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Effort and Aspirations in Tax Evasion: Experimental Evidence

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Is the effort exerted to earn taxable income considered in compliance decisions? And if so, is hard-earned income or easy money more likely to be concealed from authorities? While economic theory postulates that prior costs should not affect present decisions, psychological research shows that prior investments of money, time, or effort do matter. Findings from previous studies on the impact of effort on abstract decision tasks suggest two contradictory predictions for the context of tax compliance decisions: Either taxable income earned by high effort is subjectively of higher value, and therefore more likely to be evaded, or investments of effort cause a shift of the reference point through the establishment of an aspiration level, resulting in honest declaration of income. Two experiments were conducted to test these predictions. In a business simulation, taxable income was obtained by different levels of effort and consequently had to be reported to authorities. Results show that tax evasion was more pronounced in low-effort conditions. This suggests that effort changes the reference point rather than the slope, and provides evidence that in tax compliance decisions aspiration levels serve as reference points. Implications for tax audits are discussed.

L'effort déployé pour obtenir des revenus imposables est-il pris en compte dans les décisions qui en découlent? Et si c'est le cas, est-ce l'argent facile ou les revenus durement gagnés qui présentent une plus forte probabilité d'être soustraits au fisc? Alors que la théorie économique postule que le coût antérieur n'a pas de retombées sur les décisions présentes, les recherches de psychologie montrent que les investissements passés en argent, temps ou effort ont leur importance. Des travaux sur l'impact de l'effort sur des tâches de décision abstraite débouchent sur deux prédictions contradictoires en ce qui concerne les décisions relatives à l'impôt: ou le revenu imposable obtenu à la suite d'un

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effort substantiel est subjectivement fortement valorisé et a de fortes chances d'être camouflé, ou l'effort investi provoque un changement de référence à travers l'instauration d'un niveau d'aspiration, ce qui a pour conséquence une déclaration honnête des revenus. On a réalisé deux expériences pour mettre à l'épreuve ces prédictions. Dans une simulation commerciale, le revenu imposable a été obtenu suite à différents niveaux d'effort et devait être porté à la connaissance du fisc. Les résultats montrent que l'évasion fiscale était plus accentuée dans les conditions où l'effort était modeste. Il faut en conclure que l'effort entraîne une mutation du système de référence plutôt qu'une simple modification de niveau et que dans les décisions relatives à l'impôt les niveaux d'aspiration servent de point de référence. On réfléchit aux leçons à en tirer pour le contrôle fiscal.

INTRODUCTION

Imagine you are a self-employed architect. One year you work really hard for your income, and earning your salary takes quite an effort. In another year your work turns out to be unusually easy, so that your income is obtained without much effort on your part. When it comes to paying your taxes, in which situation are you more tempted to evade taxes?

The present study examines whether the effort needed for earning an income influences taxpayers' compliance decisions. These are often modeled as decisions under uncertainty with a safe option—compliance with the regular payoff of after-tax income—and a risky option—evasion, which yields a better payoff if it goes undetected and a worse payoff if it is detected (e.g. Allingham & Sandmo, 1972).

A variety of psychological factors influencing taxpayers' compliance decisions have been studied (for an overview see Kirchler, 2007), e.g. the perceived justice of the tax system (Wenzel, 2002), altruistic orientation (Kirchler, 1997), or the decision frame used by the taxpayer (Schepanski & Kelsey, 1990; Schepanski & Shearer, 1995). Only rarely addressed has been the question whether compliance is affected by the amount of effort exerted in earning one's taxable income.

If prior investments of effort have an impact on compliance decisions, contradictory predictions can be made regarding the direction of the effect. First, it can be assumed that hard-earned income is subjectively of higher value and reluctance to pay taxes is stronger than if taxable income has been obtained rather easily. Second, the risk of losing additional money by paying a penalty in case of an audit could deter a person from evading taxes, particularly if income was earned by a high degree of effort. In the following sections these predictions are explained in detail within a prospect theory framework and prior empirical evidence from abstract decision tasks is reviewed. Subsequently, the results from two experiments are reported, testing the impact of effort on tax compliance decisions.

EFFORT AND DECREASED TAX COMPLIANCE

Considering tax compliance as decision under uncertainty (Allingham & Sandmo, 1972), we employ a prospect theory framework (Kahneman & Tversky, 1979) to explore the specific situation of taxpayers who earn their income by different amounts of effort. Prospect theory has quite often been used in the context of tax compliance research (Chang, Nichols, & Schulz, 1987; Copeland & Cuccia, 2002; Elffers & Hessing, 1997; Robben, Webley, Weigel, Waerneryd, Kinsey, Hessing, Martin, Elffers, Wahlund, & Van Langenhove, 1990; Schepanski & Kelsey, 1990; Schepanski & Shearer, 1995), and previous studies have pointed out that taxpayers could adopt different reference points (e.g. expected assets vs. current assets) to evaluate their decision outcomes. For self-employed taxpayers, however, it is reasonable to assume that the gross income is used as the reference point since taxes are paid out of their own pocket. With the gross income as reference point, tax compliance decisions are choices between a sure loss (i.e. reporting honestly) and a gamble between a smaller loss (underreporting and not being detected) and a larger loss (underreporting and being detected). In general, original prospect theory would predict risk-seeking for such a framing (since all outcomes occur in the domain of losses).

The effort made to earn taxable income could affect the compliance decision process by increasing the value of such income. If income earned through high effort is subjectively of higher value, this would mean that the slope of the value function is affected by effort. The value function is convex for losses in prospect theory. A steeper slope of the function increases convexity when evaluating the outcomes of a given gamble, and therefore increases the risk-seeking tendency. Accordingly, high effort put into earning taxable income would make tax evasion more likely. These considerations are exemplified in Figure 1. Assume that function V represents a value function for low-effort income. High effort changes the function, resulting in value function V* with a steeper slope. In V*, subjective valuation of an outcome is higher than in V and also the difference between the subjective value of a given gamble and the subjective value of the sure outcome increases, which implies that *more* risk-seeking should be observed for the high-effort income value function V*.

