Auswirkungen steuerlicher Vorschriften auf die Risikoneigung von Individuen

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Zusammenfassung

Die vorliegende Arbeit untersucht den Einfluss von Besteuerung und Subventionierung auf das Verhalten von Individuen. Neben dem allgemeinen Einfluss steuerrechtlicher Vorschriften, liegt der Fokus der Untersuchung auf der Analyse der Effektivität einzelner steuerlicher Begünstigungsvorschriften. Insgesamt besteht die Arbeit aus vier Artikeln. Die ersten drei Artikel basieren jeweils auf experimentellen Laboruntersuchungen. Im vierten Artikel wird das Zusammenspiel ertragsteuerlicher und insolvenzrechtlicher Vorschriften anhand einer konkreten steuerrechtlichen Problemstellung dargestellt. Alle Aufsätze eint die Fragestellung, inwiefern steuerrechtliche Vorschriften bzw. steuerliche Begünstigungsvorschriften die Risikobereitschaft von Investoren beeinflussen können.

Die erste Studie (Ackermann/Fochmann/Mihm 2013), „Biased effects of taxes and subsidies on portfolio choices“ befasst sich grundsätzlich mit der Fragestellung, ob das bloße Vorhandensein von Besteuerung und Subventionierung die Risikoneigung von Individuen beeinflusst. In der experimentellen Literatur wurden bis dahin hauptsächlich Effekte von Verlustverrechnungsbeschränkungen, der Sichtbarkeit von Besteuerung oder Einflüsse auf das Konsumverhalten thematisiert. Die Wirkung von Subventionen auf das Entscheidungsverhalten von Individuen wurde bis dahin nicht experimentell untersucht. Die Autoren entwerfen ein Experimentaldesign, in welchem die Teilnehmer nacheinander mehrere unabhängige Investitionsentscheidungen treffen. Die Teilnehmer sollen sich jeweils ein Portfolio aus riskanten und risikofreien Wertpapieren zusammenstellen. Das Experiment besteht aus vier Treatments, in denen das Vorhandensein von Besteuerung und/oder Subventionierung variiert wird (ohne Besteuerung vs. mit Besteuerung, jeweils mit und ohne Subvention). Da die Netto-Auszahlungen aus den Investitionsalternativen zwischen den Treatments jeweils konstant gehalten werden, sollte sich auch die Zusammensetzung des Portfolios zwischen den Treatments nicht unterscheiden. Die Autoren finden heraus, dass sowohl die Einführung von Besteuerung, als auch die Einführung von Subventionierung, einen signifikant negativen Einfluss auf die Risikoneigung von Individuen hat. Bei gleichzeitiger Einführung von Besteuerung und Subventionierung ist die Bereitschaft riskant zu investieren am geringsten. Die Ergebnisse dieses ersten Experiments haben die Durchführung und Ausgestaltung der nachfolgenden Experimente wesentlich beeinflusst. In den folgenden Experimenten werden einzelne steuerliche Begünstigungsvorschriften, hinsichtlich deren Einfluss auf die Risikoneigung von Individuen, genauer untersucht.

Im zweiten Experiment (Ackermann/Fochmann 2015), „The Effects of Straight-line and Accelerated Depreciation Rules on Risky Investment Decisions – an Experimental Study“ wird untersucht, ob unterschiedliche Abschreibungsvorschriften das Entscheidungsverhalten von Investoren beeinflussen können. Im Experiment wird der linearen Abschreibung die Sofortabschreibung gegenüber gestellt. Zur Verifizierung des ersten Experimentes, werden die beiden Abschreibungsvorschriften noch mit einer Subvention kombiniert. So ergeben sich in Summe vier Treatments (lineare Abschreibung vs. beschleunigte Abschreibung,

jeweils mit und ohne Subvention). In den jeweiligen Treatments entscheiden sich die Teilnehmer, wie viel ihres Budgets sie in riskante und risikofreie Anlageobjekte investieren wollen. Nur das riskante Anlageobjekt wird subventioniert und besteuert. Die aus den so erstellten Portfolios resultierenden Auszahlungen, werden den Teilnehmern an zwei Auszahlungszeitpunkten ausgezahlt. Die erste Auszahlung erfolgte direkt im Anschluss an die Durchführung des Experimentes und die zweite Auszahlung nach drei Wochen bzw. drei Monaten. Durch die zeitliche Verzögerung der zweiten Auszahlung, wird der Einfluss der unterschiedlichen Abschreibungsformen hervorgehoben. Bei der Sofortabschreibung ist die erste sofortige Auszahlung aus der riskanten Anlage höher als bei der linearen Abschreibung. Die Autoren finden heraus, dass die Teilnehmer signifikant mehr in die riskante Alternative investieren, wenn diese beschleunigt abgeschrieben und mit einer Subvention kombiniert wird. Zudem finden sie heraus, dass die Einführung der Subvention die Bereitschaft der Individuen riskant zu investieren insgesamt vermindert. Damit wird das Hauptergebnis des ersten Experiments bestätigt.

Die dritte Untersuchung (Ackermann 2015), „How does the type of subsidization affect investments: Experimental evidence“ vergleicht die Effektivität unterschiedlicher Subventionsarten. Der Autor entwirft ein Experimentaldesign, in dem die Teilnehmer mehrere unabhängige Investitionsentscheidungen nacheinander treffen müssen. In jeder Runde verfügen die Teilnehmer über ein Budget, welches in unterschiedlich riskante Investitionsalternativen investiert werden muss. Zur Auswahl stehen eine risikofreie Alternative, ein riskantes Investitionsobjekt und ein noch riskanteres und subventioniertes Investitionsobjekt. Die Rückflüsse aus den drei unterschiedlichen Investitionsalternativen werden jeweils mit dem gleichen Steuersatz besteuert. Im Experiment werden fünf unterschiedliche Subventionsarten verglichen (Zuschuss, anteilige Steuerfreiheit der Rückflüsse aus der Investition, erhöhter Abzug der Investitionsausgaben von der Bemessungsgrundlage, Steuergutschrift bzw. anteilige Minderung der tariflichen Steuer und verminderter Steuersatz), somit ergeben sich insgesamt fünf Treatments. Der Vorteil aus der Subvention sowie das Risiko der riskanteren Anlage, werden im Experiment variiert. Die Netto-Auszahlungen und die Vorteile aus der Subventionierung zwischen den Treatments sind jeweils identisch. Wenn die Art der Subventionierung keine Rolle spielt, sollte auch die Zusammenstellung der Portfolios in den jeweiligen Treatments etwa gleich sein. Der Autor findet heraus, dass die Subventionierung von den Teilnehmern erkannt wird, die Art der Subventionierung aber einen großen Einfluss hat. So sind die Ausgaben für die riskantere Alternative am höchsten, wenn diese durch eine Steuergutschrift gefördert wird. Der insgesamt riskant investierte Anteil am Portfolio ist ebenfalls dann am höchsten, wenn mittels einer Steuergutschrift subventioniert wird. Die Förderung mittels anteiliger Steuerfreiheit der Bemessungsgrundlage hat die geringste Effektivität. Die drei anderen Subventionsarten erreichen in etwa gleiche mittlere Wirkungsgrade.

Im vierten Artikel (Ackermann/Reck 2012), „Die Ertragsteuer des Immobilienvermögens im Spannungsfeld der Zwangs- und Insolvenzverwaltung“ werden die Auswirkungen des Zusammentreffens ertragsteuerlicher und insolvenzrechtlicher Vorschriften im Insolvenzfall

am Beispiel vermieteter Immobilien untersucht. Im Falle der Insolvenz, ist grundsätzlich der Insolvenzverwalter für die Abwicklung der steuerlichen Obliegenheiten und Tilgung der offenen Verbindlichkeiten des Schuldners zuständig. In diesem Zusammenhang hat der Insolvenzverwalter auch die Einkünfte aus vermieteten Objekten zu ermitteln und zu erklären. Einem Grundpfandgläubiger eines Objekts, steht dem gegenüber die Möglichkeit offen, schon vor Eröffnung des Insolvenzverfahrens, einen Zwangsverwalter für die Verwaltung der betroffenen Immobilie einzusetzen. Der Zwangsverwalter wird parallel zum Insolvenzverwalter tätig. Durch Einschaltung eines Zwangsverwalters kann sich die Zugriffsmasse des Grundpfandgläubigers, im Vergleich zu den restlichen Gläubigern, erhöhen. Die Rückflüsse aus diesem Objekt werden dann vorrangig zur Befriedigung des Grundpfandgläubigers verwendet. Die Autoren zeigen auf, dass die Bestellung eines Zwangsverwalters zu einer Minderung der für den Investor (hier: die verbleibenden Geldgeber des insolventen Schuldners) verfügbaren Insolvenzmasse führen kann. Dies kann wiederum zu einem Rückgang der Risikobereitschaft bei den weiteren Investoren führen, wenn bereits Grundpfandgläubiger existieren, da die Investoren im Insolvenzfall mit einer Benachteiligung gegenüber dem Grundpfandgläubiger rechnen müssen.

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Biased effects of taxes and subsidies on portfolio choices

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HIGHLIGHTS

- Experimental study on the effects of taxes and subsidies on portfolio choices.
- Four treatments with either no tax, a tax, a subsidy or a tax and a subsidy.
- Net payoffs identical in all treatments so investment level should be constant.
- Find a highly significant negative impact from both types of intervention.

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ABSTRACT

We study how taxes and subsidies affect portfolio choices in a laboratory experiment. We find highly significant differences after intervention, even though the net income is identical in all our treatments and thus the decision pattern of investors should be constant. In particular, we observe that the willingness to invest in the risky asset decreases markedly when an income tax has to be paid or when a subsidy is paid. We investigate this result further in a range of variations of the baseline experiment and find our main result to be largely robust. However, as we reduce the number of states of nature the bias weakens considerably.

1. Introduction

In a recent experiment, Fochmann et al. (2012) find that a tax perception bias influences risk-taking behavior when subjects are able to offset losses from their taxable base. In this paper, we investigate whether a perception bias also has an effect in a more general investment problem with different types of government intervention. We look at the effects of both subsidies and taxes on portfolio choices in a laboratory experiment to see how they influence the choice between risky and risk-free assets. We find that imposing a tax and paying a subsidy both have a highly significant negative effect on the willingness to invest in a risky asset.

This paper adds to a small but growing literature on the effect of biases from government intervention. Chetty et al. (2009), for example, find that consumption decisions are influenced by the salience of sales taxes and show that the resulting distortions may have important welfare effects. Sausgruber and Tyran (2011) also find that biased tax perception can have an impact on welfare in the context of voting decisions. Gamage et al. (2010), Djanali and Sheehan-Connor (2012), and Fochmann et al. (forthcoming) observe that labor market decisions are distorted by a biased tax perception. Our contribution to this literature is twofold: (1) we shed further light on the effect of government intervention on investment decision and (2) we are to our knowledge the first to analyze the effect of subsidy perception on risk-taking.

2. Experimental design and hypothesis

In our setting, subjects have to decide on the composition of an asset portfolio in different choice situations. At the beginning

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Table 1
Returns of risky asset A and risk-free asset B (example).

State of nature	Risky asset A													Risk-free asset B
	No subsidy/tax	Subsidy				Tax				Subsidy–tax				No subsidy/tax, subsidy, tax, subsidy–tax
		Gross	Subsidy	Tax	Net	Gross	Subsidy	Tax	Net	Gross	Subsidy	Tax	Net	
1	1.000	0.667	0.333	–	1.000	2.000	–	1.000	1.000	1.333	0.667	1.000	1.000	1.300
2	1.100	0.733	0.367	–	1.100	2.200	–	1.100	1.100	1.467	0.733	1.100	1.100	1.300
3	1.200	0.800	0.400	–	1.200	2.400	–	1.200	1.200	1.600	0.800	1.200	1.200	1.300
4	1.300	0.867	0.433	–	1.300	2.600	–	1.300	1.300	1.733	0.867	1.300	1.300	1.300
5	1.400	0.933	0.467	–	1.400	2.800	–	1.400	1.400	1.867	0.933	1.400	1.400	1.300
6	1.500	1.000	0.500	–	1.500	3.000	–	1.500	1.500	2.000	1.000	1.500	1.500	1.300
7	1.600	1.067	0.533	–	1.600	3.200	–	1.600	1.600	2.133	1.067	1.600	1.600	1.300
8	1.700	1.133	0.567	–	1.700	3.400	–	1.700	1.700	2.267	1.133	1.700	1.700	1.300
Subsidy	No	50% of gross return				No				50% of gross return				No
Tax	No	No				50% of gross return				50% of gross return plus subsidy				No

of each situation, each subject receives an endowment of 100 Lab-points where 1 Lab-point corresponds to 1 Euro cent. The participants' task is to spend their endowment on two investment alternatives: asset A and asset B. The price for one asset of either type is 1 Lab-point.

The return of asset A is risky and depends on the state of nature. Eight states are possible and each state occurs with an equal probability of $\frac{1}{8}$. The return of asset B is risk-free and is therefore equal in every state of nature. The returns of both assets are chosen in such a way that asset A does not dominate asset B in each state of nature, but the expected return of asset A exceeds the risk-free return of asset B. The subjects know the potential returns on both assets in each state of nature before they make their investment decision.

The experiment consists of four treatments in which the presence of a tax and a subsidy is varied. In the no subsidy/tax treatment, no tax is levied and no subsidy is paid. In the subsidy treatment, a subsidy of 50% of the gross return is paid for each asset A, but no tax is imposed. In the tax treatment, a tax with a rate of 50% is levied on the gross return of each asset A, but no subsidy is paid. In the subsidy–tax treatment, a subsidy of 50% of the gross return is paid for each asset A, but in addition a tax has to be paid. In this case, the tax is 50% of the sum of the gross return of asset A and the subsidy. In all four treatments, the returns of the risk-free asset B are neither taxed nor subsidized. Before subjects make their investment decision, they are informed about the tax and subsidy situation.

Although the gross returns of asset A are treated differently across the treatments, they are transformed in such a way that the net returns remain the same (see Table 1 for an example). This leads to identical investment settings in all four treatments and the decision pattern should therefore also be identical across the treatments. Our hypothesis is:

Hypothesis. Investment in the risky asset A and the risk-free asset B is identical in all four treatments.

In each treatment, we have five decision situations in which we vary both the potential returns of asset A and the return of asset B. Each subject participates in each treatment (within-subject design) and therefore makes 20 investment decisions in total. To avoid learning effects, the order of these 20 decision situations is completely randomized for each subject.[1] Since we are only interested in the treatment differences, the risk attitude of the subjects is not of importance for our analysis. Participants with stable and unbiased preferences should follow the same decision pattern across the treatments independently of their individual attitude towards risk.

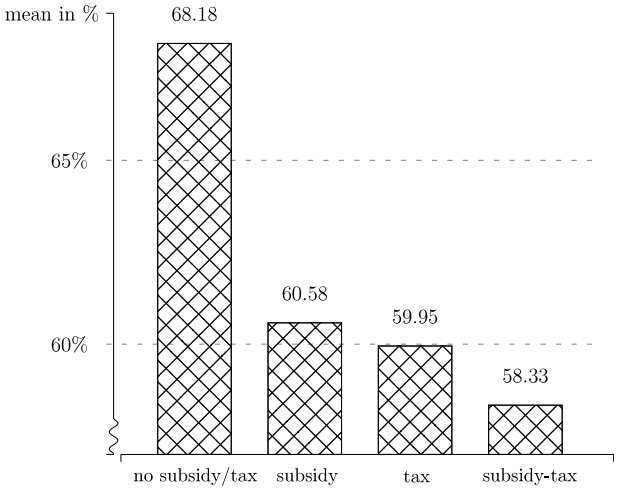

Fig. 1. Share of endowment invested in the risky asset A on average for each treatment (number of subjects: 119).

Despite the fact that we use a very simple setting, with simple tax and subsidy rates, several mechanisms are used to make sure subjects understand their decision environment. First, written instructions explain the calculation of the net returns in detail and provide one numerical example for each treatment. Second, each subject has to correctly solve one numerical example for each of the four treatments as a comprehension test. Third, subjects are provided with both a pocket calculator and a computerized "what-if"-calculator, which allows subjects to calculate their tax, subsidy, and net payoff at different investment levels in each decision situation.

All experiments were carried out at the computerized experimental laboratory at the Otto-von-Guericke University of Magdeburg (MaXLab) and were programmed with *z*-Tree (Fischbacher, 2007). To avoid income effects, we randomly selected five of the 20 decision situations to be paid in cash after the experiment was finished.

3. Results and discussion

3.1. Baseline experiment

Fig. 1 depicts the average share of endowment invested in the risky asset A for each treatment. In the no subsidy/tax treatment, subjects invested 68.18% of their endowment in asset A. Even though the net returns are identical in the other treatments, this

[1] This means that in each of the 20 rounds one of the five decision situations is randomly selected from any of the four treatments and presented to a subject instead of subjects receiving the choices in four blocks of five decision situations from the same treatment.

Table 2
Variation treatments.

	Variation 1	Variation 2	Variation 3	Variation 4	Variation 5
Average share of endowment invested in the risky asset A (in %)					
No subsidy/tax	68.45	71.98	76.53	83.73	71.87
Subsidy	63.20	64.02	54.69	75.65	63.86
Tax	56.08	65.68	68.28	78.23	68.93
Subsidy–tax	55.68	62.87	65.39	75.20	67.67
Statistical comparison (p-value, two-tailed)[a]					
No subsidy/tax vs. subsidy	0.0589	0.0030	<0.0001	0.0236	0.0019
No subsidy/tax vs. tax	<0.0001	0.0439	0.0003	0.0143	0.0932
No subsidy/tax vs. subsidy–tax	0.0001	0.0234	<0.0001	0.0007	0.1075
Subsidy vs. tax	0.0289	0.4971	<0.0001	0.6799	0.1772
Subsidy vs. subsidy–tax	0.0088	0.6374	0.0001	0.3306	0.2752
Tax vs. subsidy–tax	0.5547	0.4520	0.459	0.3814	0.7562
No. of subjects	25	24	46[b]	34	36

[a] The Wilcoxon signed-rank test is applied for the variation treatments 1, 2, 4, and 5 (treatments with within-subject design), the Mann–Whitney *U* test for variation treatment 3 (treatment with between-subject design).
[b] 12, 10, 11, and 13 subjects participated in the no subsidy/tax, subsidy, tax, and subsidy–tax treatment, respectively.

share decreased markedly when a subsidy was paid (60.58%) or a tax had to be paid (59.95%). This effect intensified weakly when a subsidy was paid and a tax imposed simultaneously (58.33%). All differences are highly significant ($p < 0.001$, Wilcoxon signed-rank test, two-tailed) compared to the no subsidy/tax treatment. Our hypothesis is therefore rejected for all these comparisons. The difference between the subsidy and the subsidy–tax treatment is weakly significant ($p = 0.077$). However, we found no significant differences between the tax and subsidy–tax treatment or between the subsidy and tax treatment.

These findings are not only at odds with our hypothesis but also with a range of biases discussed in the literature. If subjects had tax aversion (Sussman and Olivola, 2011), tax affinity (Djanali and Sheehan-Connor, 2012), or gross payoff illusion (Fochmann et al., forthcoming) then the bias would have had a different sign in the tax treatment than it did in the subsidy treatment. Since a subsidy is essentially just a negative tax, subjects with tax aversion (affinity) would receive a lower (higher) utility in the tax treatment and a higher (lower) utility in the subsidy treatment when compared to the no subsidy/tax treatment. They would thus have invested less (more) when the risky asset was taxed and more (less) when it was subsidized. This is not what we observed.

Our pattern does not indicate gross payoff illusion either. Since the gross payoff was higher than the net payoff in the tax treatment and lower than the net payoff in the subsidy treatment, subjects with the illusion that their gross payoffs are relevant would not have reacted the same to both types of intervention. They would have been drawn to the higher gross payoff in the tax treatment and the lower gross payoff in the subsidy treatment. The fact that we observe a fall in investment in both treatments can therefore not be readily explained by any of these existing theories.

Given that our main result seems at odds with existing work we checked how robust it was by carrying out a range of variations of the baseline experiment. The results are shown in Table 2 and discussed in Section 3.2.

3.2. Variations of the baseline experiment

The tax and subsidy rate in the baseline experiment was deliberately chosen to be quite extreme (50%). To see whether this is important for our results we ran an experiment in which we used a much lower rate. In *variation* 1 we used a tax and subsidy rate of 5% while leaving everything else unchanged. Given that the difference between the net and gross payoffs was now very small we might have expected subjects to react less strongly to the subsidy and tax in variation 1 than they did in the baseline experiment. However, the results were very similar to those in our initial experiment with investment in the risky asset falling sharply under each type of intervention, although the difference between the no subsidy/tax and the subsidy treatment is now only weakly significant. Thus we have strong support for our main result even when the difference between net and gross payoffs has been drastically reduced.

One explanation consistent with the finding that investment in the risky asset fell under both types of intervention is that subjects have an aversion to computational complexity, which reduces their utility from an asset that has been subsidized/taxed. To test this idea we ran an experiment (*variation* 2) in which we subsidized and/or taxed the risk-free asset B instead of the risky asset A. If aversion to computing net payoffs explains our findings then we would expect the opposite results in this variation than we observed in the baseline experiment. However, the results were in fact very similar with a subsidy and/or tax on the risk-free asset also leading to a reduction in investment in the risky asset. Thus, our main result holds in variation 2 suggesting that aversion to computational complexity is not a fitting explanation.[2]

Even though the baseline experiment was set up to be as simple as possible the environment was nonetheless complex enough to suggest that this may be playing an important role. To test this we ran experiments in which we again subsidized and/or taxed the risky asset but simplified the choice environment. We did this in two ways. In *variation* 3 we ran an experiment using a between-subject design. This gave each subject 20 rounds in which they were confronted with just one type of intervention. Stabilizing the environment in this way provided subjects with a greater opportunity to figure out strategies for dealing with the complexity of the environment. In this variation, just as in the baseline experiment, investment in the risky asset fell significantly under each type of intervention, confirming our main result in this more stable environment.

A key difference between variation 3 and the baseline is that there is now a significantly greater reduction in the subsidy treatment than in the other two treatments with intervention. However, it is worth noting that this difference was only observed in early rounds. In the tax and the subsidy–tax treatments there was no trend in their difference to the no subsidy/tax treatment over the 20 rounds. In the subsidy treatment, however, the difference to

[2] A further reason to doubt the computational complexity explanation is that our results are driven largely by subjects investing less in the risky asset under intervention (this made up on average 71% of the reduction) rather than subjects moving away from it completely. This intensive margin of reaction is harder to rationalize using computational complexity.

the no subsidy/tax treatment was much higher in early rounds and gradually fell to being of similar magnitude to the bias observed in the other two treatments. In the last five rounds, for example, the difference between the subsidy treatment and the other two treatments with intervention is no longer significant at the 10% level. But the difference between the no subsidy/tax treatment and the subsidy ($p = 0.0009$), the tax ($p = 0.0336$), and the subsidy–tax ($p = 0.0059$) treatments is still significant.

