-4.058***	-3.602***	7.997***	7.625***	2.142**	2.732*
	(0.870)	-1.107	(0.999)	(0.316)	(0.320)	(0.863)	-1.509
LAMBDA_COMP					-0.977***		0.790
					(0.162)		-1.036
LAMBDA_COOP					-0.0222		-0.272
					(0.385)		(0.624)
LAMBDA_MIX					-0.106		0.0493
					(0.818)		(0.493)
ADJ- R2/PSEUDO-R2	15,34%			61,54%		32,25%	
MODEL F-STAT				29.72***			
WALD CHI-SQUARE	205.37***				1,519.05***	110.97***	305.18***
LOG PSEUDO-LH					-1,497.17		-837.70
Wald tests between coefficients of auditor negotiation styles (p-value):							
COMP vs. COOP				0,14	0,0248	0,0009	0,0701
COMP vs. MIX				0,4162	0,2991	0,0001	0,0687
COOP vs. MIX				0,3563	0,6756	0,4042	0,4165

Note. The table reports the results of the (multinomial) logistic regression, the linear regressions and the multinomial treatment effects regressions (MTEM). Dependent variables are displayed in the 4th row. ADDTAXES is the logarithmic additional taxes assessed in the audit. AGREED is a dummy variable that equals one if an agreement was reached during the audit. AUD.COMP (AUD.COOP) equals one if the auditor used only competitive (cooperative) tactics, zero otherwise. AUD.MIX equals one if the auditor used cooperative and competitive tactics, zero otherwise. AUD.NEUTRAL equals one if the auditor used neither cooperative nor competitive tactics, zero otherwise. EXPERIENCE equals the number of years as an auditor. PRESSURE equals one if the audit was completed in the last quarter of the year and the auditor perceives strong pressure to meet set targets, zero otherwise. SPECIALIZED_AUD equals one if the assistance of a specialized auditor was necessary during the audit, zero otherwise. PROF_ACC equals one if the firm is required to publish a profit and loss account and the financial statement are audited by a certified public accountant. ADV.COMP (ADV.COOP) equals one if the factor score of the competitive (cooperative) component is $\geq$ the sample median and the factor score of the cooperative (competitive) component is $<$ the sample median, zero otherwise. ADV.MIX equals one if each factor is $\geq$ the sample median, zero otherwise. ADV.NEUTRAL equals one if each factor score is $<$ the sample median, zero otherwise. SALARY equals the number of the pay bracket. TRAINING equals the number of advanced training courses per year. SCHOOL equals one if the auditor has a university degree, zero otherwise. MOTIVATION equals one if the tax auditor does not consider the audit objective to be achieved by reaching the de minimis threshold, zero otherwise. HEAD equals one if the head of the audit department participated in the final audit meeting, zero otherwise. KNOWN_FIRM equals one if the auditor has audited the firm at least once before, zero otherwise. INEFFICIENT equals one if the auditor has made assessments in less than 50% of the audit foci defined at the beginning of the audit, zero otherwise. FAMILY equals one if at least 50% the firm is held by one family, zero otherwise. SIZE1 to SIZE6 are indicator variables for the six size categories of the German Tax Audit Regulations in ascending order. LOSS equals one if the firm has suffered financial losses in the audit period, zero otherwise. FOREIGN equals one if the key audit areas include the term "foreign", the firm is a member of a foreign group, or the involved tax auditor is specialized in foreign relations, zero otherwise. CORP_GROUP equals one if the company is a member of a corporate group, zero otherwise. EVASION equals one if the firm is suspected of tax evasion, zero otherwise. Of the industry variables SERVICE, TRADE and CONSTRUCTION, a variable equals one if the firm belongs to the industry that corresponds to the variable name, zero otherwise. DISTRUST measures the auditor's attitude toward the taxpayer. NUM_AUDIT_FOCI equals the number of audit foci defined at the beginning of the audit. Of the variables DISTRICT1 and DISTRICT2, the variable equals one if the auditor works at the office in the district represented by the variable, zero otherwise. The variables' standard errors are in brackets. *, **, and *** indicate significance at 10, 5, and 1 percent, respectively.