From an economic perspective, the effort put into earning a given income should not, by itself, make any difference in evaluation. The notion of fungibility implies that money has no labels and is spent regardless of its source (Thaler, 1990). Behavioral research, however, has demonstrated that the assumption of fungibility is frequently violated (e.g. Arkes, Joyner, Pezzo, Nash, Siegel-Jacobs, & Stone, 1994; Shefrin & Thaler, 1988; Thaler, 1985, 1999). In practice, money from different sources is not treated equally. Loewenstein and Issacharoff (1994) demonstrated source dependence in valua-

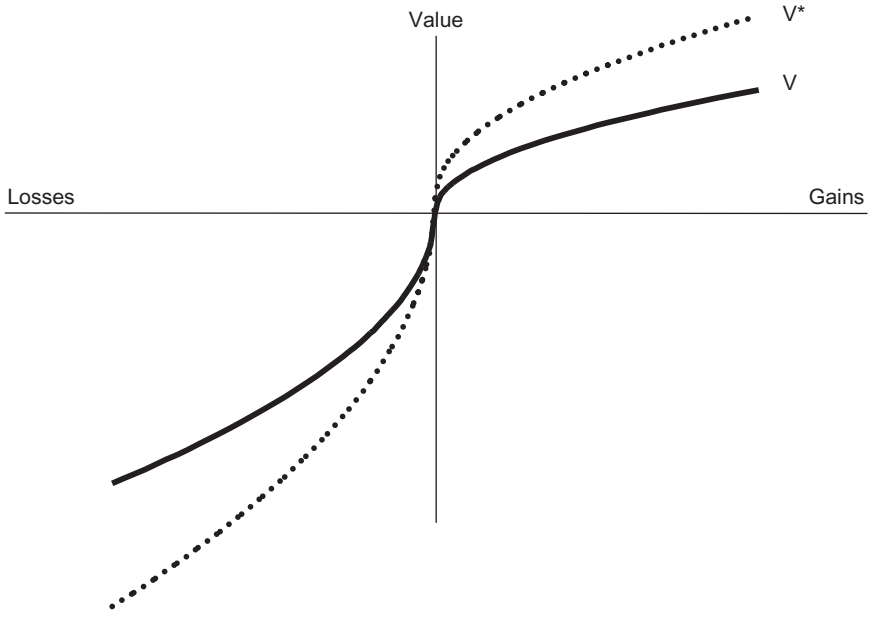

FIGURE 1. Effects of change in slope on value functions.

Note: solid line—low effort; dotted line—high effort.

tion of objects. In one study, participants had to evaluate a mug which they believed they had either obtained due to their performance in an exercise or by chance. Those who were informed that they obtained the mug due to their performance valued it significantly higher than those who believed they had received it by chance. In another study, participants who obtained the mug due to exemplary performance on a task valued it higher than those who obtained it despite their poor performance. If income obtained through high effort is subjectively valued more highly than easily earned income, reluctance to pay taxes on such income should be strong and the option of evading one's taxes would be particularly tempting.

Accordingly, research on sunk cost effects would suggest increased tax evasion when high effort was invested to earn taxable income. Prior investments of money, effort, or time have an impact on actual decisions (Arkes & Blumer, 1985) and several findings suggest that sunk costs result in risk-seeking choices (Thaler, 1980; Thaler & Johnson, 1990). For example, in one of the classic studies by Arkes and Blumer (1985), participants were asked whether they would invest in a risky development project. When being told that they already had invested in the project earlier, participants were more

likely to invest additional money. Sunk cost effects have been demonstrated in a variety of settings (see Arkes & Ayton, 1999; Brockner, 1992, for reviews), not only in the laboratory, but also in field studies (e.g. Camerer & Weber, 1999). If the effort put into earning taxable income is experienced as sunk cost, it can be expected that the risk of tax evasion is taken and all or part of the income is concealed from the authorities.

EFFORT AND INCREASED TAX COMPLIANCE

A competing prediction on the impact of effort would result when the investment of effort caused a shift of the reference point used in the compliance decision. Kahneman and Tversky (1979) in their original paper on prospect theory stated that "there are situations in which gains and losses are coded relative to an expectation or aspiration level that differs from the status quo" (p. 286). Zeelenberg and van Dijk (1997) argue that one of the situations where an aspiration level serves as a reference point is when behavioral sunk costs occurred, i.e. prior investments of effort were made. For compliance decisions it is plausible to assume that taxpayers who put different effort into earning their income adapt to different reference points. While low-effort income is supposably perceived as windfall money, i.e. an unexpected gain (Arkes et al., 1994), the endeavor of working for the high-effort money could evoke thoughts about one's "final" profit, i.e. income after tax. Hence the expected net income is more likely to serve as the reference point in the latter case. We suppose that high effort induces the setting of an aspiration level for an expected net income that serves as the reference point in the decision. Low effort, on the other hand, should decrease the likelihood that a taxpayer thinks about how much income will remain after paying taxes. Therefore she should evaluate the decision outcomes from her usual reference point, which is the gross income she already has in her pocket. The change of reference point has dramatic consequences for choice behavior, since it alters the domain of the decision: If high effort evokes an aspiration level serving as reference point for the compliance decision, the choice between compliance and evasion occurs in the gain domain of the value function. For gains, prospect theory predicts risk-aversion, i.e. compliance. If the reference point is the gross income, the choice is between losses of different magnitudes. In the loss domain, taxpayers' willingness to take the risk of evasion should be higher. Figure 2 shows the effects of adapting to different reference points. Value function V for low-effort income implies the gross income as reference point (R). Value function V* is based on the decision-maker's aspiration level, the expected net income, as reference point (R*). If outcome X, which represents the actual remaining net income in the case of honest declaration, is valuated, this outcome is always in the loss domain for value function V, but in the gain domain for value function V* if the aspiration level is lower