The second way in which we reduced the complexity of the environment was to reduce the number of states of nature. In *variation* 4 we reduced the states from eight to four and in *variation* 5 we reduced them to two. Investment in the risky asset again fell in all treatments with intervention in both these variations. While the difference between the treatments with and without intervention were smaller in variation 4 than in the baseline experiment they continue to be significant at the 5% level. With two states, however, the difference between the no subsidy/tax treatment and the tax and the subsidy–tax treatment are no longer significant at this level. Thus reducing the complexity along this dimension weakened the bias considerably.

4. Conclusion

The baseline experiment together with our five variations shows that the finding that investment in a risky asset falls in the presence of a tax and/or a subsidy is quite robust. This behavior is not consistent with theories such as tax aversion, tax affinity or gross payoff illusion, which would predict that tax and subsidy biases would have different signs. Further, our results do not appear to be driven by an aversion to computational complexity since investment in the risky asset also falls if we subsidize and/or tax the risk-free asset. However, reducing the complexity of the environment by reducing the number of states does seem to affect the strength of the bias. This indicates that the extent to which government intervention biases risk-taking behavior may fall with the complexity of the environment in which the intervention takes place.

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The Effect of Straight-line and Accelerated Depreciation Rules on Risky Investment Decisions – an Experimental Study*

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Abstract

The aim of this study is to analyze how depreciation rules influence the decision behavior of investors. For this purpose, we conduct a laboratory experiment in which participants decide on the composition of an asset portfolio in different choice situations. Using an experimental environment with different payment periods, we show that accelerated compared to straight-line depreciation can increase the willingness to invest as hypothesized by theory. However, this expected behavior is not always observed. Additionally, we are able to show that introducing a subsidy leads to a lower willingness to take risk although the net returns are kept constant.

Keywords

Taxation, Behavioral Accounting, Behavioral Taxation, Straight-line Depreciation, Accelerated Depreciation, Tax Perception, Risk Taking Behavior, Portfolio Choice

JEL-Classification

C91, D14, H24

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1 Introduction

The influence of taxation on the willingness to take risk and on the willingness to invest of firms and individuals is one main topic in the tax literature.[1] For example, the effects of introducing or increasing an income tax or a capital gains tax, loss offset provision, asymmetric taxation of gains and losses, or asymmetric taxation of different investment opportunities or investor groups are only some central issues of this strand of literature. Additionally, accounting principles – such as depreciation regulations – are important aspects that influence the advantageousness of investment alternatives as they alter the net present value of these opportunities by means of affecting the tax base and therefore the tax amount in each period over the time horizon.

Our aim is to study how depreciation rules – namely straight-line and accelerated depreciation – influence the decision behavior of investors. For this purpose, we conduct a laboratory experiment in which participants decide on the composition of an asset portfolio in different choice situations. To induce an investment environment in the lab that is closer to reality, we decided that subjects receive their money from the experiment not only immediately after the experiment has finished, but also after a certain time lag. This enables us to study the behavior of investors when they are confronted with an investment decision over different time periods. Therefore, we are able to analyze the timing/interest effects of different depreciation rules on the willingness to invest in a controlled environment. So far, there is no study in the tax and accounting literature that applies such an experimental setting to investigate this research question. Additionally, we contribute to the literature by replicating the interesting and unexpected finding of Ackermann et al. (2013) – that introducing a subsidy leads to a lower willingness to take risk although the net returns are kept constant – in a different experimental environment.

The findings of our study are manifold. First, we find that an accelerated compared to a straight-line depreciation rule increases the willingness to invest as hypothesized by theory in our more complex treatment with a subsidy. However, in our less complex treatment without subsidy, this expected behavior is not observed. Second, we are able to replicate the findings observed by Ackermann et al. (2013) when the time lag between the payment periods is not too long. Third, we show that tax misperception biases do not occur when comparing the

[1] See, for example, Hundsdoerfer et al. (2008) and Niemann and Sureth (2008) for overviews over the literature on this topic.

straight-line and accelerated depreciation rule. Fourth, our study indicates that experimental results depend to some extent on the experimental environment and raises, therefore, new questions for future research analyzing why these environment-dependent differences occur.

The remainder of the paper is organized as follows: In section 2, we give a brief review of the theoretical, empirical, and experimental literature. In section 3, we present the design of our experiment and formulate our hypotheses. The results of our study are given in section 4. The results of a variation treatment as a robustness check are presented in section 5. In our last section 6, we summarize and discuss our findings.

2 Literature Review

The research question how depreciation regulations influence the investment behavior of firms and individuals is discussed in the theoretical and empirical tax literature for many decades.[2] Coen (1971), for example, derive two ways in which the accelerated depreciation, compared to the straight-line depreciation, can stimulate investments: an accelerated depreciation increases (1) the after-tax rate of return on the asset ("rate-of-return effect") and (2) the cash flows ("liquidity effect"). Coen estimates the tax savings for 1954-1966 resulting from the accelerated depreciation and the investment tax credit. He finds that the stimulus based on the accelerated depreciation is always higher than the stimulus based on the tax credit. Klein and Taubman (1971) build up an econometric model and estimate the effect of accelerated depreciation and the investment tax credit on investments with the help of several US investment data. They examine the consequences of a temporary suspension of the tax credit and the accelerated depreciation from the fourth quarter 1966 through the third quarter 1968. The results indicate that investors anticipate the suspension and delay investments. Cummins and Hassett (1992) use firm panel data to investigate the impact of changes in the costs of capital and its influence on investment decisions. For this purpose, they consider the tax reform act of 1986 in the US with which the investment tax credit was exposed and depreciation lifetimes were extended. They find a strong linkage between investment decisions and the cost of capital. Increased costs of capital, as a result of, for example, increasing depreciation lifetimes, reduces investments.

Cohen et al. (2002) investigate a change in the US tax law introduced with the 2002 tax bill. Hereafter, firms were allowed to immediately deduct 30 percent of investment purchases in

[2] See, for example, Hundsdoerfer et al. (2008) and Niemann and Sureth (2008). An overview of papers which deals with empirical research on depreciation is given by Jorgenson (1996).

the first year. The remaining 70 percent of the investment purchases have to be depreciated under standard depreciation schedules. Cohen et al. explore the impact of the 30 percent first-year deduction on the marginal cost of equipment investment. They find that this act can increase the incentive to invest in equipment markedly. House and Shapiro (2008) deal with the same change in the US tax rules. They estimate the investment supply elasticity after the 30 percent first-year deduction rule was implemented. They argue that the elasticity of investments for long-lived capital goods is nearly infinite and therefore tax subsidies should be fully reflected in the investment prices. The result of their work indicates that the introduced immediate depreciation lowers the price of the supported assets. Therefore, the investments in qualified capital increased sharply. In addition to this tax law change in 2002, Hulse and Livingstone (2010) further analyze the 2003 Tax Act and its incentive effect of bonus depreciations on investments. In fact, qualified properties bought during the period from September 11, 2001 through December 31, 2004 are subject to an extraordinary bonus depreciation of 30% and 50%, respectively. In contrast to the previous studies, they find only a weak impact of these incentives on capital spending. In line with this result, Desai and Goolsbee (2004) show that the accelerated depreciation method has almost no important effect on the investment behavior.

Feldstein (1982) examines the interaction between depreciation rules and the rate of inflation, and its impact on the investment behavior of firms. His results indicate that the delayed consideration of the historic costs of acquisition with a periodic depreciation leads to reduced investments compared to an immediate depreciation. The longer the period of depreciation and the higher the inflation rate, the lower will be the volume of investments of the firms. Summers (1987) points out that the advantage of different depreciation rules depend on the assumed discount rate. Schneider (1981) states that the effect of using the accelerated instead of straight-line depreciation method is ambiguous and mainly depends on the time structure of alternative payments and on investor's utility function. Therefore, a clear and unambiguous prediction of how such tax incentives affect investment behavior cannot be provided from a theoretical perspective.

Jackson (2008) and Jackson et al. (2009) study the influence of different depreciation methods on investment decisions empirically. They compare the straight-line depreciation with the accelerated depreciation. The results show that firms which use the accelerated depreciation method are more likely to invest in a replacement asset than firms which use the straight-line depreciation method.

Up to now, only Davis and Swenson (1993) analyze the effects of depreciation rules on investment behavior experimentally. In particular, they investigate the influence of introducing accelerated depreciation rules and tax credits on the demand for depreciable assets in a market setting. They find that the impact of the tax incentives is rather modest as they observed that the demand was unresponsive to the tax incentives. As stated by the authors, "this result is inconsistent with extant neoclassical theory and the expectations of policymakers" (Davis and Swenson, 1993, p. 509).

A small but growing literature analyzing tax perception issues finds that investment decisions can be heavily biased by a misperception of tax effects that possibly could explain the unexpected result of Davis and Swenson (1993).[3] Fochmann et al. (2012a, b), for example, investigate the willingness to take risk when an income tax with a loss offset provision is applied compared to when no taxation is applied. They observe an unexpected high willingness to take risk under an income tax although the gross payoffs are adapted in such a way that both settings (with and without tax) are identical in net terms and thus the same decision pattern was expected. In contrast, Fochmann and Hemmerich (2014) find that introducing an income tax with or without a full loss offset provision leads investors to reduce their willingness to take risk although the gross investments are adjusted accordingly to achieve identical net investments. Ackermann et al. (2013) study how taxes and subsidies influence investment behavior. They find that – although the net income is held constant again – individuals invest less in the risky asset when a tax has to be paid or when a subsidy is paid. They conduct different variations of their baseline experiment to examine how robust these findings are and observe that only a reduction of the environment complexity by reducing the number of states mitigates the identified perception bias. The results of all these studies show that individuals often do not react to taxation as it is expected by a standard

[3] Tax perception issues are not only of importance in the context of investment decisions. For example, Gamage et al. (2010), Djanali and Sheehan-Connor (2012), and Fochmann et al. (2013) observe that individuals are more willing to supply labor when a tax is raised on their income from working than when no tax is raised although both cases are identical in net terms. König et al. (1995) and Arrazola et al. (2000) show by using archival data that labor supply decisions are distorted by an incorrect tax perception. Furthermore, Chetty et al. (2009), Finkelstein (2009), and Feldman and Ruffle (2012) find that the consumption of goods can be biased by a tax misperception. Sausgruber and Tyran (2005, 2011) reveal in different laboratory experiments that voting behavior is affected by a distorted tax perception. In the literature, some determinants influencing tax perception are identified. For example, the higher the salience of a tax is, the more correct is the tax perception (see, for example, Rupert and Wright, 1998, Sausgruber and Tyran, 2005, 2011, Chetty et al., 2009, Finkelstein, 2009, Fochmann and Weimann, 2013). Additionally, the higher the tax complexity is, the worse is the quality of individual investment decisions under taxes (see, for example, de Bartolome, 1995, Rupert and Wright, 1998, Rupert et al., 2003, Boylan and Frischmann, 2006, and Blaufus and Ortlieb, 2009). Furthermore, a positive relationship between the accuracy of the tax estimation and education, age, and income, respectively, is shown in the literature (see, for example, Gensemer et al., 1965, Morgan et al., 1977, Lewis, 1978, Fujii and Hawley, 1988, König et al., 1995, Rupert and Fischer, 1995).

theory, which assumes that individuals decide on their net payoffs. Although this strand of literature does not focus on the perception of depreciation rules explicitly, these findings indicate that perception biases are possible important as well when tax effects of different depreciation rules – such as straight-line or accelerated depreciation rules – on investment decisions are economically discussed. Thus, the aim of this study is to link both this literature on tax perception and the "standard" research literature on depreciation rules.

3 Experimental Design, Treatments, and Hypotheses

3.1 Decision Task

In our setting, subjects have to decide on the composition of an asset portfolio in different choice situations.[4] At the beginning of each situation, each subject receives an endowment of 800 Lab-points where 2 Lab-points correspond to 1 Euro cent. The participants' task is to spend their endowment on two investment alternatives: asset A and asset B. The price for one asset of either type is 8 Lab-Points. As an investor is not allowed to save her endowment, she buys 100 assets in each decision situation in total.

The return of asset A is risky and depends on the state of nature. Three states (good, middle, bad) are possible and each state occurs with an equal probability of 1/3. The return of asset B is risk-free and is therefore equal in every state of nature. The returns of both assets are chosen in such a way that asset A does not dominate asset B in each state of nature, but that the expected return of asset A exceeds the risk-free return of asset B. The subjects know the potential returns on both assets in each state of nature before they make their investment decision.

An investment in asset A or B exactly leads to two payoffs with a time lag between both payment dates. Subjects immediately receive the first payoff in cash after the experiment has finished. The second payoff is paid in three weeks. To receive the delayed payment, a participant could choose either to come to the experimenter's office or that the experimenter transfers the money to her bank account. For reasons of simplification, we use "periods" instead of "payment dates" in the following. However, subjects only decide on their investment in the first period. No further decision is made in period 2.

[4] The instructions are available in appendix A1.

3.2 Income Taxation, Subsidization, and Treatments

The income from asset A is taxed at a rate of 50%. The tax base is given by the gross return resulting from asset A (i.e., chosen number of asset A times the gross return per asset A) minus the depreciation amount (dependent on the amount initially invested in asset A). The tax is raised in each period separately. As the gross return per asset A and the depreciation amount can be different in both periods, the tax base, the tax amount, and the net payoff can differ as well. The gross returns of asset A are chosen in such a way that the tax base cannot be negative. The risk-free asset B is not subject to taxation.

In our experiment, we use a 2x2 design in which we vary the depreciation rule (within-subject design) and the existence of a subsidy (between-subject design). Thus, we have four different treatments in total. With respect to the depreciation method, we use two different rules: straight-line and accelerated depreciation. In the treatments with the straight-line depreciation rule, the total amount invested in asset A (i.e., chosen number of asset A times the price of 8 Lab-Points for one asset A) is equally distributed across both periods. In the treatments with accelerated depreciation rule, the total amount invested in asset A is completely depreciated in the first period (immediate write-off). In the second period, no further depreciation reduces the tax base.[5]

Regarding the subsidization, we implement treatments with and without a subsidy. In the treatments without subsidy, the decision situation is exactly as described. In the treatments with subsidy, a subsidy of 2 Lab-Points is paid for each asset A. For reasons of simplification, we decided that the subsidy amount does not influence the tax base and is, therefore, not taxed. The risk-free asset B is not subsidized. Table 1 gives an overview over all four treatments. Table 2 shows an example for each treatment and for each period.

Table 1: Treatment overview

		depreciation rule (within-subject design)	
		straight-line	accelerated
subsidy (between-subject design)	without subsidy	straight-line depreciation without subsidy	accelerated depreciation without subsidy
	with subsidy	straight-line depreciation with subsidy	accelerated depreciation with subsidy

[5] Note that the amount invested in asset B is not of importance for tax purposes as asset B is not subject to a tax.

Table 2: Numerical example for each treatment and period

		subsidization	**without subsidy**				**with subsidy**			
		depreciation rule	**straight-line**		**accelerated**		**straight-line**		**accelerated**	
		period	**1**	**2**	**1**	**2**	**1**	**2**	**1**	**2**
given values	(1)	depreciation share	50%	50%	100%	0%	50%	50%	100%	0%
	(2)	number of asset A	70	70	70	70	70	70	70	70
	(3)	gross return of one share of asset A	40	20	40	20	40	20	40	20
	(4)	subsidy amount of one share of asset A	---	---	---	---	2	2	2	2
	(5)	return of asset B	30	15	30	15	30	15	30	15
asset A	(6)	gross return resulting from asset A = (2) · (3)	2,800	1,400	2,800	1,400	2,800	1,400	2,800	1,400
	(7)	amount invested in asset A = (2) · 8 Lab-Points	560	560	560	560	560	560	560	560
	(8)	depreciation amount = (1) · (7)	280	280	560	0	280	280	560	0
	(9)	tax base = (6) – (8)	2,520	1,120	2,240	1,400	2,520	1,120	2,240	1,400
	(10)	tax amount = 50% · (9)	1,260	560	1,120	700	1,260	560	1,120	700
	(11)	subsidy = (2) · (4)	---	---	---	---	140	140	140	140
	(12)	**net payoff resulting from asset A** **= (6) – (10) + (11)**	**1,540**	**840**	**1,680**	**700**	**1,680**	**980**	**1,820**	**840**
asset B	(13)	share number of asset B = 100 – (2)	30	30	30	30	30	30	30	30
	(14)	**payoff resulting from asset B** **= (5) · (13)**	**900**	**450**	**900**	**450**	**900**	**450**	**900**	**450**
	(15)	**total net payoff** **= (12) + (14)**	**2,440**	**1,290**	**2,580**	**1,150**	**2,580**	**1,430**	**2,720**	**1,290**

3.3 Hypotheses

3.3.1 Straight-line vs. Accelerated Depreciation

As only the risky asset A is taxed in our experiment, the applied depreciation rule only influences the after-tax return of the asset A investment. In particular, an accelerated depreciation leads to a higher present value of the depreciation tax shield compared to a straight-line depreciation because the depreciable amount is higher in the first period under an accelerated depreciation (timing/interest effect). As a consequence, this leads to a higher net present value of the asset A investment under accelerated than under a straight-line depreciation. Thus, in accordance with the theoretical literature, we hypothesize that an accelerated compared to a straight-line depreciation leads to a higher willingness to invest in the risky asset A. This leads us to our first hypothesis.[1]

Hypothesis 1: *The investment in the risky asset A is higher under an accelerated than under a straight-line depreciation.*

As different experimental studies have found perception biases which contradict theoretical predictions (see section 2), we implement net and gross value equivalence decision situations. In the gross value equivalence decision situations, all gross payoffs are identical across the treatments with straight-line and accelerated depreciation. These decision situations are used to test hypothesis 1. To isolate perception biases, we use the net value equivalence decision situations. In these decision situations, the gross payoffs in each treatment are adapted in such a way that the net payoffs are identical across the treatments. Thus, in net terms, the choice situations are completely identical in all our treatments in these decision situations. As a consequence, the same decision pattern is expected in all treatments when no perception bias occurs. This leads us to our hypothesis 2:

Hypothesis 2: *If the net returns are identical, investment in the risky asset A and the risk-free asset B is identical irrespective of whether an accelerated or a straight-line depreciation is applied.*

[1] This hypothesis is analyzed by using the decisions of the gross value equivalent decision situations.

For each of the two depreciation rules, we use 5 net and 5 gross value equivalence decision situations, respectively. Hence, each subject is confronted with 20 decision situations in total.[2] Table 3 depicts this procedure.

Table 3: Specification of the decision situations

	straight-line depreciation	accelerated depreciation
gross value equivalence	5 decision situations	5 decision situations
net value equivalence	5 decision situations	5 decision situations

3.3.2 Subsidy vs. No Subsidy

Ackermann et al. (2013) show that introducing a subsidy while keeping the net returns constant leads to an unexpected perception bias that results in a reduced willingness to take risk.[3] To analyze this perception bias, we use two treatments with and without subsidy but adapt the gross returns in such a way that the net returns are identical in both treatments.[4] Following the observation of Ackermann et al. (2013), we conjecture:

Hypothesis 3: If the net returns are identical, investment in the risky asset A is lower with than without subsidy.

3.4 Experimental Protocol

The experiment was conducted at the computerized experimental laboratory of the Otto-von-Guericke University of Magdeburg (MaXLab). In total, 165 subjects (62 females and 103 males) participated and earned on average 12.91 Euros in approximately 100 minutes (about 7.75 Euros per hour). The experimental software was programmed with z-Tree (Fischbacher, 2007) and subjects (mainly economic students) were recruited with ORSEE (Greiner, 2003).

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[2] To avoid any order effects, the sequence of these 20 decision situations is randomized for each participant. In appendix A2 the (potential) gross and net returns of both assets are displayed for each treatment and each decision situation.

[3] As discussed by Ackermann et al. (2013), one explanation for this result could be that introducing a subsidy results in a more complex decision environment leading investors to decrease their willingness to take risk. A similar observation that points in this direction can be found in Fochmann and Hemmerich (2014).

[4] Note that this perception effect can only be analyzed if the decision situations are identical in net terms. If we would use the same gross payoffs instead, we would not be able to distinguish between a real subsidy effect and the perception effect and, thus, we would not be able to isolate the observed perception bias. A comparison between a setting with and without subsidy when the decision situations are identical in gross terms is unfortunately not possible with our experiment as we did not implement such decision situations.

We implement different methods to make sure subjects understand the decision environment. First, at the beginning of the experiment, the instructions are read out loudly where the procedure of the experiment and the payoff mechanism are explained to the participants. The instructions contain a numerical example for each depreciation rule and for each payment date. In this example the calculation of the net payoff resulting from asset A and B as well as the total net payoff are explained. The participants have time to read the instructions for their own and to ask questions. Second, after reading the instructions, participants face a comprehension test in which they are confronted with a similar example as given in the instructions, but with new numerical values. The test is solved after all questions are answered correctly. Third, participants receive a pocket calculator which could be used during the whole experiment for own calculations. Fourth, a "what-if-calculator" is provided in each decision situation which allows subjects to calculate their tax burden, the (net) payoff resulting from asset A and B, and the total net payoff at different investment levels.

To avoid income effects and strategies to hedge the risk across all decision situations, only one of the 20 decision situations is paid out. For this purpose, each participant is asked to randomly draw a number from 1 to 20 at the end of the experiment to select her payoff relevant decision situation. Hereafter, the participant has to cast a six-sided die to determine the relevant state of nature. The state of nature is good, middle, and bad if f the number is 1 or 2, 3 or 4, and 5 or 6, respectively. Dependent on the chosen quantities of asset A and B in the selected decision situation, the participant's payoffs are calculated for each of the two periods and the payoff of the first period is paid out immediately in cash.

4 Results

4.1 Straight-line vs. Accelerated Depreciation

For our statistical analyses, we use the share of endowment invested in the risky asset A as our dependent variable. The amount invested in the risk-free asset B is the residual share. Table 4 presents descriptive statistics for our dependent variable separated for the treatments and for the gross and net value equivalence decision situations. To analyze our treatment differences statistically, we use the non-parametric Mann-Whitney U test and the parametric t-test both for two independent samples. Table 4 shows the resulting (two-sided) p-values of both tests when we compare the straight-line and accelerated depreciation treatment. Figure 1 (without subsidy) and figure 2 (with subsidy) depict the mean share of endowment invested in the risky asset A.

In the *gross value equivalence* decision situations, we expect a higher willingness to invest in the risky asset under an accelerated than under a straight-line depreciation (hypothesis 1). In the treatment with subsidy, this investment behavior is actually observed and both statistical tests indicate a significant difference between both depreciation treatments (p-values below 5%). Thus, hypothesis 1 can be confirmed. In the treatment without subsidy, however, we do not observe the expected decision pattern and differences are not statistically significant (p-values above 10%). As a result, hypothesis 1 has to be rejected for the case without subsidy.