Table 4.5: Average Marginal Effects in Multinomial Logit Auditors' Negotiation Choice Model

VARIABLES	Pr(AUD.COMP) (1)	Pr(AUD.COOP) (2)	Pr(AUD.MIX) (3)	Pr(AUD.NEUTRAL) (4)
EXPERIENCE	0.00406	-0.000909	0.00663**	-0.00978***
	(0.00394)	(0.00274)	(0.00330)	(0.00329)
PRESSURE	-0.0680	0.0727	0.111**	-0.116**
	(0.0512)	(0.0541)	(0.0556)	(0.0490)
SPECIALISED_AUD	0.145*	-0.0295	-0.0154	-0.100*
	(0.0781)	(0.0424)	(0.0630)	(0.0516)
PROF_ACC	-0.0850	0.267***	-0.100	-0.0821
	(0.0802)	(0.0914)	(0.0727)	(0.0578)
ADV.COMP	0.139**	0.0300	0.176***	-0.345***
	(0.0611)	(0.0375)	(0.0456)	(0.0565)
ADV.COOP	-0.0402	0.0792*	0.119***	-0.158***
	(0.0552)	(0.0411)	(0.0440)	(0.0611)
ADV.MIX	0.00504	0.0778**	0.249***	-0.332***
	(0.0581)	(0.0397)	(0.0463)	(0.0547)

Note. The table reports average marginal effects from the multinomial logistic regression in Table 4.4. EXPERIENCE equals the number of years as an auditor. PRESSURE equals one if the audit was completed in the last quarter of the year and the auditor perceives strong pressure to meet set targets, zero otherwise. SPECIALIZED_AUD equals one if the assistance of a specialized auditor was necessary during the audit, zero otherwise. PROF_ACC equals one if the firm is required to publish a profit and loss account and the firm has a legal obligation to have the financial statement audited by a certified public accountant. ADV.COMP (ADV.COOP) equals one if the factor score of the competitive (cooperative) component is $\geq$ the sample median and the factor score of the cooperative (competitive) component is $<$ the sample median, zero otherwise. ADV.MIX equals one if each factor is $\geq$ the sample median, zero otherwise. ADV.NEUTRAL equals one if each factor score is $<$ the sample median, zero otherwise. The variables' standard errors are in brackets. *, **, and *** indicate significance at 10, 5, and 1 percent, respectively.

Fifth, we consider two conflicting hypotheses related to the reciprocation theory (H5a) and the level-of-aspiration theory (H5b). We find that a perception of the tax advisor as being competitive or at least partly competitive (i.e., as using a mixed strategy) significantly decreases the probability that the auditor will use a neutral strategy. Furthermore, auditors who perceive the tax advisor as being cooperative are more likely to use cooperative or mixed strategies instead of a neutral strategy. In accord with the predictions of reciprocation theory, we find that the average marginal effect of a perceived competitive (cooperative) advisor strategy on the probability that the auditor will use a competitive (cooperative) negotiation strategy is positive. The probability of using a competitive strategy is, on average, approximately 13.85 (7.92) percentage points significantly higher if the tax advisors' negotiation strategy is perceived as being competitive (cooperative) than if it is perceived as being neutral. Hence, we confirm hypothesis H5a. However, we find that a perceived competitive (cooperative) advisor strategy does not significantly increase the probability that an auditor will adopt a cooperative (competitive) auditor negotiation strategy. Hence, the level-of-aspiration theory does not explain auditors' behavior in this context, and we reject hypothesis H5b.

4.4.2 Effectiveness of Tax Auditors' Negotiation Strategies

Model 4 in Table 4.4 shows the linear regression result with *ADDTAXES* as a dependent variable. The result shows that only auditors who use a competitive instead of a neutral strategy achieve significantly higher taxes during an audit. We find that using a competitive instead of a neutral strategy increases additional taxes that are assessed during the tax

audit by 35.9%.[18] Moreover, we find that a competitive strategy does not significantly dominate a cooperative (mixed) strategy (p-value of the Wald tests: 0.140 (0.416)).

However, these results may be distorted by the endogeneity of the auditor's strategy choice. Thus, we additionally present the results of an endogenous multinomial treatment effect model (Model 5 in Table 4.4). The results are similar. Using a competitive strategy increases additional taxes more than using either a neutral strategy or (this is the only difference to the ordinary least squares (OLS) estimation) a cooperative strategy (Wald test p-value: 0.025). We observe no significant difference between the other strategies.[19] Overall, this evidence accords with hypothesis H6, as the use of a competitive negotiation strategy is positively associated with additional taxes. However, we have to reject hypothesis H7 because the mixed strategy does not result in a significantly higher outcome.