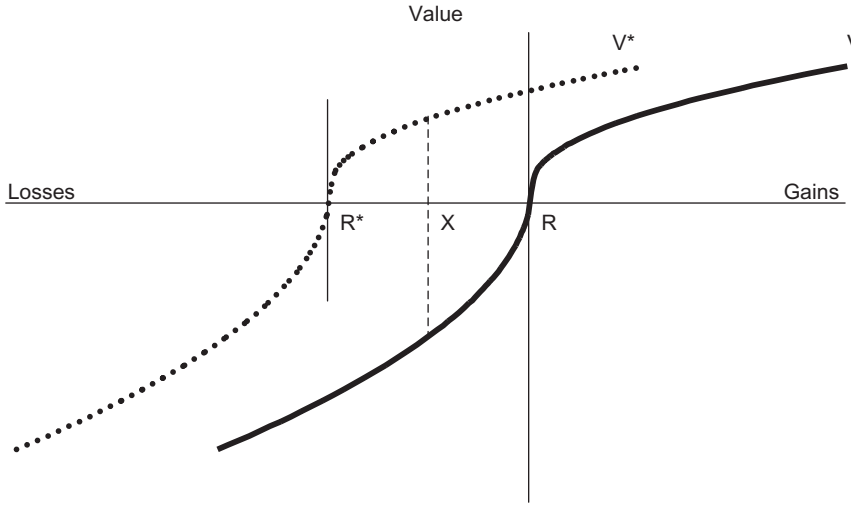

FIGURE 2. Effects of shift of reference point on value functions.

Note: solid line—low effort; dotted line—high effort.

than X. In consequence, a reference point R results in risk-seeking choices, and a reference point R* in risk-aversion. However, if the aspiration level R* is higher than X, then X is in the loss domain as well, resulting in risk-seeking behavior as for reference point R.

Evidence for the prediction that prior effort results in risk-averse choices is reported from previous studies dealing with abstract decision tasks. Research on a "reverse" sunk cost effect—in opposition to "classical" sunk cost effects as reported above—indicates that in some cases, earlier expenditure of resources can increase risk-aversion. For example, Garland, Sandefur, and Rogers (1990) presented geologists with oil exploration scenarios, and found that higher sunk costs—previously drilled dry wells—resulted in reduced likelihood to authorise the next drill. Of particular relevance to the current paper, Zeelenberg and van Dijk (1997) had their participants imagine that they had invested time and effort in a job and were offered a gamble over their payment. Participants were less willing to accept the gamble than in a control group where information on time and effort investments was omitted. Zeelenberg and van Dijk (1997) conjecture that in some cases people feel that they have "[t]oo much invested to gamble" (p. 689). While most prior research on sunk costs focused on financial investments, Zeelenberg and van Dijk (1997) argue that individuals experiencing *behavioral* sunk costs develop a certain expectancy or aspiration level (Helson, 1964; Weiner, 1996)

for (financial) compensation of their behavioral effort. If the aspiration level can be met by a safe option—refuting the gamble and accepting the contracted salary—this option is chosen. Additional gains from risky alternatives are given up, since such options also bear the risk of losing the gamble, falling below one's aspiration level and experiencing ". . . the feeling of having worked for nothing" (p. 682).

Related findings are reported by Kivetz (2003) from a marketing study. In one of his scenarios participants were offered a choice between receiving a small amount of frequent-flyer miles of an airline and a one in 50 chance for a larger amount of miles. The choice-opportunity was either described as a merit of participating in a loyalty program of a national cereal brand, or as a gift from a friend who had participated in such a program. The smaller, but sure amount of miles was more often chosen when participants were told they had "earned" the choice-opportunity themselves, rather than had received it as a gift. In line with our reasoning above, Kivetz (2003) argues that this preference reversal occurred due to a shift of the reference point, caused by the effort expended in the loyalty program. A complementary effect of risk-seeking choice preferences in total absence of effort was found in research on windfall gains (Arkes et al., 1994). In contrast to earned income, windfalls (i.e. unexpected gains) are more readily spent and also more easily put at stake in gambling.[1] Soman and Cheema (2001) show that windfall gains counteract the sunk cost effect by allowing people to "write off" the unrecoverable expenses. A related phenomenon, the house money effect (Thaler & Johnson, 1990), describes increased risk-seeking behavior after prior gains. After a successful bid in the casino, for instance, it is likely that the money won will be put on the line in further gambling. Similar results are reported by Keasey and Moon (1996) in an investment context; Clark (2002), however, found no support for house money effects in a public goods experiment. In the context of tax compliance decisions, these findings suggest that preferences for the risky option of being non-compliant should be stronger when income was earned by low effort.

To summarise, research on the impact of effort on decisions under uncertainty allows for directly opposed predictions: Reluctance to pay taxes is either particularly strong if income was earned by high effort, or taxpayers become risk-averse by such endeavor and accordingly submit honest returns to the tax office. Regarding the first prediction, we argue that the effort

[1] However, the defining characteristics of windfalls appear to be their *unexpectedness* rather than the effort needed: In one of the experiments by Arkes et al. (1994), participants imagined doing different summer jobs—pouring hot tar or working as a lifeguard on the beach. Although a pilot study indicated that these two jobs were considered very different in strenuousness, no difference in the propensity to spend the money earned on these jobs was found. The authors attribute this finding to the fact that participants in both cases were expecting the money.

invested could affect the slope of the value function, resulting in more risk-seeking choices, i.e. non-compliance. In the second prediction, we assume that a shift of the reference point due to "sunk" effort occurs, resulting in more risk-averse choices, i.e. compliance.