With respect to the *net value equivalence* decision situations, we hypothesize the same investment behavior as the net returns are identical in both depreciation treatments (hypothesis 2). Independent of whether a subsidy is paid or is not paid, we observe no economically and statistically significant difference between the straight-line and accelerated depreciation treatment. All p-values are above the 10%-level. This result is in accordance with hypothesis 2 which we can therefore confirm.

Table 4: Share of endowment invested in the risky asset A (in percent)

treatment	**statistic**	**gross value equivalence decision situations**		**net value equivalence decision situations**	
		straight-line depreciation	accelerated depreciation	straight-line depreciation	accelerated depreciation
without subsidy (# of subjects: 41)	mean	74.72	72.14	75.96	72.76
	median	90.00	90.00	90.00	83.00
	std. dev.	31.94	34.84	31.97	33.25
	minimum	0	0	0	0
	maximum	100	100	100	100
	# of observations	205	205	205	205
	MWU test	p = 0.3462		p = 0.3463	
	t-test	p = 0.3252		p = 0.1713	
with subsidy (# of subjects: 38)	mean	58.78	65.17	63.66	64.86
	median	65.00	75.00	72.50	75.00
	std. dev.	39.03	37.49	37.38	35.93
	minimum	0	0	0	0
	maximum	100	100	100	100
	# of observations	190	190	190	190
	MWU test	p = 0.0428		p = 0.7028	
	t-test	p = 0.0354		p = 0.6264	

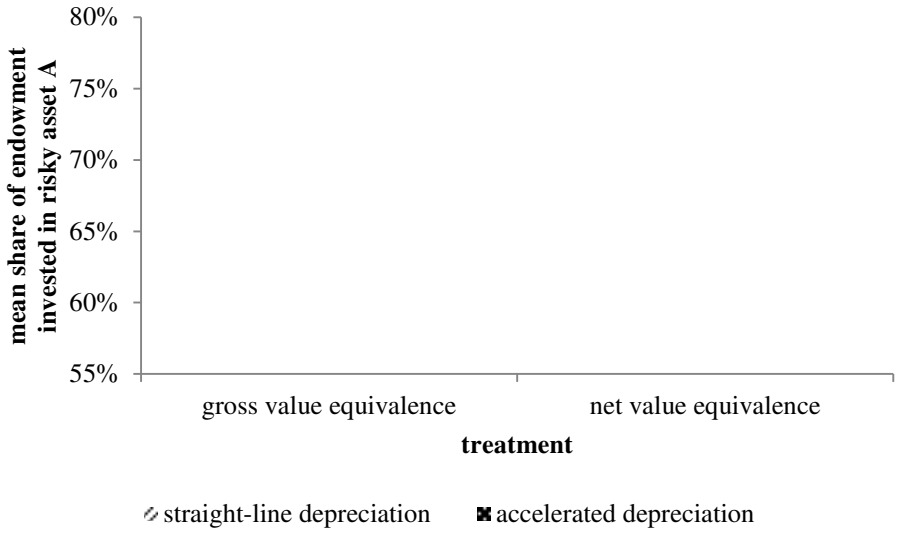

Figure 1: Mean share of endowment invested in the risky asset A (in percent) in the treatment without subsidy

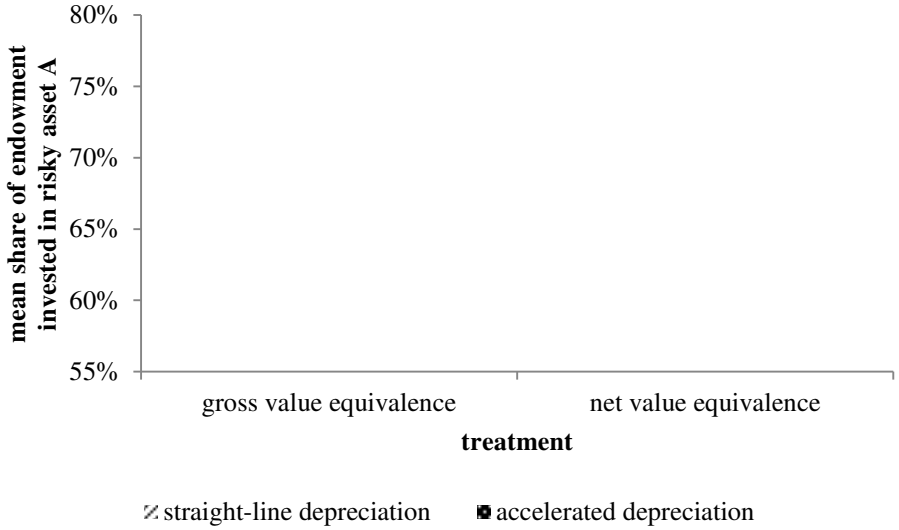

Figure 2: Mean share of endowment invested in the risky asset A (in percent) in the treatment with subsidy

4.2 Subsidy vs. No Subsidy

As observed by Ackermann et al. (2013), we hypothesize that introducing a subsidy leads investors to reduce their willingness to invest in the risky asset A although the net returns are not affected by this subsidy (hypothesis 3). As we are only interested in the decision situations with identical net returns, we just focus on the results of the net value equivalence decision situations in the following. Table 5 presents different descriptive statistics and figure 3 depicts the mean share of endowment invested in the risky asset A. Independent of whether we aggregate the results from both depreciation treatments or not, we observe that the willingness

to invest in the risky asset A decreases markedly when a subsidy is paid. All differences are statistically significant (at least) at a 5%-level. Thus, hypothesis 3 is supported and the results of Ackermann et al. (2013) are confirmed by our study.

Table 5: Share of endowment invested in the risky asset A (in percent) in the net value equivalence decision situations

treatment	statistic	without subsidy	with subsidy
straight-line and accelerated depreciation	mean	74.36	64.26
	median	90.00	75.00
	std. dev.	32.62	36.62
	minimum	0	0
	maximum	100	100
	# of subjects	41	38
	# of observations	410	380
	MWU test	$p = 0.0002$	
	t-test	$p < 0.0001$	
straight-line depreciation	mean	75.96	63.66
	median	90.00	72.50
	std. dev.	31.97	37.38
	minimum	0	0
	maximum	100	100
	# of subjects	41	38
	# of observations	205	190
	MWU test	$p = 0.0019$	
	t-test	$p = 0.0005$	
accelerated depreciation	mean	72.76	64.86
	median	83.00	75.00
	std. dev.	33.25	35.93
	minimum	0	0
	maximum	100	100
	# of subjects	41	38
	# of observations	205	190
	MWU test	$p = 0.0343$	
	t-test	$p = 0.0239$	

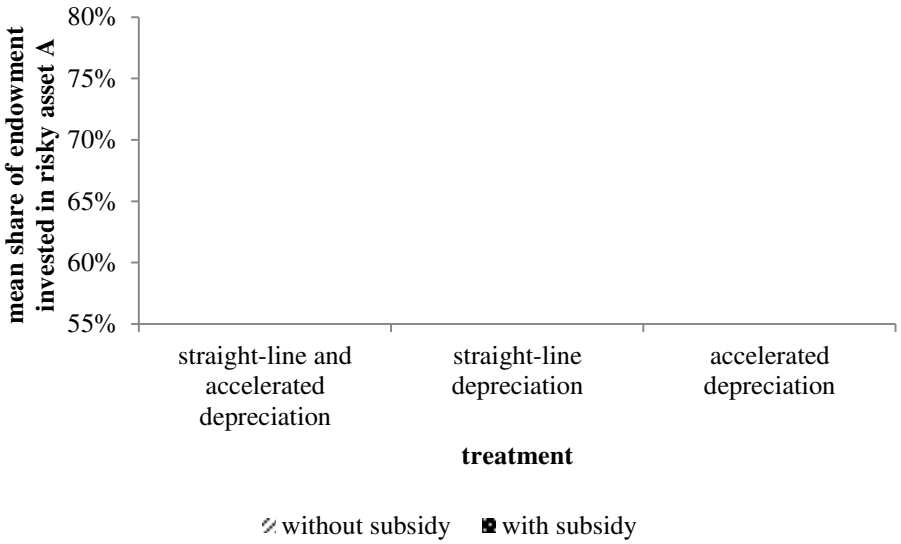

Figure 3: Mean share of endowment invested in the risky asset A (in percent) in the net value equivalent decision situations

5 Robustness Check: Three-Months-Time Lag

In the following, we analyze how robust our results are with respect to the length of the time lag between the first and the second period. The idea is that receiving the second payoff not in three weeks, but in, for example, three months makes the investment decision more important as individuals are perhaps more interested to earn money today and not in the distant future. Thus, we decided to extend the time lag to three month. Anything else remains unchanged. Table 6 and 7 present descriptive statistics for the mean share of endowment invested in the risky asset A for the treatments with the three-months-time lag.

Regarding the differences between the straight-line and accelerated depreciation treatments (see table 6), we observe very similar results as we observed with a time lag of three weeks. In the gross value equivalence decision situations, we only observe an economically and statistically significant difference between both deprecation treatments in the treatment with subsidy. As a consequence, hypothesis 1 has to be confirmed for the case with subsidy, but has to be rejected for the case without subsidy. In the net value equivalence decision situation, we find no differences and therefore hypothesis 2 is supported, again. So far, these results are robust to different time lags. With respect to the introduction of a subsidy (table 7), we still observe a decrease of the willingness to invest in the risky asset A when a subsidy is paid. However, the difference is not significant anymore. As a consequence hypothesis 3 is confirmed in the three-weeks-case, but has to be rejected in the three-months-case.

Table 6: Share of endowment invested in the risky asset A (in percent) – three month time lag

treatment	statistic	gross value equivalence decision situations		net value equivalence decision situations	
		straight-line depreciation	accelerated depreciation	straight-line depreciation	accelerated depreciation
without subsidy (# of subjects: 43)	mean	64.41	63.28	65.60	65.17
	median	70.00	70.00	70.00	80.00
	std. dev.	34.94	36.03	34.86	35.77
	minimum	0	0	0	0
	maximum	100	100	100	100
	# of observations	215	215	215	215
	MWU test	p = 0.9104		p = 0.9825	
	t-test	p = 0.6771		p = 0.8578	
with subsidy (# of subjects: 43)	mean	61.61	68.25	64.44	62.56
	median	70.00	75.00	75.00	70.00
	std. dev.	35.17	32.33	35.33	34.22
	minimum	0	0	0	0
	maximum	100	100	100	100
	# of observations	215	215	215	215
	MWU test	p = 0.1025		p = 0.2871	
	t-test	p = 0.0062		p = 0.4103	

Table 7: Share of endowment invested in the risky asset A (in percent) in the net value equivalence decision situations – three month time lag

treatment	statistic	without subsidy	with subsidy
straight-line and accelerated depreciation	mean	65.39	63.50
	median	75.00	70.00
	std. dev.	35.28	34.75
	minimum	0	0
	maximum	100	100
	# of subjects	43	43
	# of observations	430	430
	MWU test	p = 0.1933	
	t-test	p = 0.4299	
straight-line depreciation	mean	65.60	64.44
	median	70.00	75.00
	std. dev.	34.86	35.33
	minimum	0	0
	maximum	100	100
	# of subjects	43	43
	# of observations	215	215
	MWU test	p = 0.5605	
	t-test	p = 0.7324	
accelerated depreciation	mean	65.17	62.56
	median	80.00	70.00
	std. dev.	35.77	34.22
	minimum	0	0
	maximum	100	100
	# of subjects	43	43
	# of observations	215	215
	MWU test	p = 0.2284	
	t-test	p = 0.4392	

6 Summary and Discussion

The aim of this study is to analyze how depreciation regulations influence the decision behavior of investors. For this purpose, we conduct a laboratory experiment in which participants decide on the composition of an asset portfolio in different choice situations. In line with the theoretical literature, we hypothesize that the capital amount invested in the risky asset is higher under an accelerated than under a straight-line depreciation as the net present value of the investment is higher in the former case (hypothesis 1). As a result, this hypothesis is supported by our data, but only in the treatment with a subsidy. If no subsidy exists, however, the hypothesis has to be rejected.

To control for perception biases which are possibly responsible for this unexpected decision pattern, we use treatments in which the gross returns are adapted in such a way that the net returns are identical under both depreciation methods (net value equivalence decision situations). As a consequence, the same investment behavior is expected in these treatments (hypothesis 2). In line with this hypothesis, we observe no economically and statistically significant difference between the straight-line and accelerated depreciation treatment irrespective of whether a subsidy is paid or is not paid. Thus, we can summarize (1) that perception biases do not occur in this context, but (2) that the theoretical prediction that an accelerated depreciation rule spurs investments is only observed in the more complex treatment with a subsidy. These findings are robust even in a setting in which the time lag between the first and second period is extended to three months instead of three weeks.

To replicate the unexpected observation of Ackermann et al. (2013) that introducing a subsidy leads to a lower willingness to take risk although the net returns are kept constant, we implement treatments with and without a subsidy. Independent of whether we aggregate the results from both depreciation treatments or not, we observe that the willingness to invest in the risky asset A decreases markedly when a subsidy is paid. Thus, we are able to confirm our third hypothesis and, therefore, are able to replicate the findings observed by Ackermann et al. in another kind of experimental environment with different payment periods.

Interestingly, this behavior is not observed in our robustness check treatments in which the time lag between the first and second period is extended to 3 months. One plausible explanation for this asymmetric behavior is that subjects take the investment decision more seriously in the three months than in the three weeks setting. In the former case, subjects are perhaps more willing to think about the choice problem as a “wrong” decision would possibly lead to a lower payoff today and a higher payoff in the distant future. Since this trade-off of

receiving less today and more in the future is more important in the three months than in the three weeks setting, a more "rational" behavior and, thus, a lower level of perception bias is to be expected in the first case.

In addition to our contribution to the literature on the effects of different depreciation methods on investment decisions, our study indicates that experimental results depend to some extent on the experimental environment. In particular, we show that the theoretically expected higher willingness to invest under an accelerated depreciation rule is only observed in the more complex treatment with a subsidy and we show that the perception bias found by Ackermann et al. (2013) is only observed in the environment with the three-weeks-time lag between both payment periods. Therefore, future research is required to analyze in more detail why these environment-dependent differences occur.

Appendix

A1 Instructions (originally written in German)

In the following, the instructions of our experiment are presented for the three weeks case. The difference between these instructions and the instructions of the three month case is just the replacement of the word "month" instead of "week". Differences between the treatments with and without a subsidy are highlighted.

General Remarks

By taking part in this experiment, you receive the chance to earn money. The amount of money you may earn depends on the decisions you make during the experiment and upon chance.

Please note that you will not receive your full earnings today. One part of your earnings is paid out to you in cash at the end of the experiment. You will receive the other part in three weeks (meaning on June 12, 2013).

Either you can collect the payment, which you will receive in three weeks, by yourself or it will be transferred to your bank account. We will ask you to choose one of the described alternatives after the experiment.

- In case you decide for collecting the payment by yourself, come to Room 317 (Building 22 A-Part) between 9 am and 5 pm on June 12, 2013 for collecting it.
- In case you decide for transferring the payment to your bank account, we will ask you for your account information after the experiment. We will transfer the remaining

payment on June 12, 2013. We explicitly assure you that your data is treated confidentially. Your data will not be disclosed to any third party and is deleted immediately after the transfer.

On the following pages, you find the experiment instructions.

Experiment instructions

For simplification purposes, calculations are done by using Lab-points instead of Euro amounts during the experiment. 2 Lab-points correspond to one Euro Cent, i.e., 200 Lab-points are equal to 1 Euro.

We would like to point out that you are not allowed to talk to other participants or to leave your seat during the experiment. Please read the instructions carefully and thoroughly. In case you have any questions, raise your hand. We will then come to your place for answering your questions. The experiment starts after all participants fully understood the instructions. The experiment consists of *20 decision situations*.

Your task during the experiment

At the beginning of each decision situation, you receive an initial capital of 800 Lab-points which you have to invest in different investment objects. You have to choose to invest in either of the two following investment alternatives: type A or type B. Both investment types are structured in such a way that you can choose to buy one or several objects of either type, i.e., you can decide to buy 1 or, for example, 70 objects of investment type A.

The price for buying one object amounts to 8 Lab-points and is the same for both types. As you receive an initial capital of 800 Lab-points, you can thus buy 100 objects of both types together (type A and type B) in each decision situation.

In each round, you have to choose how many objects of type A and type B you want to buy. You only have to decide how many objects of type A you want to buy. The remaining capital is then automatically invested in objects of type B.

> ***Example:*** *If you decide, for example, to buy 70 objects of type A, you have to spend 560 Lab-points (= 70 · 8 Lab-points per object). The remaining 240 Lab-points (= 800 Lab-points – 560 Lab-points) are then automatically invested in objects of type B. Thus, you receive 30 objects of type B (= 240 Lab-points / 8 Lab-points per object).*

Please note: Both investment types (type A and type B) generate two payoffs. You receive one payoff today and the second one in three weeks.

Payoff of type A

Gross profit of type A

Each acquired object of type A generates a certain *gross profit* at each payment date, i.e., today and in three weeks. The amount of gross profit generated at one payment date is equal for every object of type A. However, the amount of gross profit generated can differ across the two payment dates.

The gross profit of type A depends on the occurrence of a state of nature. Three different states of nature can occur: good, middle, and bad. All states of nature occur with the same probability ($p = 1/3$). The possible gross profits of the three states of nature may be different from decision situation to decision situation and are provided to you prior to each decision.

Example:

state of nature	payment date: today	payment date: in 3 weeks
good	50	30
middle	40	20
bad	30	10

Please note: The state of nature generated by chance is applied for both payment dates. Considering the example above, if the state of nature "middle" occurs, the gross profit generated at the payment date "today" is 40 Lab-points and at the payment date "in three weeks" is 20 Lab-points. Which state of nature occurs is chosen once by chance and this state is then valid for both payment dates.

Gross payoff of type A

Your "gross payoff of type A" equals the product of the realized gross profit of type A and your acquired amount of objects of type A. For example, if the realized gross profit of type A is 40 Lab-points at a certain payment date and your acquired amount of objects of type A is 70, you receive a "gross payoff of type A" equal to 2,800 Lab-points (= 40 Lab-points · 70) at this payment date.

Net payoff of type A

Type A investment is subject to taxation. The so-called tax base provides the basis for calculating the tax amount. *The tax you have to pay amounts to 50% of the tax base*. The tax base is calculated as follows:

Tax base = gross payoff of type A – deduction

The tax base is thus determined by the amount of your gross payoff of type A and the level of deduction. The level of deduction depends on 1) the amount of capital that you have invested in type A in total and 2) which of the following rules is applied:

1. **50%-50%-rule:** At the first payment date (i.e., today), the level of deduction equals *50%* of the invested capital. At the second payment date (i.e., in three weeks), the level of deduction equals *50%* of the invested capital.
2. **100%-0%-rule:** At the first payment date (i.e., today), the level of deduction equals *100%* of the invested capital. At the second payment date (i.e., in three weeks), the level of deduction equals *0%* of the invested capital.

The applied rule may be different from decision situation to decision situation and is provided to you prior to each decision.

[treatment without subsidy:

Your "net payoff of type A" equals the "gross payoff of type A" minus tax payment.]

[treatment with subsidy:

Besides being subject to taxation, type A investments are also be granted a subsidy. The subsidy amounts to 2 Lab-points for each acquired object of type A. Please note that this subsidy will be granted to you at both payment dates. For example, if you buy 70 objects of type A, you receive a subsidy of 140 Lab-points (= 2 Lab-points · 70) at both payment dates.

Please note that the level of subsidization does not influence the level of taxation.

Your "net payoff of type A" equals the "gross payoff of type A" minus tax payment plus subsidy.]

Payoff of type B

Similar to type A investments, each acquired object of type B generates a profit at each payment date. The amount of profit generated at one payment date is equal for every object of type B. However, the amount of profit generated can differ across the two payment dates. In contrast to type A investments, the amount of profit of type B does not depend on the occurrence of a state of nature, but is equal in all states of nature. Before making your decision, you thus know with certainty the amount of profit generated at each payment date.

Example:

state of nature	payment date: today	payment date: in 3 weeks
good	30	15
middle	30	15
bad	30	15

The profit of type B may be different from decision situation to decision situation and is provided to you prior to each decision.

[treatment without subsidy:

In contrast to type A investments, type B is not subject to taxation.*]*

[treatment with subsidy:

In contrast to type A investments, type B is neither subject to taxation nor to subsidization.*]*

Your "payoff of type B" equals the product of the profit of type B and your acquired amount of objects of type B. For example, if the realized profit of type B is 30 Lab-points and your acquired amount of objects of type B is 30, you receive a "payoff of type B" equal to 900 Lab-points (= 30 Lab-points · 30).

Total payoff of type A and B

Each payment date generates a total payoff which equals the sum of the "net payoff of type A" and the "payoff of type B". Please note that a total payment is determined for each payment date.

Calculation example

Taking both rules into account, the following table gives a calculation example of how the total payoff is calculated. The following values are assigned in the calculation: acquired amount of objects of type A 70, realized gross profit of type A at first payment date (i.e., today) 40 Lab-points, realized gross profit of type A at second payment date (i.e., in three weeks) 20 Lab-points, payoff of type B at first payment date 30 Lab-points, and payoff of type B at second payment date 15 Lab-points.

[treatment without subsidy:

		deduction rule	**50%-50%-rule**		**100%-0%-rule**	
		payment date	**today**	**in 3 weeks**	**today**	**in 3 weeks**
given values	(1)	percentage for deduction	50%	50%	100%	0%
	(2)	acquired amount of objects of type A	70	70	70	70
	(3)	realized gross profit of type A	40	20	40	20
	(4)	profit of type B	30	15	30	15
asset A	(5)	gross payoff of type A = (2) · (3)	2,800	1,400	2,800	1,400
	(6)	amount invested in type A = (2) · 8 Lab-points	560	560	560	560
	(7)	deduction = (1) · (6)	280	280	560	0
	(8)	tax base = (5) – (7)	2,520	1,120	2,240	1,400

	(9)	tax amount = 50% · (8)	1,260	560	1,120	700
	(10)	**net payoff of type A** **= (5) – (9)**	**1,540**	**840**	**1,680**	**700**
asset B	(11)	acquired objects of type B = 100 – (2)	30	30	30	30
	(12)	**payoff of type B** **= (4) · (11)**	**900**	**450**	**900**	**450**
	(13)	**total net payoff** **= (10) + (12)**	**2,440**	**1,290**	**2,580**	**1,150**

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[treatment with subsidy:

		depreciation rule	**50%-50%-rule**		**100%-0%-rule**	
		payment date	**today**	**in 3 weeks**	**today**	**in 3 weeks**
given values	(1)	percentage for deduction	50%	50%	100%	0%
	(2)	acquired amount of objects of type A	70	70	70	70
	(3)	realized gross profit of type A	40	20	40	20
	(4)	subsidy per object of type A	2	2	2	2
	(5)	profit of type B	30	15	30	15
asset A	(6)	gross payoff of type A = (2) · (3)	2,800	1,400	2,800	1,400
	(7)	amount invested in type A = (2) · 8 Lab-points	560	560	560	560
	(8)	deduction = (1) · (7)	280	280	560	0
	(9)	tax base = (6) – (8)	2,520	1,120	2,240	1,400
	(10)	tax amount = 50% · (9)	1,260	560	1,120	700
	(11)	subsidy = (2) · (4)	140	140	140	140
	(12)	**net payoff of type A** **= (6) – (10) + (11)**	**1,680**	**980**	**1,820**	**840**
asset B	(13)	acquired objects of type B = 100 – (2)	30	30	30	30
	(14)	**payoff of type B** **= (5) · (13)**	**900**	**450**	**900**	**450**
	(15)	**total net payoff** **= (12) + (14)**	**2,580**	**1,430**	**2,720**	**1,290**

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General information

You have the opportunity to conduct test calculations at your computer (lower half of the screen) during the experiment. While doing this, different values (including gross and net values) are presented to you. In addition, you can use the pocket calculator which is at your workplace for own calculations.