Regarding the probability of an agreement, Model 6 in Table 4.4 shows that compared to a neutral negotiation strategy, a competitive negotiation strategy of an auditor tends to reduce the probability of an agreement. This effect, however, is insignificant. However, compared to neutral and competitive strategies, cooperative and mixed negotiation strategies lead to a significantly higher probability that the parties will reach an agreement. Further, Wald tests reveal no significant differences between the effect of cooperative and that of mixed strategies. The results of the multinomial treatment effects model confirm this finding (Model 7 in Table 4.4).[20] Hence, we confirm our last hypothesis H8: the use of cooperative tactics alone or in combination with competitive tactics increases the likelihood of reaching an agreement.[21]

4.5 Discussion and Conclusions

Similar to financial accounting, income tax law is often vague and ambiguous to cover a wide range of cases. Consequently, tax law is, to some extent, always a matter of negotiation

[18] To calculate the marginal effect of *AUD.COMP*, we follow Kennedy (1981): e^(c-0.5V(c))-1, where c is the regression coefficient of *AUD.COMP* and V(c) is the estimate of the variance of c.

[19] The coefficients of the latent factors capture the effect on ADDTAXES of unobserved characteristics that are related to the choice of negotiation strategies. There is evidence of statistically significant negative selection on unobservables for the competitive negotiation strategy (*LAMBDA*). The negative value indicates that unobserved factors that increase the relative probability of selecting a competitive strategy are more likely to decrease additional taxes than an auditor who was randomly assigned to a competitive negotiation strategy. We run a likelihood-ratio test for exogeneity of treatment, which is a test for the joint hypothesis that the lambdas are equal to zero (Deb & Trivedi, 2006a). The result shows that the null hypothesis of exogeneity is rejected (p = 0.090).

[20] Again, we run a likelihood-ratio test for exogeneity of our treatment, and the result shows that the null hypothesis of exogeneity is not rejected (p = 0.844).

[21] As described in Section 4.3.1, we truncated our data set to 98% in each size category. We repeat our analysis without any truncation. We find that the main results for the determinants of negotiation strategy choice in the multinomial logistic model and for the linear and logistic regressions analyses in this section remain almost qualitatively unchanged. The only difference is that we find an additional weak positive effect of a mixed strategy on additional taxes. However, due to the outliers, conducting the multinomial treatment effects regressions is not feasible. Thus, we refrain from reporting these results.

between taxpayers and tax auditors. In this paper, we focus on this negotiation. Using data collected from a survey of 610 tax auditors, we empirically investigate the determinants of tax auditors' choice of negotiation strategy and the effectiveness of the negotiation strategies.

We demonstrate that the audit outcome, i.e., firms' tax burden, depends on the auditor's choice of negotiation strategy. In particular, we find that compared to the neutral or the cooperative negotiation strategy, a competitive negotiation strategy is associated with significantly more additional taxes. It is not obvious that this strategy leads to lower tax adjustments. Some scholars claim that negotiations conducted in an atmosphere of mutual concession making and cooperation yield more favorable negotiation outcomes (McGillicuddy et al. 1984; Komorita and Esser 1975). However, the effectiveness of using a competitive strategy on audit adjustments accords with most general negotiation results (Hüffmeier et al. 2014). We also show that the probability of an agreement is affected by the auditor's negotiation strategy choice. Compared to neutral and competitive strategies, cooperative and mixed negotiation strategies increase the probability that the two parties will reach an agreement. This is an important finding. If, for example, the tax authority expects high legal uncertainty or high litigation costs, a mixed or cooperative strategy can be used to increase the probability of agreement. Using the mixed instead of the cooperative strategy has the further advantage that we do not find a significant difference between a competitive and a mixed strategy with respect to additional taxes.

Furthermore, we investigate which factors drive tax auditors' choice of negotiation strategy. Our analyses reveal that this choice is affected by firm or auditor characteristics and by the opponents' negotiation strategy, as perceived by the tax auditor. (1) We find that experience increases the probability of using competitive tactics. In particular, having ten more years of audit experience increases the probability of using a mixed strategy by approximately 6.63 percentage points. This complements earlier research in financial auditing (McCracken et al. 2008) by demonstrating that even without differences in job status and equity risk, audit experience alone positively affects the use of competitive tactics. However, we find no direct effect of audit experience on additional taxes. Alissa et al. (2014) find that tax auditor experience increases audit performance. According to our findings, this effect can be partly explained by the fact that experienced auditors have learned which negotiation tactics are effective in terms of performance.