Considerations about the two decision mechanisms we proposed are by no means entirely new. Concerning the change in the slope of the value function, Arkes et al. (1994, Figure 1, p. 333) conjectured that the effect of windfall gains could be due to a smaller subjective value of windfall dollars as compared with non-windfall dollars, and the findings by Loewenstein and Issacharoff (1994) are phrased as a change in subjective valuation of the object in question. Concerning the shift of the reference point due to effort, this assumption was first proposed by Zeelenberg and van Dijk (1997), and in more detail by Kivetz (2003). To our knowledge, however, the proposed mechanisms have not yet been integrated and used in a tax evasion framework.

Previous tax research dealing with the role of effort in compliance decisions is scarce. In public good experiments, which are often referred to as models of the social dilemma inherent in tax evasion, no difference in cooperation was found regardless of whether experimental income was earned or provided by the experimenters (Cherry, Kroll, & Shogren, 2005; Clark, 2002). If income had to be earned by different levels of effort (instead of comparing the impact of earned and windfall income), contributions to the public good were higher when prior effort was low (Muehlbacher & Kirchler, in press). However, an important difference between the public good game setting and tax compliance decisions seems to be the threat of audits and fines. In a more realistic tax compliance setting, a significant interaction of tax rate and source of income was found. While at a tax rate of 20 per cent no difference in compliance was found, at a rate of 40 per cent compliance was higher among participants who earned their experimental income in a multiplication exercise than among participants who were endowed with income by the experimenters. The difference, however, was statistically only marginally significant (Boylan & Sprinkle, 2001). We aim to replicate this finding, first at an even higher tax rate of 50 per cent and second by manipulating different levels of effort instead of qualitatively different sources of income (Experiment 1). In addition, we measure in the second experiment participants' aspiration levels to clarify the role of the proposed mechanisms underlying the compliance decision process (Experiment 2).

EXPERIMENT 1

Experimental Design and Procedure

The experiment was conducted in a computer classroom with groups of seven to nine participants. Participants were instructed to take the role of architects

who apply for building projects. Short descriptions of four possible projects were provided and participants had to choose one to apply for. If a project was assigned, they would receive additional information on progress and circumstances for that particular project. Each project was described as lasting one year. At the end of that year participants would learn about their income from the project and would be required to file their tax report.

The experimental design was a one-factorial within-subjects design with control condition, low-effort condition, and high-effort condition. In the control condition, participants were simply assigned a project and received a description of circumstances that contained no special events. At the end of the period, they learned about their salary (2 million guilders) and filed their tax report. In both experimental conditions, participants had to apply for a building project and were told that they would compete against the other participants in the room. After application the two conditions differed in how easily the assignment to the chosen project was obtained and how much effort was necessary to complete the assigned project. After applying in the low-effort condition, participants were told that they had been the only person applying for that particular project and therefore they obtained the assignment. The description of circumstances stressed that the project was running very smoothly, with a number of positive events making the working year particularly easy and effortless. At the end of the period, they learned about their salary (2.2 million guilders) and filed their tax return. After application in the high-effort condition, participants were told that they had been one out of seven applying for the same project and therefore the final assignment would be decided through a knowledge test. Participants then had to complete a 15-item multiple-choice test with items connected to architecture (e.g. items on spatial skills or naming a famous building typical of the Baroque style). After completion, each participant was told that he or she had been the best in the competition and therefore was assigned the project. The description of circumstances stressed that the project was not running smoothly, with a number of events making the year particularly hard and effortful. At the end of the period, they learned about their salary (2.2 million guilders) and filed their tax return. In sum, the high- and low-effort conditions differed primarily in the effort of taking the architecture test, and the problems encountered during the business year.

Each participant completed all three conditions. To make participants acquainted with the task, everyone started with the control condition. To balance out potential order effects, one half of participants then completed the low-effort condition followed by the high-effort condition; the other half of participants received the conditions in reverse order.

In the tax return participants had to file after each period, they received information about their total gross income during that period (2 million guilders or 2.2 million guilders) and information about the tax rate (50%).

They also received information about the probability of tax audits (15.3%) and about the sanctions should a tax audit reveal tax evasion (twice the evaded amount). In the tax report, participants had to fill in the gross income during that period that they would report to the tax authorities.

Although participants were led to believe that they would compete against others for assignment of the building project, each participant was assigned exactly the project he or she had applied for. To make the cover story more plausible, announcements of assignment were made only after all participants had made their applications or completed the knowledge test. No tax audit occurred during the three periods. At the end of the experimental session, participants received their payoffs. Payoffs in each period were computed as the amount received as payment for the project minus the amount paid in taxes. Payoffs were summed up over all three periods. The total amount was converted from the experimental currency into euro (conversion formula: 900,000 guilders = 1 euro). Theoretically, that is, in the case of reporting zero income in all three periods, a maximum payoff of 6.4 million guilders (7.1 euro) was possible to achieve. After the experiment, participants were thoroughly debriefed and received their payoff in cash.

Participants

Overall, 126 students enrolled in economics or economic psychology courses at the University of Vienna and the University of Economics and Business Administration of Vienna participated. Median age was 22 years, ranging from 18 to 37 years; 52 per cent of participants were male and 48 per cent female.

Results

Preliminary analyses showed no order effects for the sequence of effort conditions. Considering tax behavior as a dichotomous variable by distinguishing between complying versus evading, no differences were found whether the low-effort condition was before or after the high-effort condition (high-effort condition: χ^2 ($df = 1, n = 126) = 0.20$; $p = .66$; low-effort condition: χ^2 ($df = 1$, $n = 126$) = 0.34, $p = .56$). Thus, data were pooled over the two orderings.