After the completion of all 20 decision situations, you will be asked to draw a ball from an urn containing 20 consecutively numbered balls (from 1 to 20). The number assigned to the drawn ball determines the decision situation which is paid out to you. Further, you will be asked to throw a six-sided dice once for determining the state of nature that occurs. If you throw a [1] or [2], the state of nature "good" occurs. If you throw a [3] or [4], the state of nature "middle" occurs. If you throw a [5] or [6], the state of nature "bad" occurs. Your payoff of taking part in the experiment is thus determined by the amount of objects of type A and B you have chosen to buy in this decision situation. The total payoff is then converted in Euro and you receive the payoff generated at the payment date "today" in cash at the end of the experiment. In three weeks, you receive the in Euro converted payoff generated at the payment date "in three weeks".

After you have read the instructions, we ask you to answer several questions at your computer. Answering these questions allows us to test whether you have fully understood the experimental proceeding. At this point, your answers are not relevant for your payoff at the end of the experiment. Subsequently, the actual experiment starts. Please note that the computer program we use does not separate decimal places with a comma, but with a period.

A2 Gross and net returns

Table A1 and A2 depict the (potential) gross and net returns of both assets in each decision situation for each treatment.

Table A1: Gross and net returns in the treatment without subsidy

depreciation rule	value equivalence	decision number	state of nature	gross return				net return			
				asset A		asset B		asset A		asset B	
				period 1	period 2	period 1	period 2	period 1	period 2	period 1	period 2
straight-line depreciation	net value equivalent decision situations	1	bad	28.8	16.8	14.2	14.2	16.4	10.4	14.2	14.2
			middle	32.8	18.8			18.4	11.4		
			good	36.8	20.8			20.4	12.4		
		2	bad	16.8	28.8	14.2	14.2	10.4	16.4	14.2	14.2
			middle	18.8	32.8			11.4	18.4		
			good	20.8	36.8			12.4	20.4		
		3	bad	21.6	21.6	14.2	14.2	12.8	12.8	14.2	14.2
			middle	25.6	25.6			14.8	14.8		
			good	29.6	29.6			16.8	16.8		
		4	bad	30.8	18.8	6.8	22.8	17.4	11.4	6.8	22.8
			middle	32.8	20.8			18.4	12.4		
			good	34.8	22.8			19.4	13.4		
		5	bad	18.8	30.8	22.8	6.8	11.4	17.4	22.8	6.8
			middle	20.8	32.8			12.4	18.4		
			good	22.8	34.8			13.4	19.4		

accelerated depreciation	net value equivalent decision situations	6	bad	24.8	20.8	14.2	14.2	16.4	10.4	14.2	14.2
			middle	28.8	22.8			18.4	11.4		
			good	32.8	24.8			20.4	12.4		
		7	bad	12.8	32.8	14.2	14.2	10.4	16.4	14.2	14.2
			middle	14.8	36.8			11.4	18.4		
			good	16.8	40.8			12.4	20.4		
		8	bad	17.6	25.6	14.2	14.2	12.8	12.8	14.2	14.2
			middle	21.6	29.6			14.8	14.8		
			good	25.6	33.6			16.8	16.8		
		9	bad	26.8	22.8	6.8	22.8	17.4	11.4	6.8	22.8
			middle	28.8	24.8			18.4	12.4		
			good	30.8	26.8			19.4	13.4		
		10	bad	14.8	34.8	22.8	6.8	11.4	17.4	22.8	6.8
			middle	16.8	36.8			12.4	18.4		
			good	18.8	38.8			13.4	19.4		
straight-line depreciation	gross value equivalent decision situations	11	bad	16.4	10.4	9.1	9.1	10.2	7.2	9.1	9.1
			middle	18.4	11.4			11.2	7.7		
			good	20.4	12.4			12.2	8.2		
		12	bad	10.4	16.4	9.1	9.1	7.2	10.2	9.1	9.1
			middle	11.4	18.4			7.7	11.2		
			good	12.4	20.4			8.2	12.2		
		13	bad	12.8	12.8	9.1	9.1	8.4	8.4	9.1	9.1
			middle	14.8	14.8			9.4	9.4		
			good	16.8	16.8			10.4	10.4		
		14	bad	17.4	11.4	5.4	13.4	10.7	7.7	5.4	13.4
			middle	18.4	12.4			11.2	8.2		
			good	19.4	13.4			11.7	8.7		
		15	bad	11.4	17.4	13.4	5.4	7.7	10.7	13.4	5.4
			middle	12.4	18.4			8.2	11.2		
			good	13.4	19.4			8.7	11.7		

accelerated depreciation	gross value equivalent decision situations	16	bad	16.4	10.4	9.1	9.1	12.2	5.2	9.1	9.1
			middle	18.4	11.4			13.2	5.7		
			good	20.4	12.4			14.2	6.2		
		17	bad	10.4	16.4	9.1	9.1	9.2	8.2	9.1	9.1
			middle	11.4	18.4			9.7	9.2		
			good	12.4	20.4			10.2	10.2		
		18	bad	12.8	12.8	9.1	9.1	10.4	6.4	9.1	9.1
			middle	14.8	14.8			11.4	7.4		
			good	16.8	16.8			12.4	8.4		
		19	bad	17.4	11.4	5.4	13.4	12.7	5.7	5.4	13.4
			middle	18.4	12.4			13.2	6.2		
			good	19.4	13.4			13.7	6.7		
		20	bad	11.4	17.4	13.4	5.4	9.7	8.7	13.4	5.4
			middle	12.4	18.4			10.2	9.2		
			good	13.4	19.4			10.7	9.7		

Table A2: Gross and net returns in the treatment with subsidy

depreciation rule	**value equivalence**	**decision number**	**state of nature**	**gross return**				**net return**			
				asset A		**asset B**		**asset A**		**asset B**	
				period 1	period 2	period 1	period 2	period 1	period 2	period 1	period 2
straight-line depreciation	net value equivalent decision situations	1	bad	24.8	12.8	14.2	14.2	16.4	10.4	14.2	14.2
			middle	28.8	14.8			18.4	11.4		
			good	32.8	16.8			20.4	12.4		
		2	bad	12.8	24.8	14.2	14.2	10.4	16.4	14.2	14.2
			middle	14.8	28.8			11.4	18.4		
			good	16.8	32.8			12.4	20.4		
		3	bad	17.6	17.6	14.2	14.2	12.8	12.8	14.2	14.2
			middle	21.6	21.6			14.8	14.8		
			good	25.6	25.6			16.8	16.8		
		4	bad	26.8	14.8	6.8	22.8	17.4	11.4	6.8	22.8
			middle	28.8	16.8			18.4	12.4		
			good	30.8	18.8			19.4	13.4		
		5	bad	14.8	26.8	22.8	6.8	11.4	17.4	22.8	6.8
			middle	16.8	28.8			12.4	18.4		
			good	18.8	30.8			13.4	19.4		

accelerated depreciation	net value equivalent decision situations	6	bad	20.8	16.8	14.2	14.2	16.4	10.4	14.2	14.2
			middle	24.8	18.8			18.4	11.4		
			good	28.8	20.8			20.4	12.4		
		7	bad	8.8	28.8	14.2	14.2	10.4	16.4	14.2	14.2
			middle	10.8	32.8			11.4	18.4		
			good	12.8	36.8			12.4	20.4		
		8	bad	13.6	21.6	14.2	14.2	12.8	12.8	14.2	14.2
			middle	17.6	25.6			14.8	14.8		
			good	21.6	29.6			16.8	16.8		
		9	bad	22.8	18.8	6.8	22.8	17.4	11.4	6.8	22.8
			middle	24.8	20.8			18.4	12.4		
			good	26.8	22.8			19.4	13.4		
		10	bad	10.8	30.8	22.8	6.8	11.4	17.4	22.8	6.8
			middle	12.8	32.8			12.4	18.4		
			good	14.8	34.8			13.4	19.4		
straight-line depreciation	gross value equivalent decision situations	11	bad	16.4	10.4	11.1	11.1	12.2	9.2	11.1	11.1
			middle	18.4	11.4			13.2	9.7		
			good	20.4	12.4			14.2	10.2		
		12	bad	10.4	16.4	11.1	11.1	9.2	12.2	11.1	11.1
			middle	11.4	18.4			9.7	13.2		
			good	12.4	20.4			10.2	14.2		
		13	bad	12.8	12.8	11.1	11.1	10.4	10.4	11.1	11.1
			middle	14.8	14.8			11.4	11.4		
			good	16.8	16.8			12.4	12.4		
		14	bad	17.4	11.4	7.4	15.4	12.7	9.7	7.4	15.4
			middle	18.4	12.4			13.2	10.2		
			good	19.4	13.4			13.7	10.7		
		15	bad	11.4	17.4	15.4	7.4	9.7	12.7	15.4	7.4
			middle	12.4	18.4			10.2	13.2		
			good	13.4	19.4			10.7	13.7		

accelerated depreciation	gross value equivalent decision situations	16	bad	16.4	10.4	11.1	11.1	14.2	7.2	11.1	11.1
			middle	18.4	11.4			15.2	7.7		
			good	20.4	12.4			16.2	8.2		
		17	bad	10.4	16.4	11.1	11.1	11.2	10.2	11.1	11.1
			middle	11.4	18.4			11.7	11.2		
			good	12.4	20.4			12.2	12.2		
		18	bad	12.8	12.8	11.1	11.1	12.4	8.4	11.1	11.1
			middle	14.8	14.8			13.4	9.4		
			good	16.8	16.8			14.4	10.4		
		19	bad	17.4	11.4	7.4	15.4	14.7	7.7	7.4	15.4
			middle	18.4	12.4			15.2	8.2		
			good	19.4	13.4			15.7	8.7		
		20	bad	11.4	17.4	15.4	7.4	11.7	10.7	15.4	7.4
			middle	12.4	18.4			12.2	11.2		
			good	13.4	19.4			12.7	11.7		

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How does the type of subsidization affect investments: Experimental evidence*

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Abstract

I study how different types of subsidization affect investment decisions in a laboratory experiment. Even though the expected profit is identical in all treatments, I find highly significant differences between them. In particular, when investment alternatives get subsidized with tax credits the willingness to invest in the subsidized alternative increases remarkably. In addition, the willingness to take risks increases in general, when tax credits are introduced. Hence, tax credits might be more effective in promoting investments.

Keywords: behavioral economics, subsidies, tax incentives, distorting subsidization, real investment, risk-taking behavior

JEL-Codes: C91, D14, H25

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1 Introduction

Granting a tax incentive can be understood as the opposite of taxation. If governments subsidize in order to spur investments, the fiscal budget decreases. To keep the costs of a promotion program as low as possible, governments are interested in a most effective type of subsidization. The theory of investment behavior of firms was developed by Jorgenson (1963) respectively Hall and Jorgenson (1967).[1] In simple terms, they explain that investments will take place as long as the cost of an investment is smaller than the additional benefit of it. Tax incentives reduce the cost respectively increase the benefit of the investment and should therefore encourage investments. Hence, when the financial benefit is equal between different types of subsidization, the neo-classic investment theory predicts the same impact on investment behavior, independent from the chosen type of subsidization. While many empirical studies confirm this general relationship, they do not allow for comparisons between different types of subsidization.[2]

Nevertheless, when governments promote firms to spur investments, they often use different types of subsidization. Depending on the type of the incentive, the fiscal authority pays an amount to the firm (grant) or subsidizes through a reduction of the tax liability of the firm (e.g. by a reduction of the tax base or a reduced tax rate). Yet, there are only a few studies focusing on the mechanism of different types of subsidization. Pennings (2000) shows in a real-option model, that a tax reduction is more effective in attracting investments than equivalent investment subsidies. Danielova and Sarkar (2011) argue that a combination of lower taxes and investment subsidies spurs investments at most. In a review of tax policy literature Morisset and Pirnia (2001) argue that governments are well-advised to use different types of intervention for different purposes. They emphasize that export-oriented

[1] Other key theoretical studies include Tobin (1969); Hayashi (1982); Abel and Eberly (1994).

[2] Cummins and Hassett (1992); Cummins et al. (1994); Hassett and Hubbard (2002); Chirinko and Wilson (2008); Hassett and Newmark (2008).

firms are more attracted by reduced tax rates than those seeking the domestic market, start-up firms are more responsive to incentives that reduce their initial expenses, while expanding firms will prefer tax incentives that reduce the tax burden on profits, and small firms react stronger on tax incentives than large ones because taxes play a more important role in small firms.

The existing empirical literature provides evidence that the effectiveness of subsidies may depend on the chosen mechanism of subsidization. Bernstein and Shah (1995) examine different types of tax incentives regarding their impact in attracting investments in developing countries. They conclude that a specific subsidization is more effective than general incentives. Selective interventions such as special tax credits for investments or R&D, and special depreciation rules for particular capital goods are more effective than a general corporate tax rate reduction or tax holidays. Wells and Allen (2001) expose that tax holidays have only a weak influence by attracting investments. Yu et al. (2007) compare the effects of entry cost subsidies and tax rate reductions on foreign direct investments. They come to the conclusion that entry cost subsidies, such as providing cheaper land, are more effective than equivalent tax rate reductions.

All of these studies concern rational decision makers. This assumption is at least questionable. Some experimental literature suggests that there is a perception bias of tax rules which may affect economic decision-making. Swenson (1989) as well as King and Wallin (1990) pronounced that proportional taxes lead to higher risky investments than progressive taxes. The studies of Epley et al. (2006) and Epley and Gneezy (2007) indicate that a bonus (grant) is valued more than a equivalent tax rebate. Blaufus et al. (2013) argue that higher tax rates result in a higher perceived tax burden than equivalent changes in the tax base. It seems likely that these findings are not only relevant for the taxation of business but also for subsidization. Nevertheless, an empirical investigation on the behavioral effects of a broad selection of different investment subsidies is still missing.

Hence, there remains uncertainty regarding the effectiveness of different types of subsidization. In most empirical studies, the effect of a subsidy is measured by a comparison of the situation before the subsidy was introduced with the situation thereafter or with a situation which is very similar (difference-in-differences methodology). Changes in tax provisions often coincide with other changes in the tax law which also can influence investment behavior. Due to the coincidence of different changes in the tax law, the impact of a single tax provision should be hard to measure (see for instance Hulse and Livingstone (2010) or Black et al. (2010)).

In contrast to archival studies, laboratory experiments can focus on the different types of subsidization in investment decisions. Other disturbing influences can be excluded. Hence, this approach should be most well suited to identify behavioral effects of different types of subsidization. To my knowledge, there are no experimental studies to date which focus on the impact of different types of subsidization on risky investments. This paper will continue at this point of research.

I build up a laboratory experiment in which participants have to make portfolio choices in an investment setting. In five laboratory treatments I study five different types of subsidization and their influence on the choice between risky and risk-free assets. The tested types of subsidization are: *grant*, *tax exemption*, *tax allowance*, *tax credit* and *tax rate relief*. Other types of subsidization which include a time component, such as tax holidays, guarantees, loss-offset rules or accelerated depreciation rules will not be considered. Although the expected profit is identical in all treatments, I find highly significant differences in the willingness to take risks between the different types of intervention. Indeed, participants seem to perceive the benefit through the subsidization differently. The highest amount which was invested in the subsidized risky alternative could be observed when investments were subsidized with tax credits. Therefore tax credits seem to be most effective.

The paper is organized as follows. In Section 2 the setting of the experiment, the analyzed types of subsidization and the hypotheses are described. The results are described in Section 3. In the following Section 4 the results will be discussed before the study ends with a conclusion in Section 5.

2 Experimental design and hypotheses

In order to identify the effect of subsidization on risky investments, I conducted a laboratory experiment. Experimentations allow to focus on concrete questions. In the experiment I have stronger control over extraneous influences, which can affect investment decisions outside the laboratory. It permits a direct test of theory and a focus on the different opportunities to subsidize.

2.1 Design of the experiment

The experiment has been conducted in order to investigate the impact of five different types of subsidization. Therefore, the experiment consists of five separate treatments. Only one type of subsidization was considered per treatment. The participants take part in only one of the five treatments ("between-subject design"). For each investment choice, the participants have to choose between three investment alternatives (alternative A, B, and C) and have no time limitations in making their choice. At the beginning of each investment decision, participants receive an endowment of 100 Lab-points where 1 Lab-point corresponds to 1 Euro Cent. In each investment decision, participants have to invest their endowment of 100 Lab-points in three alternatives. Thereby, they have to choose the amount that should be invested in objects of alternative A and alternative B. The remaining amount will automatically be invested in objects of alternative C. The price for one object of each type is always 1 Lab-point. It was a one-shot game and therefore the decisions are independent. No time effects can occur.

The investment alternatives are designed in such a way that they vary in risk. The risk can be measured by the difference between the highest and smallest payoff, the probability of a payoff, and the number of states of environment. Eight equally probable states of environment are possible.[3] While alternative A and alternative B are risky investments, alternative C is risk-free. Therefore the return of alternative C is equal in every state of environment. Alternative B is more risky than alternative A, because the difference between the highest and smallest payoff is higher. Without subsidization, the expected payoff of each alternative is equal. They differ only in the variance of the payoff.

When investments differ in risk, risk-averse investors require a risk premium to purchase the more risky alternative. Without such risk premium, the demand for the most risky alternative B would decrease. Therefore, I include a subsidy for alternative B. Investors should find subsidized alternatives more attractive, and the amount invested in alternative B should rise. The type of subsidization which result in the highest investment in alternative B should be the most effective one with the highest impact in attracting investments. Therefore I need no baseline treatment. However, in a previous work, Ackermann et al. (2013) found out that subsidization could result in a decreased willingness to take risks because of complexity. If there are some participants who want to invest risky but are discouraged by the complexity of subsidization, there might invest in the alternate risky alternative A.

Taxation is considered in every investment decision. For simplification, the tax rate is fifty percent. The payment to the participants after the experiment depends on the net payoff of the investment decisions. Therefore, participants are interested in maximizing possible net payoffs. During the treatment the participants face only the gross payoff and the type of subsidization. To calculate the net payoff, participants have to subtract the tax burden from the gross payoff. The tax burden is calculated by multiplying the tax base with the tax rate. The tax base is the gross payoff minus the invested endowment.

[3] The probability of the states of environment is therefore: $p = \frac{1}{8}$.

State of environment	Decision task (without subsidization)											
	Alternative A				Alternative B				Alternative C			
	gross	tax base	tax	net	gross	tax base	tax	net	gross	tax base	tax	net
1	11.20	10.20	5.10	6.10	9.80	8.80	4.40	5.40	14.00	13.00	6.50	7.50
2	12.00	11.00	5.50	6.50	11.00	10.00	5.00	6.00	14.00	13.00	6.50	7.50
3	12.80	11.80	5.90	6.90	12.20	11.20	5.60	6.60	14.00	13.00	6.50	7.50
4	13.60	12.60	6.30	7.30	13.40	12.40	6.20	7.20	14.00	13.00	6.50	7.50
5	14.40	13.40	6.70	7.70	14.60	13.60	6.80	7.80	14.00	13.00	6.50	7.50
6	15.20	14.20	7.10	8.10	15.80	14.80	7.40	8.40	14.00	13.00	6.50	7.50
7	16.00	15.00	7.50	8.50	17.00	16.00	8.00	9.00	14.00	13.00	6.50	7.50
8	16.80	15.80	7.90	8.90	18.20	17.20	8.60	9.60	14.00	13.00	6.50	7.50
$E(X)$				7.50				7.50				7.50
σ_i				0.98				1.47				0.00

Table 1 Payoffs without subsidization

This calculation remains the same in all of the five treatments. Table 1 shows an example for calculating the net payoff without subsidization. Without subsidization the expected net value is equal in all cases, while the standard deviation remains constant.

As mentioned above, the introduction of a tax incentive on alternative B increases the expected net payoff of alternative B above that of alternative A and alternative C. The amount exceeding the expected value of alternative B results only from the subsidization. The benefit through the subsidization is identical in all of the five treatments. Therefore, the expected net payoff is identical between the different treatments. They differ only in the way of subsidization. Table 2 shows an example for calculating the net payoff with subsidization. Alternative B gets subsidized with a *grant* (subsidization rate = 10%).

To learn more about the perception of the different types of subsidization, I vary the level of subsidization and the level of risk. Four rates of subsidization (sub-rates) were considered (10%, 15%, 20% and 25%). For

State of environment	Decision task (Alternative B gets subsidized with a grant)												
	Alternative A				Alternative B					Alternative C			
	gross	tax base	tax	net	gross	tax base	tax	subsidy	net	gross	tax base	tax	net
1	11.20	10.20	5.10	6.10	9.38	8.38	4.19	0.75	5.94	14.00	13.00	6.50	7.50
2	12.00	11.00	5.50	6.50	10.70	9.70	4.85	0.75	6.60	14.00	13.00	6.50	7.50
3	12.80	11.80	5.90	6.90	12.02	11.02	5.51	0.75	7.26	14.00	13.00	6.50	7.50
4	13.60	12.60	6.30	7.30	13.34	12.34	6.17	0.75	7.92	14.00	13.00	6.50	7.50
5	14.40	13.40	6.70	7.70	14.66	13.66	6.83	0.75	8.58	14.00	13.00	6.50	7.50
6	15.20	14.20	7.10	8.10	15.98	14.98	7.49	0.75	9.24	14.00	13.00	6.50	7.50
7	16.00	15.00	7.50	8.50	17.30	16.30	8.15	0.75	9.90	14.00	13.00	6.50	7.50
8	16.80	15.80	7.90	8.90	18.62	17.62	8.81	0.75	10.56	14.00	13.00	6.50	7.50
E(X)				7.50					8.25				7.50
σ_i				0.98					1.62				0.00

Table 2 Payoffs with subsidization (sub-rate = 10%)

example, in the 10% sub-rate decisions, the economic impact caused by the subsidization amounts to 10% of the expected net value of the investment without subsidization, respectively 0.75 for an expected value of 7.50. The risk was varied by increasing the difference between the highest and the smallest payoff level in the investment situations. In sum four rates of risk (risk-rates) are considered. During the treatments four different risk-rates were combined with four different sub-rates. Therefore 16 decision situations were analyzed in 16 rounds (one decision situation per round). The investment choices were presented randomly to the participants. This is done to minimize learning effects. Table 3 provides an overview of the different decision situations. The table presents the different expected net values E(X) and the standard deviations σ_i.

