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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.

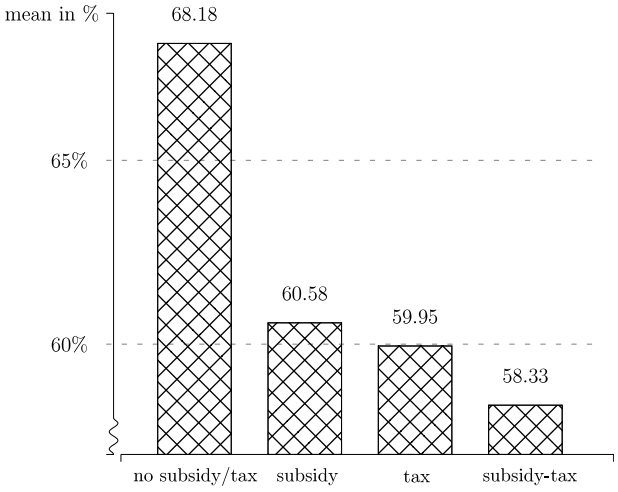

Fig. 1. Share of endowment invested in the risky asset A on average for each treatment (number of subjects: 119).

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.