Tax evasion can be measured in different ways. First, an aggregate-level perspective can be taken, and the total amount of taxes paid can be compared to the total amount of taxes due. This would correspond to the perspective of the tax authorities who look mainly at the total revenue. An index for tax evasion would be the difference between taxes due and taxes paid; an index for relative evasion would be that difference divided by the taxes due. Such a calculation gives a single proportion figure, reflecting the relative magnitude

TABLE 1
Tax Evasion on Aggregate and Individual Level by Condition (Experiment 1)

	Condition		
	Control	*Low effort*	*High effort*
Aggregate level			
Aggregate tax evasion	.21	.25	.18
Individual level			
Tax honesty			
Honest	74 (58.7%)	58 (46.0%)	73 (57.9%)
Dishonest	52 (41.3%)	68 (54.0%)	53 (42.1%)
Tax evasion severity			
Md(IR)	.50 (.57) (n = 52)	.50 (.31) (n = 68)	.45 (.42) (n = 53)

Note: Total n = 126. Md—Median, IR—Interquartile Range.

of tax evasion on the aggregate level. Second, an individual-level perspective can be taken, and both the number of individuals evading taxes and the amount evaded can be analysed. Since a given level of aggregate tax evasion can result from a large number of individuals evading little, or from a few individuals evading large amounts, both indicators are useful for tax policy.

These considerations guided data analysis. First, aggregate tax evasion was computed for each condition as [(Total taxes due – Total taxes paid)/Total taxes due]. As shown in Table 1, aggregate tax evasion was .21 in the control condition, .25 in the low-effort condition, and .18 in the high-effort condition. In other words, tax evasion amounted to 21 per cent of the taxes due in the control condition, to 25 per cent in the low-effort condition, and to only 18 per cent in the high-effort condition. These numbers suggest that more taxes were evaded in the low-effort condition. Differences between low-effort and high-effort conditions could be due either to (a) a larger number of participants evading taxes or (b) by more evasion on part of those evading.

Regarding *tax honesty*, the overall level of participants reporting their full income was rather high. In the control condition, 74 participants (59%) reported their income honestly and 52 (41%) understated their income. In the low-effort condition, 68 (54%) participants understated their income, and in the high-effort condition, 53 (42%) understated their income (see Table 1).

Tax reporting behavior on an individual level changed significantly over the three conditions, Cochran's Q (df = 2, n = 126) = 13.39, $p < .01$. Table 2 shows a breakdown of individual tax honesty patterns. Individual change over the two conditions of interest was systematic: The low-effort condition induced more tax evasion than the high-effort condition, McNemar χ^2 (df = 1, n = 126) = 10.71, $p < .01$. While only three participants (2%) filed an honest

TABLE 2
Individual-Level Tax Honesty by Condition (Experiment 1)

Condition				
Control	*Low effort*	*High effort*	*f*	*%*
Honest	Honest	Honest	51	40.5
Honest	Honest	Dishonest	2	1.6
Honest	Dishonest	Honest	10	7.9
Honest	Dishonest	Dishonest	11	8.7
Dishonest	Honest	Honest	4	3.2
Dishonest	Honest	Dishonest	1	0.8
Dishonest	Dishonest	Honest	8	6.3
Dishonest	Dishonest	Dishonest	39	31.0
			126	100.0

tax report in the low-effort condition and were dishonest in the high-effort condition, 18 participants (14%) showed the opposite behavior pattern by being dishonest in the low-effort condition and honest in the high-effort condition.

The above results indicate that participants were more inclined to report dishonestly in the low-effort condition. As an indicator for *tax evasion severity*, an index of relative evasion was computed on the individual level in analogy to the aggregate level as [(Individual taxes due – Individual taxes paid)/Individual taxes due]. This index is computed only for participants who underreported their income, with higher values indicating more severe tax evasion; for example, a value of .25 indicates that a person tried to evade 25 per cent of the taxes due. Regarding severity of tax evasion, the overall pattern indicates no noticeable differences. In the control condition, those participants who reported dishonestly on average tried to evade half of the taxes due: The median value for tax evasion severity in terms of relative evasion was .50 (IR = .57). In other words, half of the participants who evaded taxes tried to evade up to 50 per cent of the taxes due, and the other half of the participants tried to evade even more. In the low-effort condition, the median value for tax evasion severity was .50 as well (IR = .31). In the high-effort condition, the median value for tax evasion severity was .45 (IR = .42). Although this seems to indicate that tax evasion is less severe in the high-effort condition, the difference is not significant. For those participants who evaded in both the low-effort and the high-effort conditions, no change in tax evasion severity was found, Wilcoxon $Z = -.58$, $p = .56$.[2] It seems that

[2] Also, no difference in tax evasion severity was found between those 50 participants who evaded in both conditions and those 18 who evaded only in the low-effort condition, Mann-Whitney $U = 434$, $Z = -.22$, $p = .83$.

low effort induces more people to evade taxes, but does not necessarily induce more severe evasion.

Discussion

Experiment 1 studied whether higher effort would lead to more or less tax evasion. The results indicate that tax evasion was more frequent, and overall higher, in the low-effort condition. These findings seem incompatible with the proposed mechanism of effort increasing the convexity of a value function. To assume an opposite direction of the mechanism—that high effort induces a flatter value function—does not seem plausible; the findings by Loewenstein and Issacharoff (1994) indicate clearly that valuation is higher for objects obtained by skill than by luck. The results of the present experiment are in line with the findings by Zeelenberg and van Dijk (1997) who argue that the aspiration level matters. In our second experiment we therefore included a measure of aspiration levels.

EXPERIMENT 2

Experimental Design and Procedure

The experimental design and procedure were the same as in Experiment 1, except for the salary mentioned in the scenarios (to provide a more realistic environment, salaries were downsized and denoted in euro instead of an artificial currency; salaries amounted to 206,010 euros in the control condition and 236,940 euros in both experimental conditions), minor changes in the manipulation of effort and additional questions on participants' aspiration levels. In the experimental conditions, participants were asked to indicate the amount of money for which they would be willing to accept the very same project again. This question was used for measuring participants' aspiration levels: Those who had expected more income than they had received in the actual period would demand more money to accept a project like the one just completed.