In each decision, participants had to chose their individual ratio between the risky alternatives (low-risk alternative A and high-risk subsidized alternative B) and the risk-free alternative C. The design allows to observe the link between increasing risk and the benefit of subsidization. Furthermore, the design allows to observe the spillover effect toward alternative B caused by

The investment decisions												
	sub-rate 10%			sub-rate 15%			sub-rate 20%			sub-rate 25%		
	A	B	C	A	B	C	A	B	C	A	B	C
E(X)	7.50	8.25	7.50	7.50	8.63	7.50	7.50	9.00	7.50	7.50	9.38	7.50
σ_i	0.98	*1.62*	0.00	0.98	*1.69*	0.00	0.98	*1.76*	0.00	0.98	*1.84*	0.00
E(X)	7.50	8.25	7.50	7.50	8.63	7.50	7.50	9.00	7.50	7.50	9.38	7.50
σ_{ii}	0.98	*2.16*	0.00	0.98	*2.25*	0.00	0.98	*2.35*	0.00	0.98	*2.45*	0.00
E(X)	7.50	8.25	7.50	7.50	8.63	7.50	7.50	9.00	7.50	7.50	9.38	7.50
σ_{iii}	0.98	*2.69*	0.00	0.98	*2.82*	0.00	0.98	*2.94*	0.00	0.98	*3.06*	0.00
E(X)	7.50	8.25	7.50	7.50	8.63	7.50	7.50	9.00	7.50	7.50	9.38	7.50
σ_{iv}	0.98	*3.23*	0.00	0.98	*3.38*	0.00	0.98	*3.53*	0.00	0.98	*3.67*	0.00

Table 3 Expected net payoff and standard deviation per decision with subsidization

subsidization. Note that the gross payoff is transformed in a manner that the net payoff is the same in all treatments. Furthermore, the gross payoff is designed in such a way that it is not obvious whether the expected net payoff of alternative B exceeds the expected net payoff of alternative A or the certain payoff of alternative C.

2.2 Types of subsidization

2.2.1 Grant

In the treatment *grant* participants receive a tax-free direct subsidy. Because of the different rates of subsidization, the *grant* ranges between 0.75 (sub-rate: 10%) up to 1.88 (sub-rate: 25%) and may set to: 0.75, 1.13, 1.50 and 1.88. The *grant* depends on the expected payoff without subsidization and not on the realized payoff. The net payoff for one Lab-point invested in alternative B is defined as:

$$net = gross + S_g - [gross - P] \times t \tag{1}$$

where:

$gross$	=	gross payoff
S_g	=	subsidization type: tax-free direct subsidy
P	=	paid price for purchased objects (cost per object = 1)
t	=	tax rate

2.2.2 Tax exemption

A different way to subsidize investments is to reduce the tax base. In the treatment *tax exemption*, a fraction of the gross payoff is exempt from the tax base. The tax exemption corresponds with the rate of subsidization. In the 10% sub-rate decisions, 10% of the gross payoff is tax-free. The net payoff for one Lab-point invested in alternative B is defined as:

$$net = gross - [gross \times (1 - S_e) - P] \times t \tag{2}$$

where:

S_e	=	subsidization type: exempted fraction of the gross payoff

2.2.3 Tax allowance

Principally, the tax base is the difference between the gross payoff and the invested amount. If the gross payoff is for example 9.38 for an invested amount of one Lab-point, the tax base amounts to 8.38. In the treatment *tax allowance*, the tax base is the gross payoff minus a multiple of the invested amount.[4] The deductible amount increases to 500% in the 25% sub-rate decisions. Therefore,

[4] Deductible amount in the 10% sub-rate decisions = 250% of the invested amount = 250% × 1 Lab-point = 2.5 Lab-points.

in the treatment *tax allowance* the net payoff to the investor for one Lab-point invested in alternative B is defined as:

$$net = gross - [gross - S_a \times P] \times t \tag{3}$$

where:

S_a = subsidization type: deductible amount from the tax base

2.2.4 Tax credit

The subsidization with a *tax credit* implies a direct reduction of the tax due. The *tax credit* is a credited amount against the calculated tax payment. The deduction from the tax payment is 0.75 in the 10% sub-rate decisions and increases to 1.88 in the 25% sub-rate decisions. The deduction may set to: 0.75, 1.13, 1.50 and 1.88. The gross payoffs are chosen in such a way, that the tax due is always bigger than the *tax credit*. In the treatment *tax credit* the net payoff to the investor for one Lab-point invested in alternative B is defined as:

$$net = gross - [(gross - P) \times t - S_c] \tag{4}$$

where:

S_c = subsidization type: creditable amount against the tax due

2.2.5 Tax rate relief

In the treatment *tax rate relief* a reduced tax rate is applied to the realized tax base of alternative B, while the standard tax rate of 50% is applied for alternative A and C. The reduced tax rates range from 45% (in the 10% sub-rate decisions) down to 35% (in the 25% sub-rate decisions) and may

set to: 45%, 43%, 40% and 35%. In the treatment *tax rate relief* the payoff to the investor for one Lab-point invested in alternative B is defined as:

$$net = gross - [gross - P] \times t_{s,r} \tag{5}$$

where:

$t_{s,r}$ = reduced tax rate

Table 4 shows an example for every type of subsidization. The decision situation with the lowest risk-rate and lowest sub-rate is presented. The gross payoffs from alternative A and alternative C are given in Table 1 and stay constant during the whole experiment. Small differences in the gross payoff of alternative B are inevitable due to the different types of subsidization. However, as investors should be interested in the expected net payoffs, the small deviations in the gross payoff can be neglected. It becomes clear that the expected net payoff is identical for the different types of intervention.

2.3 Hypotheses

There are no differences in the net payoff and the economic impact of the subsidization is equal between the different subsidy types. Therefore, if investors are rational and focus on the user-costs of capital, the amount invested in alternative B should be the same across all treatments. This leads to my first hypothesis:

Hypothesis 1. *The investment in alternative B is identical in all of the five treatments.*

In the experiment, four different sub-rates were considered. The benefit that results from the subsidization increases from 10% up to 25%. If there is no perception bias, the amount invested in alternative B should increase in the subsidy level. This leads to my second hypothesis:

State of environment	High risk subsidized alternative B																				
	grant					tax exemption				tax allowance				tax credit					tax rate relief			
	gross	tax base	tax	grant	net	gross	tax base	tax	net	gross	tax base	tax	net	gross	tax base	tax	credit	net	gross	tax base	tax	net
1	9.38	8.38	4.19	0.75	5.94	9.89	7.90	3.95	5.94	9.38	6.88	3.44	5.94	9.38	8.38	4.19	0.75	5.94	9.98	8.98	4.04	5.94
2	10.70	9.70	4.85	0.75	6.60	11.09	8.98	4.49	6.60	10.70	8.20	4.10	6.60	10.70	9.70	4.85	0.75	6.60	11.18	10.18	4.58	6.60
3	12.02	11.02	5.51	0.75	7.26	12.29	10.06	5.03	7.26	12.02	9.52	4.76	7.26	12.02	11.02	5.51	0.75	7.26	12.38	11.38	5.12	7.26
4	13.34	12.34	6.17	0.75	7.92	13.49	11.14	5.57	7.92	13.34	10.84	5.42	7.92	13.34	12.34	6.17	0.75	7.92	13.58	12.58	5.66	7.92
5	14.66	13.66	6.83	0.75	8.58	14.69	12.22	6.11	8.58	14.66	12.16	6.08	8.58	14.66	13.66	6.83	0.75	8.58	14.78	13.78	6.20	8.58
6	15.98	14.98	7.49	0.75	9.24	15.89	13.30	6.65	9.24	15.98	13.48	6.74	9.24	15.98	14.98	7.49	0.75	9.24	15.98	14.98	6.74	9.24
7	17.30	16.30	8.15	0.75	9.90	17.09	14.38	7.19	9.90	17.30	14.80	7.40	9.90	17.30	16.30	8.15	0.75	9.90	17.18	16.18	7.28	9.90
8	18.62	17.62	8.81	0.75	10.56	18.29	15.46	7.73	10.56	18.62	16.12	8.06	10.56	18.62	17.62	8.81	0.75	10.56	18.38	17.38	7.82	10.56
E(X)					8.25				8.25				8.25					8.25				8.25
σ_i					1.62				1.62				1.62					1.62				1.62

Table 4 Different types of intervention (sub-rate 10%)

Hypothesis 2. *Higher rates of subsidization result in higher amounts invested in alternative B.*

The impact of different subsidy types is measured by a comparison of the separate treatments. One can assume that the treatment with the highest average investment in alternative B provides the type of subsidization with the highest impact in promoting risky investments. However, a subsidization of alternative B might also reduce the investments in other risky alternatives. To examine the overall impact on risk-taking resulting on the different tax incentives, the invested amount in risky assets (invested amount in alternative A plus alternative B) has to be investigated. If there is no perception bias, the risky invested amount should be equal across all treatments. To investigate this assumption, I formulate my third hypothesis:

Hypothesis 3. *The risky invested amount (amount invested in the alternatives A and B) is identical in all of the five treatments.*

Besides, the risk of alternative B was varied by increasing the differences between the highest and the smallest payoff. Increasing risk should reduce the amount invested in alternative B. The fourth hypothesis is therefore:

Hypothesis 4. *Higher rates of risk result in lower amounts invested in alternative B.*

2.4 Risk preference lottery

To make sure that deviations between the different risky invested amounts are attributable to the different types of subsidization, the participants in the different treatments must be identical in their willingness to take risks. The risk preferences of the participants were tested with a method introduced by Holt and Laury (2002). I used a multiple price-list to infer the risk aversion. Subjects were faced with ten choices between paired lotteries presented in Table 5 (the expected payoff differences were not shown).

Option A							Option B							Expected payoff difference
1/10	of	4.00	and	9/10	of	3.60	1/10	of	7.70	and	9/10	of	0.20	2.69
2/10	of	4.00	and	8/10	of	3.60	2/10	of	7.70	and	8/10	of	0.20	1.98
3/10	of	4.00	and	7/10	of	3.60	3/10	of	7.70	and	7/10	of	0.20	1.27
4/10	of	4.00	and	6/10	of	3.60	4/10	of	7.70	and	6/10	of	0.20	0.56
5/10	of	4.00	and	5/10	of	3.60	5/10	of	7.70	and	5/10	of	0.20	-0.15
6/10	of	4.00	and	4/10	of	3.60	6/10	of	7.70	and	4/10	of	0.20	-0.86
7/10	of	4.00	and	3/10	of	3.60	7/10	of	7.70	and	3/10	of	0.20	-1.57
8/10	of	4.00	and	2/10	of	3.60	8/10	of	7.70	and	2/10	of	0.20	-2.28
9/10	of	4.00	and	1/10	of	3.60	9/10	of	7.70	and	1/10	of	0.20	-2.99
10/10	of	4.00	and	0/10	of	3.60	10/10	of	7.70	and	0/10	of	0.20	-3.70

Table 5 Ten paired lottery-choice decisions

The potential payoffs for Option A in this lottery have a lower variance than the payoffs for Option B. In the first decision, the probability of the high payoff is 1/10 in Option A and in Option B. Therefore, only a participant with a high willingness to take risks would choose Option B. The expected payoff incentive choosing Option A in the first decision is 2.69 et cetera. In the next decision the probability of the high payoff increases. When the probability is sufficiently high, participants should switch to Option B. In every treatment participants have to play the same lottery. After the experiment, one randomly chosen decision gets paid out to the subjects.

On average, the participants of the five treatments shift between the sixths and seventh decision from Option A to Option B.[5] All groups seem to be risk-averse. There are no significant differences between the treatment-groups. Hence, one can assume that the different groups have the same willingness to take risks.

2.5 Complexity reduction methods

At the beginning of each treatment, the instructions were read out loud. In the instructions, the procedure of the treatment and the payoff to the

[5] For further details see Table 11 in the appendices.

participants were explained. Furthermore, the instructions contain a special example related to the relevant type of subsidization. In this example, the calculation of the total net payoff of a specific investment in the alternatives A, B, and C was explained. The participants had as much time as they needed to read the instructions for their own and to ask questions.

After reading the instructions, participants faced a comprehension test. During the test, participants had to answer questions about a different investment situation and had to calculate the total net payoff. The test was completed after all questions were answered correctly. Because of the somewhat difficult calculations, the participants were handed a pocket calculator. They were allowed to use it during the whole experiment. I ran the comprehension test to check and to ensure that the participants were able to understand the calculations, which they faced during the treatment.

After the comprehension test, the actual treatment got started. In order to support participants decision-making, a "what-if-calculator" was implemented in the experiment. With the help of the "what-if-calculator" participants were able to calculate the total net payoff for every possible decision, depending on the state of environment. The calculator could be used as often as required. Table 6 shows the frequency of how often the "what-if-calculator" was used per decision on average.

grant	tax exemption	tax allowance	tax credit	tax rate relief
6.66	3.56	4.78	4.21	4.89

Table 6 Intensity of using the calculator per decision

One can see that participants used the calculator very often. Before an investment decision was made, the "what-if-calculator" was used at least four times on average. After the treatments, participants had to answer a questionnaire which included information such as gender, age, and education.

2.6 Experimental setup

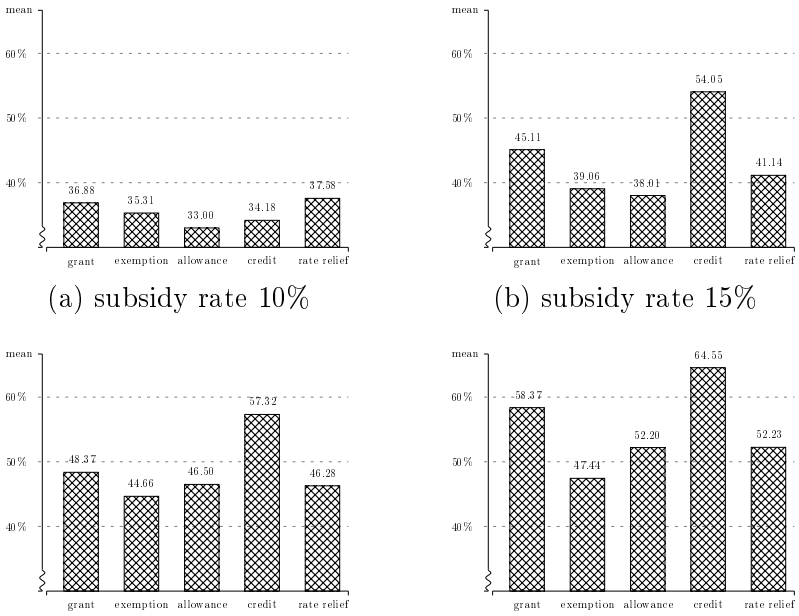
All treatments were conducted at the computerized experimental laboratory at the Otto-von-Guericke-University Magdeburg (MaXLab) in January 2013 and were programmed with z-Tree (Fischbacher, 2007). In sum, 112 students participated in the five treatments (43 female and 69 male subjects). The students were recruited with ORSEE (Greiner, 2004). Most of the students majored in Economics and Management. The participants completed the tasks at individual speed but all treatments took nearly $1\frac{3}{4}$ hours on average. After the treatment, the participants were paid their earnings in cash. To avoid income effects, the amount earned in the risk-preference lottery was paid out after the whole treatment. Until the end of the treatment, participants did not know their payoff. In addition, they received the profit from only one randomly drawn and played out investment choice. The participants earned a aggregated payoff between 9.60 Euros and 18.40 Euros, with an average of 13.63 Euros.

3 Results

3.1 Descriptive statistics

Figure 1 depicts the average amount invested in the high-risk subsidized alternative B for different subsidy rates and treatments. The amount invested in alternative B differs between the treatments. In the 10%-decisions, there are no significant differences between the different treatments (see Table 18 in the appendix for the corresponding Mann-Whitney-U test).

With increasing sub-rate, the amount invested in alternative B increases as expected. However, the increase is not the same among all treatments. It is much stronger in the treatment *tax credit* and the treatment *grant*. In the 25% sub-rate decisions, 64.55% of the endowment will be invested in alternative B on average, if it gets subsidized with a *tax credit*. This represents an increase



(a) subsidy rate 10%

(b) subsidy rate 15%

(c) subsidy rate 20%

(d) subsidy rate 25%

Figure 1 Average high-risk subsidized investment B

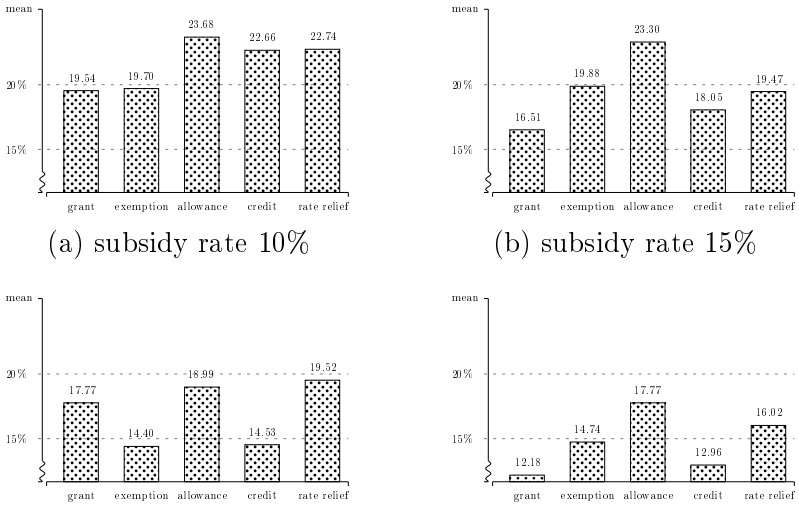
compared to the 10%-sub-rate decisions of 30.37 percentage points. In the treatment *grant* the average amount is still as high as 58.37% (increase of 21.49 percentage points).

While in the 10%-sub-rate decisions no significant differences between the treatments could be observed, this changed when sub-rates are increased. Especially when investments got subsidized with a *tax credit*, the share invested in alternative B increases significantly above that of the other treatments (see the Tables 18 to 21 in the appendix for the corresponding Mann-Whitney-U tests). *Hypothesis 1* is therefore rejected when the subsidy rate exceeds 10%.

Higher incentives result in an increase in the share invested in alternative B, regardless to the type of subsidization. Obviously, the increasing sub-rate was perceived in all treatments. The *hypothesis 2* is therefore confirmed.

By contrast, Figure 2 illustrates that the increasing subsidy rate on investments in alternative B results in a decrease in the share invested in

alternative A on average (see also Table 12 in the appendix). Figure 2 depicts the share invested in the low-risk alternative A for each subsidy rate and treatment on average. The endowment invested in alternative A differs among the treatments. However, even with an increase in the rate of subsidization, the differences are not significant (see the Tables 18 to 21 in the appendix). Hence, two important insights can be obtained. On the one hand, increasing rates of subsidization result in a decrease of the share invested in alternative A, regardless of the type of subsidization. However, the decrease in alternative A is not quite as strongly as the increase in alternative B. The strongest decrease in alternative A can be observed as the treatment *credit* with a decrease of 9.70 percentage points (corresponding with an increase in alternative B of 30.37 percentage points; see the Tables 12 and 13 in the appendix). On the other hand, the differences in the extent to which the investment in alternative A decline among the treatments are not significant.



(a) subsidy rate 10%

(b) subsidy rate 15%

(c) subsidy rate 20%

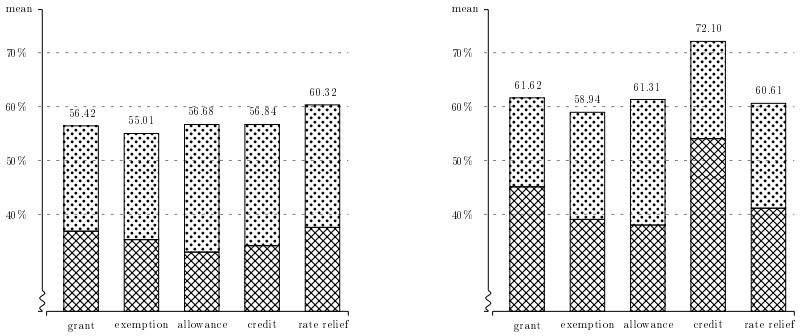
(d) subsidy rate 25%

Figure 2 Average low-risk investment A

Comparing the results of the investments in alternative A and alternative B, it can be stated that the greater the sub-rate is, the greater the crowding out by alternative A towards alternative B will be. The effect is particularly

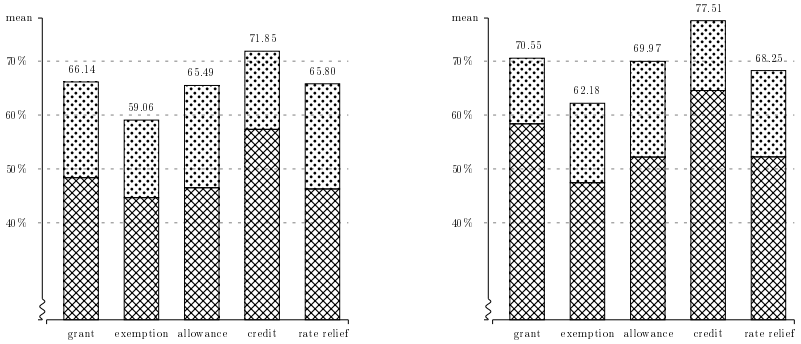
strong in the treatments *tax credit* and *grant*. This is in line with the stronger effects of *tax credit* and *grant* on investments in alternative B.

Nevertheless, the amount of the risky investment (amount invested in alternative A plus the amount invested in alternative B) increases with increasing subsidization. Since the increase in B is generally higher than the decrease in A, the share invested in alternative C must decrease with increasing subsidization. This is illustrated by Figure 3 (see also Table 14 in the appendix).



(a) subsidy rate 10%

(b) subsidy rate 15%



(c) subsidy rate 20%

(d) subsidy rate 25%

Figure 3 Average total risky investment (A+B)

In the 10%-sub-rate decisions 55%-60% of the budget will be invested risky. There are no significant differences between the treatments. This changes with increasing rates of subsidization. The risky invested amount is significantly higher when investments get subsidized with a *tax credit* and the sub-rate is

15% or higher (see the Tables 18 to 21 in the appendix for the corresponding Mann-Whitney-U tests). The difference between the treatment *tax credit* to the other treatments is up to 13 percentage points . Hence, *tax credits* have a stronger effect on aggregated risky investments compared to other subsidy types. The *hypothesis 3* must therefore be rejected. In the other treatments the risky invested amount increases to a smaller extent.