(2) We show that time pressure increases the probability of using cooperative negotiation tactics. The probability of using a mixed strategy increases by 11.11 percentage points under time pressure at the end of a year. We assume that this is because, at the end of the year, tax auditors have to report to the head of the audit department on the number of completed audit cases. For tax auditors, this end-of-the-year report increases the importance and their awareness of their own case completion rate. To the best of our knowledge, this is the first evidence that the criteria for evaluating the performance

of revenue agencies are directly associated with the negotiation behavior of tax auditors. Furthermore, time pressure strongly negatively affects additional taxes, thereby implying the direct costs of such a performance evaluation.

(3) We find that the probability of using a competitive strategy increases by 14.52 percentage points when a specialized auditor is involved during the audit. This result suggests that the negotiating position is strengthened by an additional qualified opinion. In the case that a competitive strategy leads to higher additional taxes, an additional opinion may be worthwhile.

(4) We find that the quality of taxpayers' accounting is related to the negotiation behavior of tax auditors. Our results reveal an increasing probability of 26.71 percentage points of using a cooperative strategy if the firm is required to publish the balance sheet and a profit and loss account, and the firm has a legal obligation to have the financial statement audited by a certified public accountant. We suggest that the quality of information given by the taxpayer leads to a more trustful relationship between the two parties; this trust leads, in turn, to cooperative behavior. This indicates how taxpayers might influence the negotiation behavior of auditors.

(5) Our analyses reveal that the auditors' negotiation choice is not only affected by firm or auditor characteristics but also determined by the opponents' negotiation strategy, as perceived by the tax auditor. If the auditor perceives that the opponent is being competitive (cooperative) instead of neutral, the probability that the auditor will use a competitive (cooperative) strategy increases by approximately 13.85 (7.92) percentage points. This finding accords with the reciprocation theory by Osgood (1962), which predicts that negotiation partners reciprocate the opponent's strategy. Moreover, we also find that the perceived negotiation strategy of the advisor affects firms' tax burden. A perception of the tax advisor as being a neutral negotiator significantly decreases the firms' tax liability, while a perception of the tax advisor as being competitive increases additional taxes. Thus, the tax auditor benefits in terms of higher additional tax assessments if he or she employs a competitive strategy. In contrast, tax advisors that are perceived as being competitive tend to harm their clients. These opposing findings highlight that the effectiveness of negotiation strategies depends on the context. We suggest that, in our case, the difference in negotiation power with the greater threat potential of the tax auditor explains this result. Thus, negotiators should use such a competitive strategy only when they are clearly the more powerful party. In sum, our findings demonstrate that firms' tax burden and the probability of agreement depend not only on tax law norms but also on negotiation strategies employed by tax advisors and auditors.

Our study is a first attempt at understanding tax audit negotiations. Several open questions remain for future research. For example, studies could extend the number of possible auditor negotiation tactics. The study by Perreault et al. (2017), for instance, suggests that a simultaneous negotiation strategy may be more effective than a sequential

strategy. Second, the effects of communication style (Perreault and Kida 2011) and emotions (van Kleef et al. 2004) may also affect tax audit negotiations. Third, studies could examine the effects of taxpayers' negotiation strategies on audit outcomes. Fourth, countries differ in their tax audit environment (van der Hel-van Dijk, Lisette 2011). Future cross-country studies that examine the effect of the audit environment on tax audit negotiations may thus elucidate the effect of different incentives on tax audit negotiations. Fifth, future research could examine negotiation strategies in a dynamic context. Against the potential benefit of a mixed strategy that we observe in our study, it could be particularly worthwhile to examine whether tax auditors' use of negotiation tactics change over time in response to actions and counteroffers of the negotiation opponent (tax advisor).