Again, payoffs were summed up over all three periods. The total amount was converted from the experimental currency into real euro (conversion formula: 100,000 "lab" euro = 1 euro). Theoretically, that is, in the case of reporting zero income in all three periods, a maximum payoff of 679,890 "lab" euro (6.8 euro) was possible to achieve.

Participants

Overall, 178 students enrolled in economics or economic psychology courses at the University of Vienna and the University of Economics and Business

Administration of Vienna participated. Median age of the 59 per cent males and 41 per cent females was 23 years, ranging from 18 to 50.

Results

Preliminary analyses showed no order effects for the sequence of conditions (high-effort condition: χ^2 ($df = 1$, $n = 178$) = .11, $p = .74$; low-effort condition: χ^2 ($df = 1$, $n = 178$) = .10, $p = .75$) Therefore, data were pooled over the two orderings.

Tax Evasion and Effort. The aggregate level of tax evasion was .23 (23%) in the control condition, .26 (26%) in the low-effort condition and .24 (24%) in the high-effort condition (see Table 3). Aggregate levels of evasion in the low-effort condition and in the high-effort condition replicate reasonably well the pattern of overall levels in the first study.

Regarding *tax honesty*, 93 participants (52%) underreported their income in the control condition. In the low-effort condition, 101 participants (57%) underreported, and in the high-effort condition, 103 participants (58%) underreported. Over the three conditions, individual tax honesty did not vary, Cochran's Q ($df = 2$, $n = 178$) = 3.65, $p = .16$. In particular, no significant difference was found between the conditions of interest, the low-effort and the high-effort conditions, McNemar χ^2 ($df = 1$, $n = 178$) = .14, $p = .70$. Table 4 gives details.

Regarding *tax evasion severity*, the median value for relative evasion in the control condition was .42 (IR = .40). In the low-effort condition, the median value for tax evasion severity was .39 (IR = .50), and in the high-effort

TABLE 3
Tax Evasion on Aggregate and Individual Level by Condition (Experiment 2)

	Condition		
	Control	*Low effort*	*High effort*
Aggregate level			
Aggregate tax evasion	.23	.26	.24
Individual level			
Tax honesty			
Honest	85 (47.8%)	77 (43.3%)	75 (42.1%)
Dishonest	93 (52.2%)	101 (56.7%)	103 (57.9%)
Tax evasion severity			
Md(IR)	.42 (.40) ($n = 93$)	.39 (.50) ($n = 101$)	.30 (.44) ($n = 103$)

Note: Total $n = 178$. Md—Median, IR—Interquartile Range.

TABLE 4
Individual-Level Tax Honesty by Condition (Experiment 2)

Condition				
Control	*Low effort*	*High effort*	*f*	*%*
Honest	Honest	Honest	59	33.1
Honest	Honest	Dishonest	5	2.8
Honest	Dishonest	Honest	6	3.4
Honest	Dishonest	Dishonest	15	8.4
Dishonest	Honest	Honest	3	1.7
Dishonest	Honest	Dishonest	10	5.6
Dishonest	Dishonest	Honest	7	3.9
Dishonest	Dishonest	Dishonest	73	41.0
			178	100

condition, the median value was .30 (IR = .44). This pattern seems to indicate that evasion severity is less in the high-effort condition. Those 88 participants who were dishonest in both conditions, on average showed a relative tax evasion of .29 (IR = .49) in the high-effort condition and .38 (IR = .48) in the low-effort condition. However, this difference is not significant, Wilcoxon $Z = -1.02$, $p = .31$.

Tax Evasion and Aspiration Level. For the analysis of aspiration-level effects on tax behavior, participants' answers were transformed into relative aspiration levels: The relative aspiration level reflects what participants expected to earn relative to what they would earn if they declared their income honestly.

As assumed, participants stated a higher relative aspiration level in the high-effort condition than in the low-effort condition, Wilcoxon $Z = -6.35$, $p < .01$. The median relative aspiration level in the high-effort condition was 1.27 (IR = 0.63), and in the low-effort condition it was 1.10 (IR = 0.27). In other words, participants stated that they would expect 27 per cent more income in the high-effort condition, but only 10 per cent more in the low-effort condition.

The aspiration level was differentially related to tax evasion behavior. In the high-effort condition, participants who evaded taxes stated a higher aspiration level (Md = 1.35, IR = 0.59) than those who reported honestly (Md = 1.27, IR = 0.42), $U = 3170$, $Z = -2.05$, $p = .04$. In the low-effort condition, participants who evaded taxes stated a similar aspiration level (Md = 1.18, IR = 0.34) as participants who reported honestly (Md = 1.06, IR = 0.27), Mann-Whitney $U = 3559$, $Z = -0.97$, $p = .33$. The aspiration level is also differentially related to severity of tax evasion, depending on the treatment condition. In

TABLE 5
Aspiration Level and Tax Evasion by Condition (Experiment 2)

	Low effort		*High effort*	
	Honest (n = *77*)	*Dishonest* (n = *101*)	*Honest* (n = *75*)	*Dishonest* (n = *103*)
Relative aspiration level Md(IR)	1.06 (0.27)	1.18 (0.34)	1.27 (0.42)	1.35 (0.59)*
Correlation between relative aspiration level and tax evasion severity (Spearman's rho)		.15		.29*

Note: * $p < .05$.

the high-effort condition the correlation is significant, rho = .29, $p < .01$, $n = 103$. In the low-effort condition, the correlation between relative aspiration level and tax evasion severity was not significant, Spearman's rho = .15, $p = .13$, $n = 101$. Details are provided in Table 5.