By contrast, in the treatment *tax exemption* the average risky invested amount lags behind the other treatments when the sub-rate exceeds 15%. No significant differences can be observed between the treatments *grant*, *tax allowance*, *tax exemption* and *tax rate relief* (compare the Tables 18 to 21 in the appendix). The amount differs only in the composition of the low-risk investment A and the high-risk investment B.

The standard economic theory predicts a decrease in the willingness to invest risky, if the risk increases. In the experiment, the risk of alternative B was increased by increasing the differences between the highest and the smallest income chance in the decision situations. Table 3 depicts the increasing risk, represented by the standard deviation, of the 16 situations. In the experiment, the participants react as predicted by the theory. Table 7 presents the share of endowment invested in the high-risk subsidized alternative B on average for all treatments and risk rates.

Alternative B	grant	tax exemption	tax allowance	tax credit	tax rate relief
σ_i	53.25	44.38	44.44	58.67	47.61
σ_{ii}	50.52	42.25	42.52	49.23	46.32
σ_{iii}	44.64	40.06	40.98	54.21	43.70
σ_{iv}	40.32	39.78	41.77	48.00	39.59
average	47.18	41.62	42.43	52.53	44.31
$\Delta_{(4-1)}$	-12.93	-4.60	-2.67	-10.67	-8.02

Table 7 Average high-risk subsidized investment B by risk-rates

The increasing risk results in a decrease in the willingness to invest in the high-risk alternative B, regardless of the type of subsidization. The participants seem to be risk-averse. The *hypothesis 4* is therefore confirmed. In the treatments *grant* and *tax credit* the participants react more sensitive to higher rates of risk.

It can be noted that the participants of the experiment increase risky investments for higher sub-rates and reduce risky investments for higher risk-rates. They behave like the standard economic theory predicts. Deviating from the standard economic theory, it can further be stated that the different types of subsidization have a different impact on risky investments. If investments were subsidized with a *tax credit*, the risky invested amount was significantly higher than in the other treatments. This is mainly due to the fact that the share invested in alternative B rises significantly above that of the other treatments when B is subsidized with a *tax credit*.

3.2 Regression results

To confirm the results from the descriptive statistics I run six linear regressions. The regression variables are explained in Table 8 and the regression results are presented in Table 9. To check the influence of the different types of subsidization on the risk-taking behavior I consider three different dependent variables: average of the investment in the low-risk alternative A (the first two regressions), average of the investment in the high-risk subsidized alternative B (third and fourth regression), and average of the investment in the total risky investment (amount invested in alternative A plus the amount invested in alternative B; fifth and sixth regression). I use an ordinary least-square estimation (OLS) with normal standard errors.[6]

The treatment *grant* is the default, and therefore the coefficients of the variables measure the differences between the respective treatments and the treatment *grant*. Similar to the previous results, the investment in alternative

[6] I checked also with robust standard errors. No significant differences appeared.

Variable	explanation
type of subsidization	grant (=1); tax exemption (=2); tax allowance (=3); tax credit (=4); tax rate relief (=5)
rate of subsidization (sub-rate)	0.1; 0.15; 0.2; 0.25
rate of risk (risk-rate)	standard deviation (see Table 3)
age	in years (19 to 29)
gender	female = 0; male = 1
economic major (econ major)	1 = study with a major in economics; 0 = elsewise
decision time	in seconds (1 to 911)

Table 8 Regression variables

A in the treatments *tax credit*, *tax exemption*, and *grant* is approximately at the same level (model 1). Merely in the treatments *tax allowance* and *tax rate relief* subjects chose a significantly higher investment level in alternative A. The coefficients are significant at a 1% level respectively at a 5% level.

In model 2, I regressed the investment in the low risk alternative A on the different types of subsidization, the rate of subsidization, the rate of risk, the age, the gender, the academic major and the decision time of the subjects. The regression indicates a significant negative influence (at a 1% level) of the variables sub-rate, age, and gender. The investment level in alternative A decreases significantly with increasing subsidization of alternative B, supporting my previous results. The older and especially the male participants invested significantly less in alternative A.

In model 3 and 4, I regress the average of the investment in the high risk subsidized alternative B on the different types of subsidization and additionally on the other variables. The results support my prior findings. Subsidization

	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6
	low risk (A)	low risk (A)	high risk subsidized (B)	high risk subsidized (B)	total risky investment (A+B)	total risky investment (A+B)
Constant	16.500***	44.980***	47.180***	27.160***	63.680***	72.150***
	(0.926)	(4.559)	(1.587)	(7.710)	(1.417)	(7.138)
tax credit	0.549	0.131	5.345**	6.063***	5.894***	6.194***
	(1.310)	(1.254)	(2.244)	(2.120)	(2.005)	(1.963)
tax exemption	0.676	-0.332	-5.566**	-4.284**	-4.889**	-4.616**
	(1.325)	(1.279)	(2.270)	(2.164)	(2.027)	(2.003)
tax allowance	4.432***	2.750**	-4.753**	-2.572	-0.321	0.178
	(1.325)	(1.277)	(2.270)	(2.159)	(2.027)	(1.999)
tax rate relief	2.935**	-0.310	-2.875	1.838	0.060	1.528
	(1.325)	(1.296)	(2.270)	(2.192)	(2.027)	(2.030)
sub-rate		-48.900***		137.900***		88.970***
		(7.299)		(12.340)		(11.430)
risk-rate		1.010		-4.190***		-3.180***
		(0.623)		(1.054)		(0.976)
age		-0.633***		-0.180		-0.813***
		(0.168)		(0.284)		(0.263)
gender (male = 1)		-9.377***		14.250***		4.875***
		(0.860)		(1.455)		(1.347)
econ major (major in economics = 1)		-0.092		-3.084*		-3.175**
		(0.958)		(1.620)		(1.500)
decision time		-0.013**		0.019*		0.006
		(0.006)		(0.011)		(0.010)
Observations	1,792	1,792	1,792	1,792	1,792	1,792

Standard errors in parentheses; ***$p \leq 0.01$, **$p \leq 0.05$, *$p \leq 0.1$

Table 9 Linear Regressions

with a *tax credit* increases the investment level in alternative B significantly (at a 1% level) above the level of the grant, whereas a subsidization with a *tax exemption* results in a significantly (at a 5% level) lower investment level in alternative B. The invested amount in alternative B in the other types is nearly at the same level. At a 1% level, the variables sub-rate, risk-rate and gender have a significant influence on the investment in alternative B. Higher rates of subsidization increase the investment in alternative B, whereas a higher risk decreases the investment in alternative B, supporting my previous observations and the visualization in Figure 1. The males in the experiment invest significantly more in the high-risk subsidized alternative B than females

do. This result is in line with the assumption that women are more risk-averse than men.[7]

In model 5 and 6, I put the alternative A and alternative B together and regressed the total risky investment on the different types of subsidization (model 5) and additionally on the control variables (model 6). In both models, the investment level increases significantly (at a 1% level) if alternative B gets subsidized with a *tax credit*. In the treatment *tax exemption* the investment level decreases significantly (at a 5% level). The investment level in the other treatments is approximately equal. The variables sub-rate, risk-rate, age and gender have a significant influence on the total risky investment (at a 1% level).

More regressions are presented in the appendix (compare the Tables 22 to 26 in the appendix). The regressions include different interaction terms. In particular it should be noted that the interaction terms consisting of the different types of subsidization and the rates of subsidization, do not have a significant influence on the risky investments of the participants (see Table 22). Therefore, the results of Table 9 are not driven by the rate of subsidization but by the type of subsidization. The regressions confirm my prior results.

4 Discussion

This article contributes to the understanding of the deviant behavior of the recipients of subsidization. The results of the experiment indicate that the economic impact of subsidization may differ between different types of subsidization. This means that the design of the subsidization can generate real economic effects in spite of a constant subsidy payoff. In my view, mainly two effects could explain the results: the *tax aversion bias* and the *salience effect*.

Tax payments are not on a voluntary basis. Additionally, there is a lack of a specific compensation. It is not identifiable to what purposes the paid taxes

[7] See Croson and Gneezy (2009) for a excellent overview to this topic.

will be used for. Therefore, many people dislike paying taxes. Their desire to avoid taxes is much stronger than their desire to avoid an economic equivalent payment (Fennell and Fennell, 2003; McCaffery and Baron, 2006; Löfgren and Nordblom, 2009; Hill, 2010; Sussman and Olivola, 2011). The tendency of tax evasion increases with the increasing number of possibilities to evade taxes, in spite of threatened penalization (Kleven et al., 2011). It seems that there is an internal desire to reduce individual tax payments which is beyond of the pure willingness to maximize the individual wealth. As all treatments are equally affected by the taxation there should be no differences between them. However, only the *tax credit* offers a legal possibility to reduce the disliked tax burden directly. People value this possibility even more than other equivalent subsidies. Recent studies from Hundsdoerfer and Sichtmann (2009); Lozza et al. (2010); Blaufus and Möhlmann (2014) also find an preference for tax reductions. Insofar, the stronger effect of the *tax credit* in investment decisions confirms these prior results.

Besides, the *salience effect* may play an important role. If taxes are not salient, people seem to neglect their tax aversion, respectively people do not take taxes into account in their decision making process (Sausgruber and Tyran, 2005; Finkelstein, 2009; Chetty et al., 2009). Applying these findings on subsidization, subsidies in which the benefit is clearly visible may have the strongest effect on investment decisions. Increasing visibility of subsidization will enhance the decision performance (Rupert and Wright, 1998). The best visibility of the subsidy payoff is provided by the subsidization types *tax credit* and *grant*. Here, the benefit of the subsidization can directly be recognized, whereas in the other treatments the benefit has to be calculated. Indeed, the largest effects have been observed when investments gets subsidized with a *tax credit* or a *grant*. Then the average amount invested in the high-risk subsidized investment B is at its greatest level. However, when alternative B gets subsidized with a *grant* there seems to be a lack of the perceived reduction of the tax burden although the *grant* is tax-free. Therefore, the *tax credit* results in a higher amount invested risky.

After the experiment participants were asked to assess the level of difficulty of the treatments. The average of the answers range between 1.7 and 2.0 whereas 1 stands for easy, 2 for middle and 3 for difficult. The differences between the treatments are significant (see Table 27 in the appendix). The treatment *grant* were perceived as easiest whereas the other treatments were perceived as significantly more difficult. The *tax credit* were perceived as most difficult. Therefore, the results of the experiment seem not to be a result of complexity.

5 Conclusion

I conducted an experiment to investigate the impact of different types of subsidizations on risky investments. Five different types of subsidization were considered: *grant*, *tax exemption*, *tax allowance*, *tax credit* and *tax rate relief*. The participants chose between three investment alternatives: A, B and C. The alternatives A and B are risky investments whereas alternative C is free of risk. Alternative B is riskier than alternative A and investments in alternative B get subsidized. The investments in the different treatments have the same expected net value. The benefits resulting from the different types of subsidization are equal. Additionally, the participants in the treatments have the same average willingness to take risks.

Nevertheless, the risky invested amount differs markedly between the treatments. There seems to be a bias in the perception of the different types of subsidization. If investments get subsidized with a *tax credit*, the risky invested amount increases significantly above that of the other treatments. This is mainly due to the fact that the investment in alternative B increases much stronger than in the other treatments. With increasing benefit through the subsidization participants shift investments from alternative A and alternative C towards alternative B. Besides, if investments get subsidized with a *tax exemption*, the risky invested amount decreases significantly below that of the other treatments. All treatments have in common that an increasing risk-rate

and an increasing sub-rate were perceived as the standard economic theory predicts.

The results of the experiment are clear and highly significant. Nevertheless, the results provide only an indication on the real behavior of investors. Most investors will be advised by tax consultants who can calculate the real benefit caused by the subsidization. However, especially small enterprizes or company founder could be influenced by such governmental interventions. They often do not mandate tax consultants because of the high expenses. This might be exploited by governments. The fiscal authority in the U.S. offer more than 20 different business tax credits for small businesses and self-employed persons.[8] Besides special deduction rules, tax credits are the most important tools to promote investments in the U.S.. Maybe this is the right way to subsidize. Further research has to be done on this topic.

[8] See IRS-Homepage, http://www.irs.gov/Businesses/Small-Businesses-&-Self-Employed/Business-Tax-Credits (7th April 2015).

Figures and tables

Figures

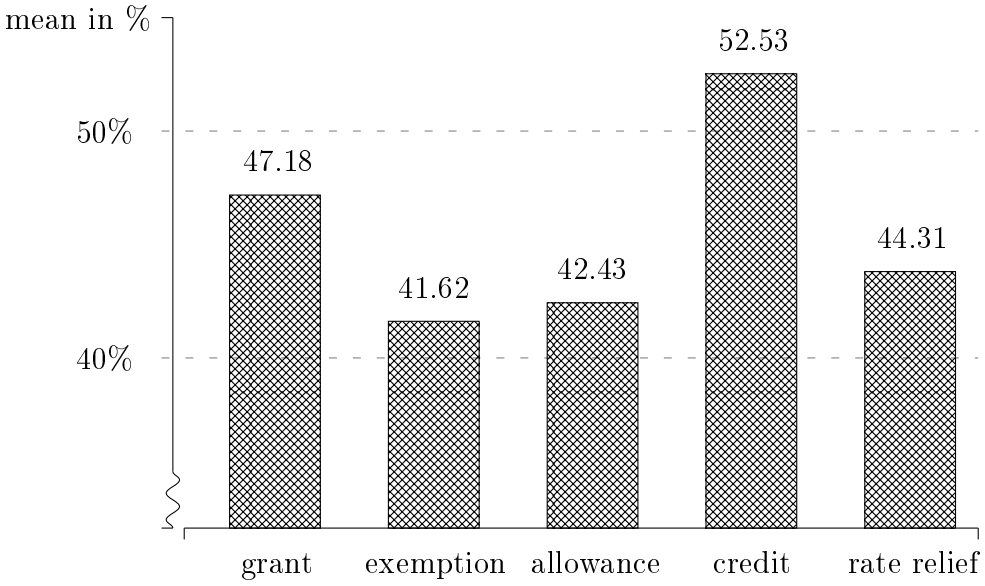


Figure 4 Mean of the invested amount in high risk subsidized investment B

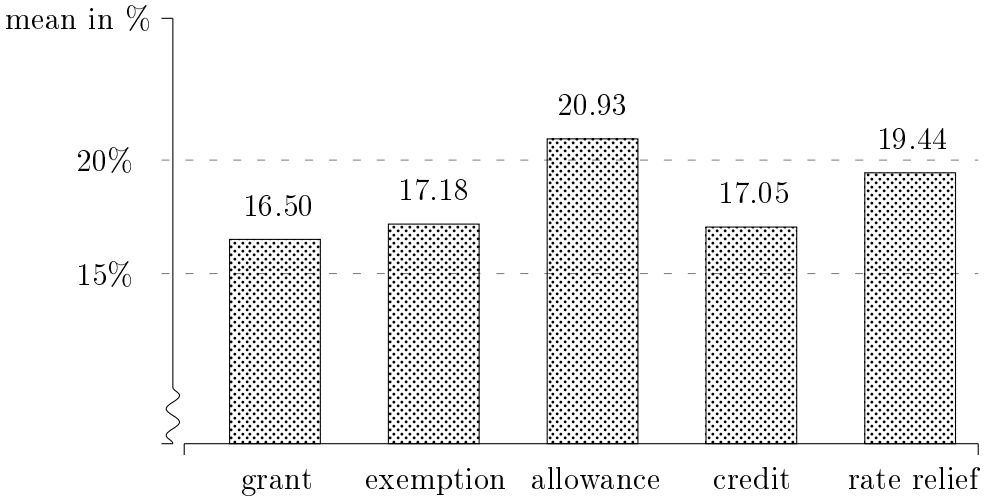


Figure 5 Mean of the invested amount in low risk investment A

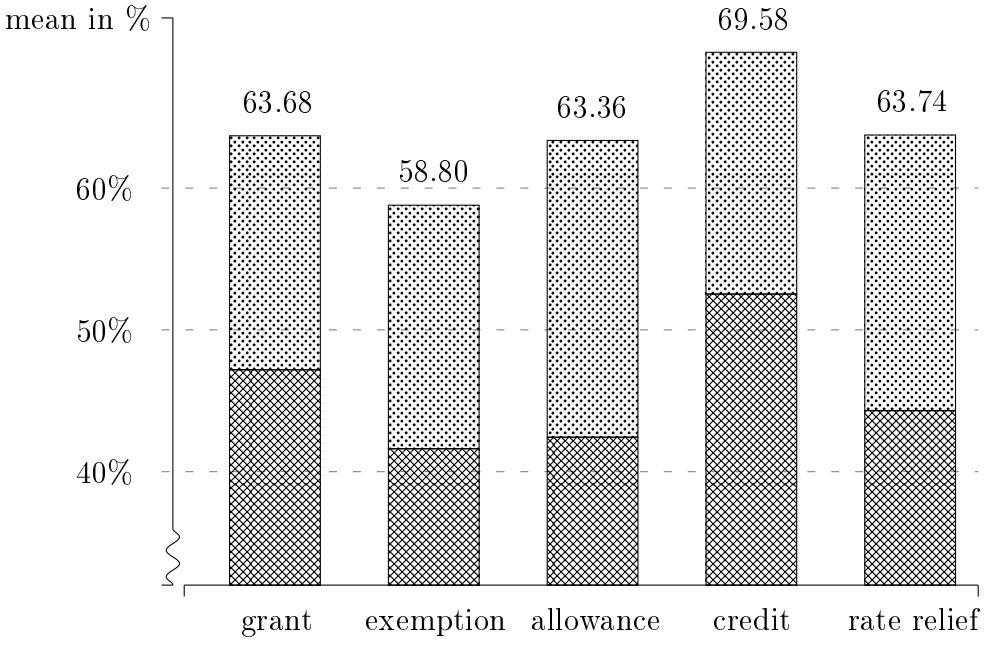


Figure 6 Mean of total risky investment (A + B)

Tables

Expected net value without subsidization per alternative												
	A	B	C	A	B	C	A	B	C	A	B	C
E(X)	7.50	7.50	7.50	7.50	7.50	7.50	7.50	7.50	7.50	7.50	7.50	7.50
σ_i	0.98	1.47	0.00	0.98	1.47	0.00	0.98	1.47	0.00	0.98	1.47	0.00
E(X)	7.50	7.50	7.50	7.50	7.50	7.50	7.50	7.50	7.50	7.50	7.50	7.50
σ_{ii}	0.98	1.96	0.00	0.98	1.96	0.00	0.98	1.96	0.00	0.98	1.96	0.00
E(X)	7.50	7.50	7.50	7.50	7.50	7.50	7.50	7.50	7.50	7.50	7.50	7.50
σ_{iii}	0.98	2.45	0.00	0.98	2.45	0.00	0.98	2.45	0.00	0.98	2.45	0.00
E(X)	7.50	7.50	7.50	7.50	7.50	7.50	7.50	7.50	7.50	7.50	7.50	7.50
σ_{iv}	0.98	2.94	0.00	0.98	2.94	0.00	0.98	2.94	0.00	0.98	2.94	0.00

Table 10 Expected value without subsidization and after taxation

Decision number	grant	exemption	allowance	credit	rate relief	Expected payoff difference
1.						2.69
2.			1			1.98
3.						1.27
4.		3	1	2	2	0.56
5.	5	2	4	2	2	-0.15
6.	10	12	7	11	3	-0.86
7.	7	4	5	4	10	-1.57
8.	1		2	2	3	-2.28
9.		1			2	-2.99
10.						-3.70
Σ	23	22	20	21	22	
ø-shift	**6.2**	**6.0**	**6.0**	**6.1**	**6.7**	

Table 11 Risk preference lottery: depiction of the decision number when participants shift from Option A to Option B

Alternative A	sub-rate 10%	sub-rate 15%	sub-rate 20%	sub-rate 25%	average	$\Delta_{(4-1)}$
grant	19.54	16.51	17.77	12.18	16.50	-7.36
exemption	19.70	19.88	14.40	14.74	17.18	-4.96
allowance	23.68	23.30	18.99	17.77	20.93	-5.91
credit	22.66	18.05	14.53	12.96	17.05	-9.70
rate relief	22.74	19.47	19.52	16.02	19.44	-6.72

Table 12 Reaction to increasing subsidization on low risk investment A

Alternative B	sub-rate 10%	sub-rate 15%	sub-rate 20%	sub-rate 25%	average	$\Delta_{(4-1)}$
grant	36.88	45.11	48.37	58.37	47.18	21.49
exemption	35.31	39.06	44.66	47.44	41.62	12.13
allowance	33.00	38.01	46.50	52.20	42.43	19.20
credit	34.18	54.05	57.32	64.55	52.53	30.37
rate relief	37.58	41.14	46.28	52.23	44.31	14.65

Table 13 Reaction to increasing subsidization on high risk subsidized investment B

Altern. A + B	sub-rate 10%	sub-rate 15%	sub-rate 20%	sub-rate 25%	average	$\Delta_{(4-1)}$
grant	56.42	61.62	66.14	70.55	63.68	14.13
exemption	55.01	58.93	59.06	62.18	58.80	7.17
allowance	56.68	61.31	65.49	69.98	63.36	13.30
credit	56.68	72.11	71.85	77.51	69.58	20.83
rate relief	60.32	60.60	65.81	68.25	63.74	7.93

Table 14 Reaction to increasing subsidization on total risky investment (A+B)

Alternative A	grant	exemption	allowance	credit	rate relief
σ_i	14.73	15.97	19.55	14.22	19.90
σ_{ii}	15.68	15.15	21.68	18.35	20.76
σ_{iii}	16.72	19.27	21.99	17.37	19.48
σ_{iv}	18.88	18.33	20.52	18.27	17.61
average	16.50	17.18	20.93	17.05	19.44
$\Delta_{(4-1)}$	4.15	2.36	0.97	4.05	-2.29

Table 15 Reaction to increasing risk on low risk investment A

Alternative B	grant	exemption	allowance	credit	rate relief
σ_i	53.25	44.38	44.44	58.67	47.61
σ_{ii}	50.52	42.25	42.52	49.23	46.32
σ_{iii}	44.64	40.06	40.98	54.21	43.70
σ_{iv}	40.32	39.78	41.77	48.00	39.59
average	47.18	41.62	42.43	52.53	44.31
$\Delta_{(4-1)}$	-12.93	-4.60	-2.67	-10.67	-8.02

Table 16 Reaction to increasing risk on high risk subsidized investment B

Altern. A + B	grant	exemption	allowance	credit	rate relief
σ_i	67.98	60.34	63.99	72.89	67.51
σ_{ii}	66.21	57.40	64.20	67.58	67.08
σ_{iii}	61.36	59.33	62.97	71.58	63.18
σ_{iv}	59.20	58.11	62.30	66.27	57.20
average	63.68	58.80	63.36	69.58	63.74
$\Delta_{(4-1)}$	-8.78	-2.23	-1.69	-6.62	-10.31