4.6 Appendix A: Tax Auditor Survey – Questionnaire

*Please think of your **last two** completed audit cases. Please answer the following questions.*

Case 1

Size group: ☐ Micro ☐ Small ☐ Medium ☐ L3 ☐ L2 ☐ L1 ☐ Other

Legal form: ☐ sole proprietorship ☐ civil law partnership ☐ general partnership ☐ limited partnership ☐ partnership limited by shares ☐ GmbH & Co. KG ☐ non-typical silent partnership ☐ stock corporation ☐ corporation ☐ cooperative ☐ association ☐ foundation ☐ partnership ☐ _____

Listed company / part of a listed group of affiliated companies: ☐ yes ☐ no ☐ not specified

Family firm (majority shareholding of one family): ☐ yes ☐ no ☐ not specified

Controlling owner-manager: ☐ yes ☐ no ☐ not specified

Determination of taxable income: ☐ cash accounting ☐ financial balance sheet = tax balance sheet ☐ independent tax balance sheet ☐ § 60 II Income Tax Implementing Ordinance

Type of income: ☐ commercial business ☐ self-employment income ☐ agriculture and forestry ☐ non-business

Industry:

☐ construction ☐ banking and insurance ☐ accommodation and food services
☐ retail trade ☐ wholesale trade ☐ other services
☐ manufacturing ☐ information and communication ☐ transportation
☐ freelancer ☐ food industry and semi-luxury industry ☐ public utilities

Does the taxpayer belong to a group of affiliated companies?

☐ no ☐ yes, to a: ☐ national group ☐ multinational group
☐ as subsidiary company ☐ as controlling company ☐ as both

Represented in tax matters: ☐ yes ☐ no

taxpayer has an own accounting department: ☐ yes ☐ no

and a separate tax department: ☐ yes ☐ no

Place of the field audit: ☐ at the company ☐ at the tax advisor's office ☐ in the tax office

Period of auditing: from _____ to _____

Follow-up audit: ☐ yes ☐ no Number of examinations by you: ☐ 1x ☐ 2x ☐ 3x ☐ __x

Highest sales in the audit period (€):

☐ < 155k ☐ 155k-450k ☐ 450k-800k ☐ 800k-2M ☐ 2M-3.5M ☐ 3.5M-6.5M

☐ 6.5M-8M ☐ 8M-15M ☐ 15M-20M ☐ 20M-32M ☐ > 32M ☐ not specified

Highest taxable income in the audit period (€):

☐ loss ☐ 0 < 32k ☐ 32k-50k ☐ 50k-115k ☐ 115k-250k ☐ 250k-500k

☐ 500k-1M ☐ 1M-5M ☐ 5M-10M ☐ 10M-20M ☐ > 20M ☐ not specified

Was the participation of other auditors or their support needed? ☐ yes ☐ no

☐ specialist for foreign relations ☐ specialist for reorganization ☐ specialist for auditing software

☐ specialist for valuation ☐ building expert ☐ actuary

Which result did you achieve in the audit?

☐ without result ☐ additional tax assessment approx.: _____ ☐ tax credit approx.: _____

☐ reduction accumulated losses brought forward approx.: _____ ☐ increase accumulated losses brought forward approx.: _____

If specialized auditors took part in the auditing, which share is allotted to their audit?

☐ < 10% ☐ 10 < 25% ☐ 25 < 33% ☐ 33 < 50% ☐ 50 < 66% ☐ 66 < 75% ☐ 75 < 90% ☐ 100%

How high would you estimate the share of the audit adjustments that result in merely temporary income shifting? ca._____%

If audit adjustments result in temporary income shifting, will these reverse within 5 years after the last audited year?

☐ yes ☐ no, but: ☐ within ___ years ☐ not at all

How many days for auditing and reporting were required? auditing:____ reporting:____

How long did the audit approximately last (from the preparation to the completion of the audit report)?

☐ < 1 month ☐ 2 to 3 months ☐ 4 to 6 months ☐ 7 to 9 months

☐ 10 months to 1 year ☐ 1 to 1.5 years ☐ 1.5 to 2 years ☐ > 2 years

How many weeks ago did you complete your tax audit report? _____ weeks ago.

Which were the key issues of the audit?

1. _____ 2. _____ 3. _____

4. _____ 5. _____ ☐ none

Which of them led to adjustments?

□ no. 1 □ no. 2 □ no. 3 □ no. 4 □ no. 5 □ not one

If further adjustments were made, please indicate them:

6. _____ 7. _____ 8. _____

9. _____ 10. _____ 11. _____

Has tax evasion been suspected, and if yes, in which case?

□ no □ yes: □ no. 1 □ no. 2 □ no. 3 □ no. 4 □ Nr. 5

□ no. 6 □ no. 7 □ no. 8 □ no. 9 □ no. 10 □ no. 11

Did a final audit conference take place? □ yes □ no

If yes, did the section head take part in it? □ yes □ no

How many participants were there altogether? tax office: ___ taxpayer: ___ tax advisor: ___

Did you come to an agreement on the adjustments? □ yes □ no

How did you agree on adjustments?