To test for the possibility that these results are a consequence of the higher aspiration levels in the high-effort condition, an alternative analysis was run by performing a median-split by aspiration level in each condition. In the low-effort condition, those with above-average aspiration levels did not significantly more often evade taxes than those with below-average aspiration levels, χ^2 ($df = 1$, $n = 178$) = 1.30, $p = .29$. In the high-effort condition, those with above-average aspiration levels were more likely to report dishonestly, χ^2 ($df = 1$, $n = 178$) = 5.53, $p = .02$. Regarding tax severity, no difference between below-average and above-average aspiration levels was found in the low-effort condition, Mann-Whitney $U = 1045$, $Z = -1.56$, $p = .12$, but a significant difference was found in the high-effort condition: those with above-average aspiration levels engaged in more severe evasion, Mann-Whitney U = 903, Z = –2.78, p < .01.

Discussion

The findings of more frequent and higher tax evasion in the low-effort condition as in Experiment 1 could not be perfectly replicated. While on the aggregate level percentages of evaded income match those of the prior study, the effect of effort on the individual level did not hold. Percentages of dishonest reporting did not differ between low- and high-effort conditions. However, the measure of tax evasion severity revealed the same pattern with less severe evasion in the high-effort condition.

The analysis of aspiration levels indicated complex interrelations between effort, aspiration levels, and tax behavior. Aspiration levels were higher in the

high-effort condition than in the low-effort condition. Furthermore, severity of evasion was about the same in the low-effort condition, regardless of participants' aspiration levels. In the high-effort condition, however, an above-median aspiration level led to more severe tax evasion than a below-median aspiration level.

Given the relation between aspiration levels and tax evasion, for future studies it seems reasonable to distinguish four potential levels of expectations. First, the aspiration level can lie below even the worst outcome of a given gamble: In this case, there is not much at stake and therefore the risk-seeking tendency should be high. Second, as in the theory of Zeelenberg and van Dijk (1997), the aspiration level can lie between the safe option and the worse outcome of the gamble: Then, risk-aversion is likely. Third and fourth, both cases of an aspiration level above the safe option should provoke risk-seeking behavior. At the third level there is a break-even possibility with the better outcome of the gamble, whereas at the fourth level the aspiration level can never be reached, even in case of winning the gamble. In a tax framework, these considerations would translate into higher tax evasion for three out of the four levels. Tax evasion should be less severe if honest declaration of income satisfies the aspiration level, but evasion bears the risk of falling below it.

GENERAL DISCUSSION

The purpose of the present paper was to study the effect of effort exerted in earning one's income on tax evasion behavior. Findings from research on the impact of prior effort on abstract decision tasks suggest contradictory predictions about the direction of effect. Cast in a prospect theory framework, we proposed two mechanisms that could underlie the decision process and explain the contradictory effects of effort in previous studies: (a) Higher effort could change the slope of the value function, result in a steeper value function, and therefore increase risk-seeking choices. This mechanism would lead to more tax evasion, if taxable income was obtained by high effort. (b) Higher effort could result in the setting of an aspiration level, which in turn serves as a new reference point in the value function. Depending on the exact position of the aspiration level, higher effort could lead to more or less tax evasion.

Results from our first experiment suggest that high effort evokes higher risk-aversion in the compliance decision and therefore diminishes the propensity to evade taxes. This finding gives some support to the second decision mechanism we have proposed, that is, expenditure of effort resulted in the setting of an aspiration level, which is the individual's expectancy for financial compensation for prior effort. The aspiration level serves as a reference point and allows for simplifying the choice by classifying outcomes of a decision as satisfactory or unsatisfactory. If one's aspiration level can be satisfied by a safe option and the risky option offers a better outcome, but

simultaneously bears the risk of falling below one's expectations, the "classical" sunk cost effect can reverse and lead to risk-averse behavior. Our findings in the second experiment provide some evidence for the proposition that aspiration levels depend on prior effort, and—in turn—compliance depends on the aspiration level.

The impact of effort, however, could not be perfectly replicated in the second experiment, even though we have found tendencies pointing in the same direction. Consistent with ours are results from the experiment by Boylan and Sprinkle (2001). They also studied the impact of prior effort and found marginally significant differences when endowed and earned income had to be declared. Thus, the effect of prior effort on tax compliance seems to be rather weak.

Although the interpretation in terms of changing reference points seems plausible, it should be noted that alternative theoretical interpretations of our data are possible. First, manipulation in the low-effort condition of our experiments might have induced participants to feel in a run of luck, which in turn could have increased their risk-seeking tendency. Second, a mental accounting process could have occurred that led participants to open an account for taxes in the high-effort condition. If in the low-effort condition—due to a lack of such a "tax account"—participants fail to allocate some part of their income for the tax duty, they might have been more reluctant when it came to pay their taxes.

For further research on tax behavior in a sunk cost framework it seems important to consider the nature of prior investments. As proposed by Zeelenberg and van Dijk (1997), behavioral sunk costs such as work and effort seem to lead to different cognitive mechanisms than financial sunk costs. Perhaps investments of time evoke a still different mechanism (Greitemeyer, Schulz-Hardt, Popien, & Frey, 2005; Soman, 2001).

Regarding the practical conclusions of this study, it may be advisable for tax authorities to take into account taxpayers' aspiration levels on their net income. Assuming that aspiration levels can be influenced, media and other communication channels might help to keep taxpayers' aspirations at a modest level. Further, since tax authorities cannot audit all tax files, instead of selecting files at random, it may be advisable to audit reports on easily earned money (e.g. capital gains) rather than income earned through blood, toil, tears, and sweat.

REFERENCES

Allingham, M.G., & Sandmo, A. (1972). Income tax evasion: A theoretical analysis. *Journal of Public Economics*, *1*(3–4), 323–338.

Arkes, H.R., & Ayton, P. (1999). The sunk cost and Concorde effects: Are humans less rational than lower animals? *Psychological Bulletin*, *125*(5), 591–600.

Arkes, H.R., & Blumer, C. (1985). The psychology of sunk cost. *Organizational Behavior and Human Decision Processes*, *35*(1), 124–140.