Table 17 Reaction to increasing risk on total risky investment (A+B)

			low risk (A)	high risk subsidized (B)	total risky investment (A + B)
credit	-	grant	0.4860	0.1636	0.4880
credit	-	exemption	0.3869	0.6562	0.5731
credit	-	allowance	0.4290	0.2723	0.3272
credit	-	rate relief	0.9095	0.0889	0.8482
exemption	-	grant	0.6752	0.2494	0.8788
exemption	-	allowance	0.0565	0.5503	0.9715
exemption	-	rate relief	0.2444	0.1988	0.3585
grant	-	allowance	0.1566	0.5757	0.8265
grant	-	rate relief	0.3730	0.7948	0.2727
allowance	-	rate relief	0.6007	0.3750	0.1432

Table 18 Mann-Whitney U-Test (p-values, sub-rate 10%)

			low risk (A)	high risk subsidized (B)	total risky investment (A + B)
credit	-	grant	0.9127	0.1219	0.0018
credit	-	exemption	0.4229	0.0024	0.0034
credit	-	allowance	0.0240	0.0043	0.0002
credit	-	rate relief	0.4545	0.0236	0.0015
exemption	-	grant	0.2712	0.0611	0.8574
exemption	-	allowance	0.2128	0.5379	0.8713
exemption	-	rate relief	0.8785	0.2684	0.9160
grant	-	allowance	0.0142	0.1186	0.7306
grant	-	rate relief	0.2880	0.4370	0.8506
allowance	-	rate relief	0.2241	0.4581	0.5172

Table 19 Mann-Whitney U-Test (p-values, sub-rate 15%)

			low risk (A)	high risk subsidized (B)	total risky investment (A + B)
credit	-	grant	0.0501	0.0708	0.0303
credit	-	exemption	0.5271	0.0054	0.0038
credit	-	allowance	0.0541	0.0342	0.0028
credit	-	rate relief	0.0414	0.0249	0.0311
exemption	-	grant	0.2085	0.1814	0.2680
exemption	-	allowance	0.1623	0.2363	0.4899
exemption	-	rate relief	0.1106	0.3326	0.2613
grant	-	allowance	0.9895	0.8248	0.6216
grant	-	rate relief	0.5567	0.6787	0.8209
allowance	-	rate relief	0.7148	0.8052	0.3767

Table 20 Mann-Whitney U-Test (p-values, sub-rate 20%)

			low risk (A)	high risk subsidized (B)	total risky investment (A + B)
credit	-	grant	0.4962	0.1506	0.0053
credit	-	exemption	0.2831	0.0005	0.0003
credit	-	allowance	0.0386	0.0049	0.0005
credit	-	rate relief	0.1197	0.0055	0.0011
exemption	-	grant	0.4661	0.0054	0.1331
exemption	-	allowance	0.3419	0.1719	0.2792
exemption	-	rate relief	0.6899	0.1567	0.3270
grant	-	allowance	0.0955	0.1256	0.7159
grant	-	rate relief	0.1875	0.1363	0.8299
allowance	-	rate relief	0.6490	0.9219	0.8183

Table 21 Mann-Whitney U-Test (p-values, sub-rate 25%)

	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6
	low risk (A)	low risk (A)	high risk subsidized (B)	high risk subsidized (B)	total risky investment (A+B)	total risky investment (A+B)
Constant	16.500***	44.000***	47.180***	26.070***	63.680***	70.070***
	(0.926)	(5.173)	(1.587)	(8.730)	(1.417)	(8.090)
tax credit	0.549	4.481	5.345**	-3.504	5.894***	0.977
	(1.310)	(4.113)	(2.244)	(6.942)	(2.005)	(6.433)
tax exemption	0.676	-0.333	-5.566**	4.558	-4.889**	4.225
	(1.325)	(4.163)	(2.270)	(7.026)	(2.027)	(6.510)
tax allowance	4.432***	3.359	-4.753**	-2.204	-0.321	1.155
	(1.325)	(4.162)	(2.270)	(7.023)	(2.027)	(6.508)
tax rate relief	2.935**	-0.368	-2.875	8.141	0.060	7.773
	(1.325)	(4.169)	(2.270)	(7.036)	(2.027)	(6.520)
sub-rate		-43.170***		144.000***		100.900***
		(15.890)		(26.820)		(24.850)
risk-rate		1.010		-4.190***		-3.180***
		(0.624)		(1.053)		(0.975)
age		-0.633***		-0.180		-0.813***
		(0.168)		(0.283)		(0.263)
gender (male = 1)		-9.376***		14.250***		4.875***
		(0.861)		(1.452)		(1.346)
econ major (major in economics = 1)		-0.091		-3.085*		-3.176**
		(0.959)		(1.618)		(1.499)
decision time		-0.013**		0.019*		0.006
		(0.006)		(0.011)		(0.010)
sub_inter_credit		-24.860		54.670		29.810
		(22.390)		(37.790)		(35.020)
sub_inter_exemption		-0.001		-50.520		-50.520
		(22.640)		(38.210)		(35.410)
sub_inter_allowance		-3.488		-2.092		-5.580
		(22.640)		(38.210)		(35.410)
sub_inter_rate relief		0.329		-36.010		-35.690
		(22.640)		(38.220)		(35.410)
Observations	1,792	1,792	1,792	1,792	1,792	1,792

Standard errors in parentheses; $^{***}p \leq 0.01$, $^{**}p \leq 0.05$, $^{*}p \leq 0.1$

Table 22 Linear regression with interaction terms: sub-rate × sub-form

	Model 1 low risk (A)	Model 2 low risk (A)	Model 3 high risk subsidized (B)	Model 4 high risk subsidized (B)	Model 5 total risky investment (A+B)	Model 6 total risky investment (A+B)
Constant	16.500***	41.540***	47.180***	35.610***	63.680***	77.150***
	(0.926)	(5.507)	(1.587)	(9.315)	(1.417)	(8.622)
tax credit	0.549	2.461	5.345**	-4.686	5.894***	-2.225
	(1.310)	(5.099)	(2.244)	(8.626)	(2.005)	(7.984)
tax exemption	0.676	0.733	-5.566**	-14.680*	-4.889**	-13.950*
	(1.325)	(5.160)	(2.270)	(8.728)	(2.027)	(8.079)
tax allowance	4.432***	7.627	-4.753**	-17.730**	-0.321	-10.110
	(1.325)	(5.158)	(2.270)	(8.726)	(2.027)	(8.077)
tax rate relief	2.935**	9.048*	-2.875	-4.684	0.060	4.364
	(1.325)	(5.164)	(2.270)	(8.735)	(2.027)	(8.085)
sub-rate		-48.900***		137.900***		88.970***
		(7.298)		(12.340)		(11.430)
risk-rate		2.355		-7.476***		-5.121***
		(1.355)		(2.291)		(2.121)
age		-0.634***		-0.178		-0.811***
		(0.168)		(0.284)		(0.263)
gender (male = 1)		-9.376*** (0.860)		14.250*** (1.455)		4.875*** (1.347)
econ major (major in economics = 1)		-0.091 (0.958)		-3.085* (1.620)		-3.175** (1.500)
decision time		-0.013**		0.019*		0.006
		(0.006)		(0.011)		(0.010)
risk_inter_credit		-0.900		4.151		3.251
		(1.909)		(3.229)		(2.989)
risk_inter_exemption		-0.412		4.015		3.603
		(1.930)		(3.265)		(3.022)
risk_inter_allowance		-1.884		5.856*		3.971
		(1.930)		(3.265)		(3.022)
risk_inter_rate relief		-3.614*		2.519		-1.095
		(1.930)		(3.265)		(3.022)
Observations	1,792	1,792	1,792	1,792	1,792	1,792

Standard errors in parentheses; $^{***}p \leq 0.01$, $^{**}p \leq 0.05$, $^{*}p \leq 0.1$

Table 23 Linear regression with interaction terms: risk-rate × sub-form

	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6
	low risk (A)	low risk (A)	high risk subsidized (B)	high risk subsidized (B)	total risky investment (A+B)	total risky investment (A+B)
Constant	16.500***	41.500***	47.180***	30.730***	63.680***	72.230***
	(0.926)	(4.818)	(1.587)	(8.156)	(1.417)	(7.570)
tax credit	0.549	0.225	5.345**	7.327***	5.894***	7.552***
	(1.310)	(1.475)	(2.244)	(2.496)	(2.005)	(2.317)
tax exemption	0.676	-1.189	-5.566**	-1.115	-4.889**	-2.304
	(1.325)	(1.442)	(2.270)	(2.441)	(2.027)	(2.266)
tax allowance	4.432***	4.393	-4.753**	-1.580	-0.321	2.813
	(1.325)	(1.488)	(2.270)	(2.519)	(2.027)	(2.338)
tax rate relief	2.935**	0.944	-2.875	1.029	0.060	1.973
	(1.325)	(1.547)	(2.270)	(2.619)	(2.027)	(2.431)
sub-rate		-48.900***		137.900***		88.970***
		(7.265)		(12.300)		(11.410)
risk-rate		1.014		-4.200***		-3.186***
		(0.620)		(1.050)		(0.975)
age		-0.501***		-0.383		-0.884***
		(0.176)		(0.299)		(0.277)
gender (male = 1)		-9.460***		14.790***		5.333***
		(0.864)		(1.462)		(1.357)
econ major (major in economics = 1)		1.259		-0.065		1.195
		(1.924)		(3.256)		(3.022)
decision time		-0.012*		0.016		0.005
		(0.006)		(0.011)		(0.010)
econ_inter_credit		-0.215		-4.180		-4.395
		(2.788)		(4.719)		(4.380)
econ_inter_exemption		7.736**		-18.960***		-11.230**
		(3.270)		(5.535)		(5.137)
econ_inter_allowance		-6.693**		-3.243		-9.936**
		(2.895)		(4.900)		(4.548)
econ_inter_rate relief		-4.472		3.848		-0.624
		(2.879)		(4.874)		(4.523)
Observations	1,792	1,792	1,792	1,792	1,792	1,792

Standard errors in parentheses; ***$p \leq 0.01$, **$p \leq 0.05$, *$p \leq 0.1$

Table 24 Linear regression with interaction terms: economic major × sub-form

	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6
	low risk (A)	low risk (A)	high risk subsidized (B)	high risk subsidized (B)	total risky investment (A+B)	total risky investment (A+B)
Constant	16.500***	44.760***	47.180***	25.500***	63.680***	70.260***
	(0.926)	(4.572)	(1.587)	(7.738)	(1.417)	(7.152)
tax credit	0.549	3.242	5.345**	-1.922	5.894***	1.320
	(1.310)	(2.401)	(2.244)	(4.063)	(2.005)	(3.756)
tax exemption	0.676	0.353	-5.566**	1.238	-4.889**	1.591
	(1.325)	(2.329)	(2.270)	(3.940)	(2.027)	(3.642)
tax allowance	4.432***	6.975***	-4.753**	-3.554	-0.321	3.421
	(1.325)	(2.273)	(2.270)	(3.846)	(2.027)	(3.555)
tax rate relief	2.935**	-1.757	-2.875	0.286	0.060	-1.471
	(1.325)	(2.122)	(2.270)	(3.591)	(2.027)	(3.319)
sub-rate		-48.900***		137.900***		88.950***
		(7.261)		(12.290)		(11.360)
risk-rate		1.003		-4.197***		-3.195***
		(0.620)		(1.049)		(0.970)
age		-0.666***		-0.066		-0.731***
		(0.173)		(0.293)		(0.271)
gender (male = 1)		-7.938***		13.010***		5.076
		(2.042)		(3.456)		(3.194)
econ major (major in economics = 1)		0.125		-2.961*		-2.836*
		(0.957)		(1.620)		(1.497)
decision time		-0.014**		0.017		0.003
		(0.006)		(0.011)		(0.010)
gender_inter_credit		-4.383		11.350**		6.972
		(2.838)		(4.802)		(4.438)
gender_inter_exemption		-0.812		-8.926*		-9.739**
		(2.781)		(4.706)		(4.349)
gender_inter_allowance		-6.814**		1.347		-5.467
		(2.793)		(4.726)		(4.368)
gender_inter_rate relief		4.680		2.810		7.490*
		(2.797)		(4.733)		(4.375)
Observations	1,792	1,792	1,792	1,792	1,792	1,792

Standard errors in parentheses; $^{***}p \leq 0.01$, $^{**}p \leq 0.05$, $^{*}p \leq 0.1$

Table 25 Linear regression with interaction terms: gender × sub-form

	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6
	low risk (A)	low risk (A)	high risk subsidized (B)	high risk subsidized (B)	total risky investment (A+B)	total risky investment (A+B)
Constant	16.500***	18.990**	47.180***	84.160***	63.680***	103.200***
	(0.926)	(9.178)	(1.587)	(15.510)	(1.417)	(14.380)
tax credit	0.549	44.020***	5.345**	-75.140***	5.894***	-31.110*
	(1.310)	(11.260)	(2.244)	(19.020)	(2.005)	(17.630)
tax exemption	0.676	21.290*	-5.566**	-101.200***	-4.889**	-79.940***
	(1.325)	(12.280)	(2.270)	(20.760)	(2.027)	(19.240)
tax allowance	4.432***	-3.424	-4.753**	-50.450*	-0.321	-53.870**
	(1.325)	(15.780)	(2.270)	(26.670)	(2.027)	(24.720)
tax rate relief	2.935**	46.700***	-2.875	-34.230	0.060	12.470
	(1.325)	(14.110)	(2.270)	(23.850)	(2.027)	(22.100)
sub-rate		-48.950***		138.000***		89.050***
		(7.252)		(12.260)		(11.360)
risk-rate		1.008		-4.174***		-3.166***
		(0.619)		(1.047)		(0.970)
age		0.496		-2.672***		-2.177***
		(0.387)		(0.654)		(0.606)
gender (male = 1)		-9.967***		15.010***		5.045***
		(0.909)		(1.536)		(1.423)
econ major (major in economics = 1)		0.570		-2.557		-1.987
		(1.020)		(1.724)		(1.598)
decision time		-0.012*		0.019*		0.007
		(0.006)		(0.011)		(0.010)
age_inter_credit		-1.886***		3.496***		1.610**
		(0.481)		(0.813)		(0.754)
age_inter_exemption		-0.932*		4.169***		3.237***
		(0.524)		(0.886)		(0.821)
age_inter_allowance		0.271		2.070*		2.341**
		(0.681)		(1.151)		(1.067)
age_inter_rate relief		-2.038***		1.563		-0.475
		(0.611)		(1.032)		(0.956)
Observations	1,792	1,792	1,792	1,792	1,792	1,792

Standard errors in parentheses; ***$p \leq 0.01$, **$p \leq 0.05$, *$p \leq 0.1$

Table 26 Linear regression with interaction terms: age × sub-form

	difficulty
Constant	1.652***
	(0.0265)
tax credit	0.348***
	(0.0374)
tax exemption	0.257***
	(0.0378)
tax allowance	0.121***
	(0.0378)
tax rate relief	0.121***
	(0.0378)
Observations	1,792

Standard errors in parentheses; ***$p \leq 0.01$, **$p \leq 0.05$, *$p \leq 0.1$

Table 27 Perceived difficulty (1 = easy, 2 = middle, 3 = difficult)

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Die Ertragsteuer des Immobilienvermögens im Spannungsfeld der Zwangs- und Insolvenzverwaltung

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Die Ertragsteuer des Immobilienvermögens im Spannungsfeld der Zwangs- und Insolvenzverwaltung

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In der jüngsten Vergangenheit ist zu beobachten, dass seitens der Finanzämter vermehrt von zwangsverwalteten Objekten vom Insolvenzverwalter die ertragsteuerlichen Obliegenheiten eingefordert werden. Der Insolvenzverwalter hat dann die steuerliche Last aus der Masse für den Steuerpflichtigen zu tragen. Die Komplexität des steuerlichen Sachverhaltes, den es im Rahmen der Insolvenz abzuwickeln gilt, nimmt zu, wenn sich das Objekt im Eigentum einer GbR befindet.

Der vorliegende Beitrag erörtert die steuerlichen Pflichten und Lasten, die der Insolvenzverwalter bei der Verwaltung einer Immobilie zu berücksichtigen hat und zeigt Fallstricke beim Zusammentreffen von Zwangsverwaltung und Insolvenzverwaltung auf. Hierzu wird der steuerliche Grundfall der Vermietung und Verpachtung immer weiter abgewandelt. Das Ergebnis der Untersuchung zeigt, dass die Zwangsverwaltung im Zusammenspiel mit der Insolvenz aus der Sicht des Insolvenzverwalters den ertragsteuerlichen Supergau darstellen kann.

In diesem Zusammenhang sei hervorgehoben, dass allein die ertragsteuerliche Problematik erörtert wird. Umsatzsteuerliche Sachverhalte werden nicht betrachtet, da dies den Rahmen der Darstellung sprengen würde und der Stringenz der Darstellung abträglich wäre.

I. Klärung von Begrifflichkeiten

Der Steuerpflichtige ist derjenige, der vom Steuergesetzgeber auferlegte Pflichten zu erfüllen hat (§ 33 AO). Dazu gehören neben der Verpflichtung zur Führung von Auf-

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zeichnungen i.S.d. §§ 141 AO ff. u.a. auch die Pflicht zur Zahlung von Steuern. Der Steuerschuldner ist derjenige, der die Steuer schuldet aber nicht zwangsläufig derjenige, der die Steuer entrichten muss (§ 43 AO). Bspw. schuldet die GmbH in der Insolvenz die Körperschaftsteuer, welche aber durch den Insolvenzverwalter abgeführt wird. Der Begriff des Steuerschuldners ist daher lediglich ein Unterbegriff des Steuerpflichtigen. Vermögensverwalter (z.B. Insolvenzverwalter) sind gem. § 34 Abs. 3 AO i.V.m. § 34 Abs. 1 AO zwar in einer fremden Sache tätig, sie sind jedoch aufgrund der genannten Vorschriften in diesem Bereich "wie in eigener Sache" tätig und daher "steuerpflichtig" (AEAO zu § 34 Nr. 1). [1]

Im Gegensatz zum Insolvenzverwalter, der das gesamte Vermögen des Schuldners verwaltet und abwickelt (§ 35 InsO), verfügt der Zwangsverwalter lediglich über das Immobilienvermögen bzw. Teile des

Immobilienvermögens (z.B. einen Miteigentumsanteil). Hierzu muss ein im Grundbuch eingetragener Grundpfandgläubiger die Zwangsverwaltung der Immobilie anordnen. Voraussetzung ist, dass ein vollstreckbarer Titel vorliegt. Das Vollstreckungsgericht prüft, ob der Antrag zulässig und begründet ist. Wenn das der Fall ist, wird das Grundstück beschlagnahmt (§ 148 ZVG) und ein Zwangsverwalter eingesetzt (§ 150 Abs. 1 ZVG). Der Vorteil, der sich aus der Anordnung einer Zwangsverwaltung für den Antragsteller ergibt, ist häufig der, dass Dritte ab der Eröffnung des Verfahrens nur noch begrenzt Ansprüche zum Ausgleich mit den Miet- bzw. Pachteinnahmen beanspruchen können. Zumindest aber soll die verwaltete Immobilie einer einträglicheren Nutzung zugeführt werden. [2] Aus der Sicht des Grundpfandgläubigers erhöht sich dadurch die Zugriffsmasse. Die Immobilie stellt daher die Schnittmenge der beiden Verwaltungen dar, was quasi zwangsläufig zu Problemen führt ("Doppelzuständigkeit").

II. Grundfall

Der Eigentümer einer vermieteten Immobilie hat die Mieteinkünfte gem. § 21 EStG i.V.m. § 2 Abs. 1 Nr. 6 EStG zu versteuern, wobei der Besteuerung der Überschuss der Einnahmen über die Werbungskosten unterliegt (§ 2 Abs. 2 Nr. 2 EStG). Gem. § 25 Abs. 3 EStG hat der Steuerpflichtige für die Einkünfte aus Vermietung und Verpachtung eine Steuererklärung abzugeben, die ggf. auch noch seine weiteren Einkunftsquellen umfasst.

Beispiel 1:

A ist Zahnarzt und erzielt mit seiner eigenen Praxis Einkünfte aus selbstständiger Tätigkeit. Um für seinen Ruhestand vorzusorgen, erwarb A zu Beginn des Vorjahres (Jahr 00) eine vermietete Immobilie. Er finanzierte den Erwerb über einen Kredit bei seiner Hausbank. Aus der Immobilie erzielt er seitdem Einkünfte aus Vermietung und Verpachtung. Mit der Erledigung seiner steuerlichen Obliegenheiten hat A den Steuerberater S beauftragt, der auch die Steuererklärungen für A fertigt (inklusive der Anl. V für die vermietete Immobilie, hier werden die Mieterträge erklärt, von denen die Ausgaben abgezogen werden).

Ist die Immobilie einer GbR zuzurechnen, wie es im Rahmen der Immobilienwirtschaft häufiger anzutreffen ist, wird der Gewinn generell gem. § 21 EStG ermittelt. Der Überschuss wird dann im Rahmen einer gesonderten und einheitlichen Gewinnfeststellung den Eigentümern zugerechnet (§§ 179 , 180 AO). Die Überschussanteile gehen in die steuerliche Gewinnermittlung der einzelnen Steuerpflichtigen ein.

Handelt es sich bei der Immobilie um Betriebsvermögen einer Kapitalgesellschaft, werden die Einnahmen im Rahmen der steuerlichen Gewinnermittlung berücksichtigt (§ 7 Abs. 2 KStG i.V.m. § 8 KStG).

Abwandlung Beispiel 1:

A gründet zusammen mit dem befreundeten Zahnarzt B eine GmbH, welche dann die vermietete Immobilie erwirbt. Die Einkünfte aus der Vermietungstätigkeit stellen bei der GmbH gewerbliche Einkünfte dar. Der Gewinn (sofern vorhanden) aus der Vermietungstätigkeit wird an die Zahnärzte A und B ausgeschüttet oder thesauriert. Ein Verlust kann ggf. als Verlustvortrag genutzt werden.

Ist die Immobilie Betriebsvermögen einer Personengesellschaft, werden die Mieterlöse und Kosten im Rahmen der Gewinnermittlung der Gesellschaft berücksichtigt. Der Gewinn oder Verlust aus der Vermietung erhöht den Gewinn oder Verlust der Gesellschaft, der wiederum einheitlich und gesondert festgestellt und den einzelnen Steuerpflichtigen zugerechnet wird.

III. Einfluss der Zwangsverwaltung

1. Verwaltung gemäß ZVG

Die Zwangsverwaltung stellt neben der Zwangsversteigerung und der Eintragung einer Zwangssicherungshypothek eine weitere selbstständige Methode der Immobiliarzwangsvollstreckung dar (§ 866 Abs. 1 ZPO). Im Rahmen der Zwangsverwaltung einer Immobilie erfolgt die Beiziehung der Mieterlöse separat durch den Zwangsverwalter, der auch die Kosten des Objekts begleicht (vgl. §§ 152 und 154 ZVG). Zu den Kosten zählen insbesondere öffentliche Lasten wie die Grundsteuer oder Versicherung und die

Versorgungsträger, aber auch die mit Bauleistungen im Zusammenhang stehende Bauabzugsteuer gem. § 48 EStG . [3] Der Zwangsverwalter ist nicht für die ertragsteuerliche Abwicklung des Steuerpflichtigen verantwortlich. [4] Ihn trifft allein für die mit der Immobilie im Zusammenhang

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1
Vgl. *Andrascek-Peter/Braun/Friemel/Schiml*, Lehrbuch der Abgabenordnung, 17. Aufl. 2010, Rn. 429.