❑ I waived small adjustments in favor of one large adjustment

❑ No agreement on all adjustments.

❑ Agreement on all adjustments.

❑ I waived adjustments because the firm's "pain threshold" was reached.

❑ I waived uncertain adjustments to avoid the risk of litigation.

❑ I waived adjustments because the other side convinced me.

How would you describe the atmosphere?

❑ friendly ❑ cooperative ❑ unfriendly ❑ objective ❑ emotional

❑ constructively ❑ entrenched ❑ reproachful ❑ non-factual ❑ _____

Which statements describe the behavior of the taxpayer and the tax advisor? Please put a cross on yes or no!

		yes	no			yes	no
1. Appealed to the economic situation of the company	Taxp.:	❑	❑	2. Set deadlines but did not adhere to them	Taxp.:	❑	❑
	Adv:	❑	❑		Adv:	❑	❑
3. Threatened with tax court, disciplinary complaint, etc.	Taxp.:	❑	❑	4. Kept you waiting or disrupted meetings	Taxp.:	❑	❑
	Adv:	❑	❑		Adv:	❑	❑
5. Imposed time pressure	Taxp.:	❑	❑	6. Was authoritarian	Taxp.:	❑	❑
	Adv:	❑	❑		Adv:	❑	❑

7. Referred to an established system	Taxp.:	❑	❑	8. Was particularly friendly	Taxp.:	❑	❑
	Adv:	❑	❑		Adv:	❑	❑
9. Information was withheld/filtered	Taxp.:	❑	❑	10. Referred to actions of other auditors	Taxp.:	❑	❑
	Adv:	❑	❑		Adv:	❑	❑
11. Information was manipulated/extenuated	Taxp.:	❑	❑	12. Appeared self-confident	Taxp.:	❑	❑
	Adv:	❑	❑		Adv:	❑	❑
13. Frequently interrupted you while you were speaking	Taxp.:	❑	❑	14. Offered agreement on minor assessments	Taxp.:	❑	❑
	Adv:	❑	❑		Adv:	❑	❑
15. Said what you want to hear	Taxp.:	❑	❑	16. Offered agreement on major assessments	Taxp.:	❑	❑
	Adv:	❑	❑		Adv:	❑	❑

Finally, you are asked to answer a few questions regarding yourself, your personal valuation as well as training course A24a.

Please indicate on each scale to what extent the following statements apply to you!

	disagree				agree
I felt exposed to a strong statistical pressure during my auditing.	☐	☐	☐	☐	☐
There is a statistical pressure, but it does not affect me since I regularly achieve my target.	☐	☐	☐	☐	☐
Due to the statistical pressure, I consider the audit target to be achieved by reaching the de minimis level.	☐	☐	☐	☐	☐
Taxpayers aim to declare everything correctly.	☐	☐	☐	☐	☐
Nearly every taxpayer would cheat on their tax declaration if there was no control by the tax authority.	☐	☐	☐	☐	☐
Taxpayers without a tax department/tax advisor are overburdened by their tax obligations.	☐	☐	☐	☐	☐
Taxpayers seek to minimize their tax burden by all permitted means.	☐	☐	☐	☐	☐
Tax advice abates taxpayers' material and formal deficiencies reducing the number and amount of adjustments.	☐	☐	☐	☐	☐
Tax advice accelerates audit procedures.	☐	☐	☐	☐	☐
Supporting the audit, the tax advisor promotes the opportunity to settle an agreement.	☐	☐	☐	☐	☐
The clarification of facts by the tax advisor is only possible with difficulty.	☐	☐	☐	☐	☐

4.7 Appendix B: Additional Table

Table 4.6: Sample Comparison

	Additional tax burden due to audit adjustments (in EUR)			
	All audits		Sample	
	N	Mean	N	Mean
SIZE1: Micro firms	2,649	13,829	133	13,219
SIZE2: Small firms	2,315	15,965	222	16,105
SIZE3: Medium firms	2,415	30,952	304	34,402
SIZE4: Large firms L1	805	96,872	100	115,488
SIZE5: Large firms L2	320	151,637	61	191,393
SIZE6: Large firms L3	177	1,435,133	78	1,963,032

Note. This table presents a comparison of the additional tax burden of all business sample cases truncated at 98% for each size category with those of all tax audits completed in Berlin in the year 2010.

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