Arkes, H.R., Joyner, C.A., Pezzo, M.V., Nash, J.G., Siegel-Jacobs, K., & Stone, E. (1994). The psychology of windfall gains. *Organizational Behavior and Human Decision Processes*, *59*(3), 331–347.

Boylan, S.J., & Sprinkle, G.B. (2001). Experimental evidence on the relation between tax rates and compliance: The effect of earned vs. endowed income. *The Journal of the American Taxation Association*, *23*(1), 75–90.

Brockner, J. (1992). The escalation of commitment to a failing course of action: Toward theoretical progress. *Academy of Management Review*, *17*(1), 39–61.

Camerer, C.F., & Weber, R.A. (1999). The econometrics and behavioral economics of escalation of commitment: A re-examination of Staw and Hoang's NBA data. *Journal of Economic Behavior and Organization*, *39*(1), 59–82.

Chang, O., Nichols, D., & Schulz, J. (1987). Taxpayer attitudes toward tax audit risk. *Journal of Economic Psychology*, *8*(3), 299–309.

Cherry, T.L., Kroll, S., & Shogren, J.F. (2005). The impact of endowment heterogeneity and origin on public good contributions: Evidence from the lab. *Journal of Economic Behavior and Organization*, *57*(3), 357–365.

Clark, J. (2002). House money effects in public good experiments. *Experimental Economics*, *5*(3), 223–231.

Copeland, P.V., & Cuccia, A.D. (2002). Multiple determinants of framing referents in tax reporting and compliance. *Organizational Behavior and Human Decision Processes*, *88*(1), 499–526.

Elffers, H., & Hessing, D.J. (1997). Influencing the prospects of tax evasion. *Journal of Economic Psychology*, *18*(2–3), 289–304.

Garland, H., Sandefur, C.A., & Rogers, A.C. (1990). De-escalation of commitment in oil exploration: When sunk costs and negative feedback coincide. *Journal of Applied Psychology*, *75*(6), 721–727.

Greitemeyer, T., Schulz-Hardt, S., Popien, G., & Frey, D. (2005). Der Einfluss versunkener monetärer und zeitlicher Kosten auf Ressourcenallokationen. Eine Studie zum Sunk-Cost-Effekt mit Experten. *Zeitschrift für Arbeits- und Organisationspsychologie*, *49*(1), 35–43.

Helson, H. (1964). *Adaption-level theory*. New York: Harper & Row.

Kahneman, D., & Tversky, A. (1979). Prospect theory: An analysis of decision under risk. *Econometrica*, *47*(2), 263–291.

Keasey, K., & Moon, P. (1996). Gambling with the house money in capital expenditure decisions: An experimental analysis. *Economics Letters*, *50*(1), 105–110.

Kirchler, E. (1997). The burden of new taxes: Acceptance of taxes as a function of affectedness and egoistic versus altruistic orientation. *Journal of Socio-Economics*, *26*(4), 421–437.

Kirchler, E. (2007). *The economic psychology of tax behaviour*. Cambridge: Cambridge University Press.

Kivetz, R. (2003). The effects of effort and intrinsic motivation on risky choice. *Marketing Science*, *22*(4), 477–502.

Loewenstein, G., & Issacharoff, S. (1994). Source dependence in the valuation of objects. *Journal of Behavioral Decision Making*, *7*(3), 157–168.

Muehlbacher, S., & Kirchler, E. (in press). Origin of endowments in public good games: The impact of effort on contributions. *Journal of Neuroscience, Psychology, and Economics*.

Robben, H.S., Webley, P., Weigel, R.H., Waerneryd, K.-E., Kinsey, K.A., Hessing, D.J., Martin, F.A., Elffers, H., Wahlund, R., & Van Langenhove, L. (1990). Decision frame and opportunity as determinants of tax cheating: An international experimental study. *Journal of Economic Psychology*, *11*(3), 341–364.

Schepanski, A., & Kelsey, D. (1990). Testing for framing effects in taxpayer compliance decisions. *The Journal of the American Taxation Association*, *12*(1), 60–77.

Schepanski, A., & Shearer, T. (1995). A prospect theory account of the income tax withholding phenomenon. *Organizational Behavior and Human Decision Processes*, *63*(2), 174–186.

Shefrin, H.M., & Thaler, R.H. (1988). The behavioral life-cycle hypothesis. *Economic Inquiry*, *26*(4), 609–643.

Soman, D. (2001). The mental accounting of sunk time costs: Why time is not like money. *Journal of Behavioral Decision Making*, *14*(3), 169–185.

Soman, D., & Cheema, A. (2001). The effect of windfall gains on the sunk-cost effect. *Marketing Letters*, *12*(1), 51–62.

Thaler, R.H. (1980). Toward a positive theory of consumer choice. *Journal of Economic Behavior and Organization*, *1*(1), 39–60.

Thaler, R.H. (1985). Mental accounting and consumer choice. *Marketing Science*, *4*(3), 199–214.

Thaler, R.H. (1990). Anomalies: Saving, fungibility, and mental accounts. *Journal of Economic Perspectives*, *4*(1), 193–205.

Thaler, R.H. (1999). Mental accounting matters. *Journal of Behavioral Decision Making*, *12*(3), 183–206.

Thaler, R.H., & Johnson, E.J. (1990). Gambling with the house money and trying to break even: The effects of prior outcomes on risky choice. *Management Science*, *36*(6), 643–660.

Weiner, B. (1996). Level of aspiration. In A. Manstead & M. Hewstone (Eds.), *The Blackwell encyclopedia of social psychology*. Oxford: Blackwell.

Wenzel, M. (2002). The impact of outcome orientation and justice concerns on tax compliance: The role of taxpayers' identity. *Journal of Applied Psychology*, *87*(4), 629–645.

Zeelenberg, M., & van Dijk, E. (1997). A reverse sunk cost effect in risky decision making: Sometimes we have too much invested to gamble. *Journal of Economic Psychology*, *18*(6), 677–691.