2
Vgl. BGH, Beschl. v. 18.7.2002 - IX ZB 26/02 , ZInsO 2002, 825 .

3
Vgl. *Böttcher*, ZVG, 5. Aufl. 2010, § 152 Rn. 66 ff.

4
Vgl. BFH, Urt. v. 22.8.1959 - VI 157/57; BFH, BStBl. II 1988, S. 920; *Gorris/Schmittmann*, IGZInfo 2005, 69 ff.; *Haut/Beyer/Mengwasser*, IGZInfo 2007, 49 ff.; *Haarmeyer/Wutzke/Förster*, Zwangsverwaltung, 5. Aufl. 2011, § 5 Rn. 25.

stehende Umsatz-, Lohn- und Gewerbesteuer [5] die Steuererklärungs- und Abführungspflicht. [6] Für die unter Zwangsverwaltung stehende Immobilie erhält der Verwalter hierfür vom Finanzamt eine neue Steuernummer. Steuerschuldner bleibt der Schuldner des Zwangsverwaltungsverfahrens. Insofern wird der Zwangsverwalter über die §§ 33 und 34 AO verpflichtet, allein für diese steuerlichen Angelegenheiten für den Steuerschuldner dessen Obliegenheiten zu erledigen. [7] Bzgl. der ertragsteuerlichen Abwicklung (Einkommensteuer oder Körperschaftsteuer) bedeutet dies, dass für den Steuerpflichtigen, sei es als Einzelperson, in Form der Personen- oder Kapitalgesellschaft, weiterhin die Steuererklärungs- und Abführungspflicht besteht. Um diesen Verpflichtungen nachzukommen, ist der ertragsteuerliche Steuerpflichtige auf die Zuarbeit des Zwangsverwalters angewiesen. Dies gilt primär für die Fälle, in denen der Zwangsverwalter abweichend vom Kalenderjahr abrechnet. In den anderen Fällen kann als Basis der Jahresbericht des Zwangsverwalters nach § 154 Satz 2 ZVG verwendet werden (vgl. § 14 Abs. 2 ZwVwV , hier wird die Rechnungslegung je Kalenderjahr vom Verordnungsgeber fixiert). Der Jahresbericht ist dem Gericht, dem Gläubiger und dem Schuldner vorzulegen. Die Abrechnung des Zwangsverwalters ist um die Abschreibungen des Objekts zu ergänzen. Hierbei gilt es im Weiteren zu beachten, dass auch die Zinsen zu ergänzen sind. Die Zahlungen können im Rahmen der Einnahmen- und Überschussrechner i.S.d. § 4 Abs. 3 EStG (Einzelperson oder nicht bilanzierende GbR) auch der Jahresabrechnung des Verwalters entnommen werden, da diese unter Berücksichtigung des Abflussprinzips des § 11 Abs. 2 EStG den Zahlungen laut Teilungsplan entsprechen. Bei mehreren zwangsverwalteten Objekten ist darauf zu achten, dass die Verwaltung für jedes Objekt getrennt erfolgt. Es darf nicht zu einer Vermischung von Ein- und Ausgaben unterschiedlicher Objekte kommen. [8]

Beispiel 2:

Aufgrund fehlender Erfahrung erkennt A zunächst nicht, dass aufwendige Renovierungsarbeiten an seiner Immobilie notwendig sind. Wegen der verspätet durchgeführten Renovierungsmaßnahmen ziehen im Jahr 01 sämtliche Mieter aus dem Gebäude aus. Da es A nur schleppend gelingt neue Mieter für seine Immobilie zu gewinnen, kann er die Zins- und Tilgungsleistungen bald nicht mehr erbringen. Deshalb lässt seine Hausbank im Jahr 02 seine Immobilie unter Zwangsverwaltung stellen. Der eingesetzte Zwangsverwalter zieht nunmehr die Mieterträge der neuen Mieter ein und begleicht daraus die anfallenden Verbindlichkeiten. [9] *Bei der Erstellung der Steuererklärungen für A durch den Steuerberater S, greift S auf den Jahresbericht des Zwangsverwalters zurück um die erklärungspflichtigen Einkünfte aus Vermietung und Verpachtung zu ermitteln.*

Sonderbetriebseinnahmen und Sonderbetriebsausgaben im Bereich der GbR und Personengesellschaften können allein von den einzelnen Personen im Rahmen der gesonderten und einheitlichen Veranlagung geltend gemacht werden. Bei den bilanzierenden Personengesellschaften kommt komplizierend hinzu, dass

hier Zinsen allein durch eine Bescheinigung der Bank angesetzt werden können, denn allein diese kann die zu bilanzierende Verpflichtung exakt ermitteln. Darüber hinaus sind auch die Forderungen, die noch nicht beigezogen wurden, zu besteuern. Die Komplexität des Vorstehenden im Zusammenhang mit der Bilanzierung gilt auch für die Kapitalgesellschaft.

Für die Kapitalgesellschaft, die ein unter Zwangsverwaltung stehendes Objekt im Rahmen des Abschlusses abzuwickeln hat, ist der Geschäftsführer für die Erfüllung der steuerlichen Obliegenheit zuständig (§ 35 GmbHG). Im Bereich der Personengesellschaften gilt dies ebenso, hierbei gilt es aber auch noch § 183 Abs. 1 Satz 2 AO zu beachten, demnach erfolgt die Bekanntgabe an einen Empfangsbevollmächtigten, wobei der bekannt gegebene Steuersachverhalt die Wirkung für und gegen alle Beteiligte entfaltet (§ 183 Abs. 1 Satz 4, 2. HS AO).

2. Zwangsverwaltung und Insolvenz

a) Fall der Einzelperson

aa) Echte Zwangsverwaltung

Erleidet eine Person die Insolvenz, so umfasst die Insolvenz das gesamte Vermögen des Schuldners (§ 35 InsO). Hierzu gehört auch das Immobilienvermögen. Die ertragsteuerliche Abwicklung des Steuerpflichtigen hat hierbei der Insolvenzverwalter, § 34 Abs. 3 AO .

Wirkliche "Freude" kommt dabei beim Insolvenzverwalter auf, wenn ein Grundstück vor der Eröffnung der Insolvenz oder danach auf Betreiben eines Gläubigers unter Zwangsverwaltung gestellt wird (betreibender Gläubiger ist im Regelfall eine Bank). Hierbei ist zu beachten, dass die Anordnung der Zwangsverwaltung Vorrang vor der Verwaltung durch den Insolvenzverwalter hat. [10] Ein bereits bestehendes Zwangsverwaltungsverfahren bleibt auch nach der Insolvenzeröffnung bestehen (§ 80 Abs. 2 Satz 2 InsO). Zwischen dem eingesetzten Zwangsverwalter und dem Insolvenzverwalter darf keine Personenidentität bestehen. Falls der Insolvenzverwalter nachweist, dass durch die Zwangsverwaltung eine wirtschaftlich sinnvolle Nutzung der Insolvenzmasse wesentlich erschwert wird, kann er die Einstellung des Zwangsverwaltungsverfahrens beantragen (§ 153b Abs. 1 ZVG). Der Grundpfandgläubiger erhält zur Begleichung daraus resultierender Nachteile regelmäßige Ausgleichszahlungen aus der Insolvenzmasse (§ 153b

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5
Vgl. *Haarmeyer/Wutzke/Förster* (Fn. 4), § 9 Rn. 12. Die Verpflichtung zur Abführung der Gewerbesteuer ergibt sich allein für den absoluten Ausnahmefall der Betriebsfortführung im Rahmen der Zwangsverwaltung.

6
Vgl. *Haarmeyer/Wutzke/Förster* (Fn. 4), § 9 Rn. 12; *Schmittmann/Brandau/Stroh*, IGZInfo 2012, 3 ff.

7
Vgl. *Brüggemann/Haut*, Arbeitshilfen Zwangsverwaltung, 2008, Rn. 878.

8
Vgl. *Böttcher* (Fn. 3), § 152 Rn. 33a.

9
Altverbindlichkeiten - vor Anordnung der Zwangsverwaltung entstanden - werden nicht bedient.

10
Vgl. BGH, Urt. v. 7.12.1998 - II ZR 382/96 , ZInsO 1999, 173 .

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Abs. 2 ZVG). Während der Zwangsverwaltung sind die Einnahmen und Ausgaben vom Zwangsverwalter beizuziehen bzw. zu bezahlen (s.o.), die ertragsteuerlichen Verpflichtungen verbleiben aber beim Insolvenzverwalter. Dieser hat die Einnahmen aus Vermietung und Verpachtung zu erklären und die Einkommensteuer hierfür zu bezahlen, auch wenn er tatsächlich keine Einnahmen für die Insolvenzmasse erzielt hat.

Einen Ausgleich findet der Verwalter ggf. in dem Umstand, dass er Verlustvorträge i.S.d. § 10d EStG nutzen kann. Dies setzt aber eine durchgängige Veranlagung des Steuerpflichtigen voraus, die ggf. erst unter hohem Aufwand hergestellt werden kann. Weniger ratsam ist in diesem Zusammenhang das Tolerieren von Schätzungsbescheiden i.S.d. § 162 AO . Hier können sich immer Haftungsfragen anschließen, da die tatsächlichen Verluste evtl. höher waren als die Schätzung und somit Verlustvorträge verschenkt werden.

Beispiel 3:

A erkennt, dass seine Anstrengungen zur Renovierung der Immobilie zu spät kommen und beschließt einen Insolvenzantrag zu stellen. Kurz bevor er den Antrag stellen kann, lässt seine Hausbank einen Zwangsverwalter für die vermietete Immobilie einsetzen. Der Insolvenzverwalter kann nun nicht mehr auf die Erträge aus der Immobilie zugreifen. Er ist aber verpflichtet, die Einkommensteuererklärung für A zu erstellen und einzureichen. Für die Ermittlung der Einkünfte aus Vermietung und Verpachtung greift er auf den Jahresbericht des Zwangsverwalters zurück. Die Nachzahlung aus der Einkommensteuererklärung, inklusive des Teils, der auf die Einkünfte aus der Vermietung entfällt, hat der Insolvenzverwalter zu begleichen.

bb) Kalte Zwangsverwaltung

Hier wird die Zwangsverwaltung simuliert. Häufig bietet die "kalte Zwangsverwaltung" einen Lösungsansatz bei widerstreitenden Interessen von Zwangsverwalter und Insolvenzverwalter. Hierzu schließt der Insolvenzverwalter einen Geschäftsbesorgungsvertrag mit dem Grundpfandgläubiger ab und führt die Verwaltung wie ein gerichtlich bestellter Zwangsverwalter durch. Gegenüber der Bank als Gläubigerin mit den eingetragenen Sicherungsrechten, rechnet der Verwalter ebenfalls ab, als ob eine echte Zwangsverwaltung implementiert wurde. Die Insolvenzmasse erhält mithin im Regelfall 10 % der Mieteinnahmen (§ 21 ZwVwV analog).

In diesem Zusammenhang sollte der Verwalter allerdings darauf achten, wenn er mit der Bank abrechnet, dass er eine evtl. anfallende Einkommensteuer, die auf den Bereich der Vermietung und Verpachtung entfällt, noch einbehält. Dies gilt insbesondere in den Fällen, in denen die Immobilie schon vor einiger Zeit verkauft wurde und die steuerliche Veranlagung z.T. erst mit einem Zeitversatz von 2 oder 3 Jahren erfolgt.

Insbesondere das zuletzt Genannte unterscheidet dabei die Zwangsverwaltung durch Gerichtsbeschluss von der kalten Zwangsverwaltung. Im Rahmen der kalten Zwangsverwaltung kann der Verwalter nämlich durchaus im Rahmen einer Verhandlungslösung erreichen, dass die ertragsteuerlichen Belastungen im Ergebnis von der Bank getragen werden und nicht von der Insolvenzmasse. Im Fall der echten Zwangsverwaltung ist diese Möglichkeit nicht gegeben.

Abwandlung Beispiel 3:

Die Bank verzichtet auf die Bestellung eines separaten Zwangsverwalters. Stattdessen muss der Insolvenzverwalter mit der Bank abrechnen, als wäre er der Zwangsverwalter. Hierfür erhält er einen verhandelbaren Teil der Mieteinnahmen für die Insolvenzmasse.

Sollten steuerliche Belastungen im Nachgang auftauchen, dürfte eine Freigabe als Allzweckwaffe wenig sachdienlich sein, da die ertragsteuerliche Belastung, die eine Masseverbindlichkeit des § 55 InsO bedingt, während der Verwaltungszeit begründet wurde. Im Anschluss an die Freigabe ergeben sich keine steuerlichen Verpflichtungen mehr, da das Grundstück dann nicht mehr Bestandteil der Masse ist.

Für die Insolvenzmasse bleibt ggf. als letzte Handlungsalternative, insbesondere bei einer geringen Masse, die Masseunzulänglichkeit anzuzeigen, wenn diese durch die ertragsteuerliche Belastung bedingt wird. [11]

Schon an dieser Stelle dürfte offensichtlich werden, dass die Manövriermasse, um die ertragsteuerliche Belastung abzuwenden, nicht unbedingt als hoch einzuschätzen ist. Mit anderen Worten, die Masse wird mit

der Steuer von Vermögensgegenständen belastet, deren Erlöse derselben nicht zufließen. Eine frühzeitige Kalkulation erscheint insofern angebracht (auch in Form einer schnellen Freigabe im Rahmen der Überschneidung von Zwangsverwaltung und Insolvenzverwaltung), um ggf. nachteilige Konsequenzen zu vermeiden.

b) Fall der GbR [12]

Im Fall der GbR ist der ideelle Anteil des Insolvenzschuldners eines Vermietungsobjekts Bestandteil der Zwangsverwaltung (ggf. auch der kalten Zwangsverwaltung). Insofern ist sein steuerlicher Anteil zu ermitteln. Hierzu bedarf es der einheitlichen und gesonderten Gewinnfeststellung. Entsprechende Schreiben gehen mithin an die steuerlichen Verpflichteten. Daraus ergibt sich die zu klärende Frage, ob der Insolvenzverwalter die steuerliche Abwicklung für eine unter Zwangsverwaltung gestell-

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Bei der Anzeige der Masseunzulänglichkeit ist aber darauf zu achten, dass dies frühzeitig erfolgt. Erfolgt die Anzeige verspätet, kann durchaus wiederum die Haftungsfrage gestellt werden.

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Die nachstehenden Ausführungen betreffen auch den Einzelunternehmer oder die Einzelperson, die insolvent ist und dessen Vermögensabwicklung durch den Insolvenzverwalter erfolgt, wobei Massebestandteil ein ideeller Anteil an einer Immobilie ist.

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te Immobilie (ggf. auch kalte Zwangsverwaltung) durchführen muss. Fakt ist, dass für die steuerliche Abwicklung generell die Geschäftsführung der GbR (OHG und KG) verantwortlich ist. [13] Jeder Geschäftsführer (Gesellschafter) der GbR ist insofern verpflichtet (§ 709 BGB). Abweichend hiervon kann laut Vertrag in der GbR ein Gesellschafter zur Führung der Geschäfte bestimmt werden. Dieser schließt dann die weiteren Gesellschafter von der Geschäftsführung aus. Gem. § 34 Abs. 3 AO tritt nun der Verwalter an die Stelle des insolventen Schuldners, der zugleich Miteigentümer der unter Zwang gestellten Immobilie ist. Der Verwalter muss nun die steuerlichen Verpflichtungen ggf. übernehmen. Hierzu gehört jedoch nicht die Pflicht zur Einreichung der Erklärung zur gesonderten Gewinnfeststellung, wobei hier jedoch die Rechtsstellung des Insolvenzverwalters und deren steuerliche Involvierung Berücksichtigung finden sollte. [14] Grds. aber gehört die Erstellung der Gewinnfeststellungserklärung gem. §§ 179 AO ff. zu den insolvenzfreien Tätigkeiten des Geschäftsführers, da sie den Vermögensbereich der Gesellschaft nicht berührt. [15]

Beispiel 4:

A und B gründeten eine GbR, welche die vermietete Immobilie erworben hat. B wurde zur Führung der Geschäfte bestimmt. Nachdem A seinen Teil der Zins- und Tilgungsleistungen nicht mehr bezahlen konnte, hatte seine Hausbank im Jahr 02 einen Zwangsverwalter für seinen Grundstücksbruchteil eingesetzt. Der Zwangsverwalter kann die Verwaltung nur mit dem anderen Miteigentümer B gemeinsam durchführen. [16] *B bleibt verantwortlich für die Erklärung zur gesonderten und einheitlichen Feststellung der Besteuerungsgrundlagen für A und B.*

Letztlich kann man dieser Diskussion beitreten, muss es aber nicht, wenn man das Handeln des Finanzamts berücksichtigt, denn hier werden ggf. vergleichsweise schnell Fakten geschaffen. Das Amt erlässt häufig einen Schätzungsbescheid gem. § 162 AO . Im Weiteren sei die richtige Bekanntgabe unterstellt, wobei in der Praxis ggf. viele Fehler gemacht werden. Die Anschlussfrage lautet aber nun, muss der Verwalter auf den Bescheid reagieren, denn im Regelfall ist die Schätzung pro fiskalisch, schnell werden hier z.B. 80.000 € aus Vermietung und Verpachtung als Überschuss je Feststellungsbeteiligten ermittelte, obwohl sich tatsächlich nur ein Überschuss von 20.000 € ergeben würde. Der Verwalter kann und darf einen solchen Bescheid nicht gegen sich wirken lassen, denn das Beispiel legt deutlich offen, dass die hieraus resultierende Einkommensteuerschuld (auf 80.000 €) zu hoch ist, was ggf. eine Haftung über § 60 InsO bedingt.

Im Weiteren kann, wie bei einer Einzelperson (insofern s. auch die obigen Ausführungen) überlegt werden, ob die Freigabe eine Handlungsalternative darstellt, um sich der steuerlichen Belastung zu entledigen. Das Ergebnis ist mit den Ausführungen zur Einzelperson identisch. Schon begründeter Steuerschulden kann man sich nicht entledigen. Für die zukünftigen Steuerschulden stellt die Freigabe eine Handlungsoption dar.

Für die Masse bleibt ggf. als letzte Handlungsalternative, dass bei einer geringen Masse, die Masseunzulänglichkeit anzuzeigen ist, wenn diese durch die ertragsteuerliche Belastung bedingt wird. [17]

c) Anmerkungen zur Personengesellschaft und Kapitalgesellschaft

Für die Personengesellschaft gelten im Prinzip die vorstehenden Ausführungen. Wenn die Personengesellschaft Anteile an einer Immobilien GbR hat, gilt es zu beachten, dass zuerst das Ergebnis der Immobilien GbR zu ermitteln ist. Das Ergebnis wird dann im Rahmen der Veranlagung der Personengesellschaft berücksichtigt. Im Rahmen der Veranlagung ergibt sich dann das Zuständigkeitsdilemma, das in Abschnitt b) angesprochen wurde, auf beiden Ebenen. Dies gilt es für den Verwalter sauber aufzulösen, um die Frage einer späteren Haftung zu vermeiden. Gleiches gilt auch für den Abwickler einer Kapitalgesellschaft, die Anteile an einer Immobilien-GbR hat, wobei es hier nur auf der Ebene der Immobilien-GbR zu einem Zuständigkeitsdilemma kommen kann.

IV. Zusammenfassung

Die Ausführungen machen deutlich, dass das Zusammentreffen von Zwangsverwaltung und Insolvenzverwaltung zu erheblichen negativen ertragsteuerlichen Belastungen für die Insolvenzmasse führen kann. Im Rahmen der kalten Zwangsverwaltung ergibt sich dabei die Option, dass die Belastung auf die Bank durch geschickte Verhandlungen übertragen werden kann, was aus der Sicht der Insolvenzmasse ein Optimum darstellt. Liegt der Fall einer echten Zwangsverwaltung in Verbindung mit einer Insolvenz vor, trägt die Insolvenzmasse die ertragsteuerlichen Folgen, ohne die Früchte der Vermietung vereinnahmen zu können.

Die Freigabe stellt im Weiteren, so wurde herausgearbeitet, nur die Entlastung für zukünftige steuerliche Belastungen dar. Bei einem Zusammentreffen von Zwangsverwaltung und Insolvenz ist insofern schnell zu analysieren, ob eine Freigabe erfolgen sollte. Bereits begründete Steuerschulden bleiben von der Freigabe unberührt. Auch die Handlungsalternative der Masseunzulänglichkeit gilt es mit Bedacht zu analysieren, sofern sie als Alternative überhaupt in Betracht kommt.

13
Vgl. *Klein*, AO, 10. Aufl. 2009, § 34 Rn. 7.

14
Vgl. *Waza/Uhländer/Schmittmann*, Insolvenzen und Steuern, § 179 AO Rn. 499.

15
Vgl. *Rüsken*, in: Klein (Fn. 13), § 69 Rn. 129a.

16
Vgl. *Böttcher* (Fn. 3), § 152 Rn. 34.

17
Zu einer eventuellen Haftungsproblematik wird auf Fn. 6 hingewiesen.

Ehrenerklärung

Ich versichere hiermit, dass ich die vorliegende Arbeit ohne unzulässige Hilfe Dritter und ohne Benutzung anderer als der angegebenen Hilfsmittel angefertigt habe; verwendete fremde und eigene Quellen sind als solche kenntlich gemacht. Insbesondere habe ich nicht die Hilfe eines kommerziellen Promotionsberaters in Anspruch genommen. Dritte haben von mir weder unmittelbar noch mittelbar geldwerte Leistungen für Arbeiten erhalten, die im Zusammenhang mit dem Inhalt der vorgelegten schriftlichen Promotionsleistung stehen.

Ich habe insbesondere nicht wissentlich:

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- fremde Ergebnisse oder Veröffentlichungen plagiiert,
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Mir ist bekannt, dass Verstöße gegen das Urheberrecht Unterlassungs- und Schadenersatzansprüche des Urhebers sowie eine strafrechtliche Ahndung durch die Strafverfolgungsbehörden begründen können. Diese Arbeit wurde bisher weder im Inland noch im Ausland in gleicher oder ähnlicher Form als schriftliche Promotionsleistung eingereicht und ist als Ganzes auch noch nicht veröffentlicht.

Ich erkläre mich damit einverstanden, dass die Dissertation ggf. mit Mitteln der elektronischen Datenverarbeitung auf Plagiate überprüft werden kann.

Magdeburg, 30. März 2016

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