Doctoral Thesis

University of Trento

School of Social Sciences

Doctoral School in Economics and Management

Experimental Essays on Social and Agency Dilemmas

A dissertation submitted to the Doctoral School in Economics and Management
in partial fulfillment of the requirements for the Doctoral degree (Ph.D.)
in Economics and Management

Sandro Casal

December 2014

Advisor

Prof. Luigi Mittone
University of Trento

Doctoral Committee

Prof. Roberto Benedetti
University of Chieti-Pescara

Dott. Marco Faillo
University of Trento

Prof. Alessandro Innocenti
University of Siena

Acknowledgements

Unfortunately few lines permit only to express my gratitude to a small share of people who contributed, in a way or another, to this dissertation; nevertheless, and regardless the appearance or not of the name in this page, I am deeply thankful to all of them.

Personal thanks to my advisor Prof. Luigi Mittone who has been supporting and supervising me since the beginning of my PhD.

I want to express my gratitude for the useful comments, suggestions and corrections to all my co-authors: it is hard to describe with simple words what I have learned from them. Special thanks to all the CEEL staff: Matteo, Dominique, Marco and all the other collaborators for having accepted me in this happy family and for having contributed to my growth as a researcher. I am also grateful to my colleagues of the School of Social Sciences and to all the peers I have encountered in the recent past.

Outside academia, the list of people to thank is even longer: it would be impossible to go through these years without the presence of family and friends. For their love and unconditional support I warmly thank my parents Renzo and Raffaella, my sisters and my whole family. I want to thank Francesco, Michele and Rolando which, regardless the geographical distance, I still consider my second family.

Finally, Linda. No words for describing my boundless gratitude for you, just the hope to have enough time together to express it in the every day life. TU LO CAPISCI.

Abstract

Economic research frequently uses experimental methods to study, in the laboratory or in the field, behaviour of economic agents.

The advantage of the laboratory experimental method is the collection of data which is, in some cases, otherwise impossible to obtain. In addition, experiments permit to test, ceteris paribus, the impact of a certain treatment on the behaviour of the economic agents.

These are the reasons for the application of laboratory experimental methods in the three essays of this thesis; which are focused on possible measures for rising compliant behaviour in social and agency dilemmas. Tax compliance has been selected for two essays on social dilemma, while asset management has been chosen for one essay on agency dilemma.

In the tax compliance context, we refer to a compliant behaviour when subjects do not engage tax evasion: the support of compliance has been studied through non monetary (dis)incentives (Chapter 2) and through direct participation of taxpayers in the tax system (Chapter 3).

In the asset management context (Chapter 4), we refer to a compliant behaviour when a fund manager, managing her clients's money, follows the client's disposition even if this implies a payoff reduction for the manager herself. Accountability and monetary punishment are the measures studied in order to reduce opportunistic behaviour of managers and rise their compliance.

Keywords: Social dilemma, Agency dilemma, Experimental Economics, Tax Evasion, Asset Management.

Table of Contents

Tables

Figures

Introduction

A social dilemma is a situation in which individual interests enter in conflict with the collective interest of a community. In reality, it is not difficult to find these situations, and it is plausible to think that everybody has, at least once, faced a social dilemma. Students which share an apartment probably share also the desire of living in a clean space but, when it comes the time of cleaning up, everybody prefers to avoid the task and hopes that someone else will manage the situation. A similar situation could occur every day in many workplaces, where workers have to work in teams for the same project; or in public transport vehicles, in which users can decide not to pay the ticket in order to get a free ride. As in public transport, the *free rider condition* is, in economics and game theory, exactly the situation in which an individual has an incentive not to cooperate since, by defection, she receives an higher income. Intuitively, each member of the community is worse off if they all defect than if they all cooperate. For this reason, from a (neoclassical) economic point of view, individuals should be forced to cooperate by introducing some control mechanisms and/or some forms of punishments for defection.

Social dilemmas are studied not only in economic theory and game theory but also in other branches of social sciences such as sociology and psychology. Very often social dilemmas are studied in laboratory experiments in which cooperation and defection can be easily checked. The economic perspective differs from other social science perspectives in the definition of characteristics of individuals and, as a consequence, in the effective role played by controls and punishments: from behavioral economics and a psychological point of view, for example, individuals are not always selfish and egoistic and, if this is the case, strict controls and severe fines could backfire and lead people to be less cooperative.

The tax system nicely fits the definition of a social dilemma and it affects not only the citizens which are required to pay taxes, which can actually decide whether to cooperate (to pay taxes) or to defect (to evade), but also these categories of citizens which are not required, according to the law, to pay. These are penalized by evasion since publicly available resources are inevitably reduced by non compliant behaviour. Collected taxes, in fact, constitute a public good which is redistributed to all citizens through the supply of public services (health, education, defense etc.). It is clear that the public good is not affected by a single defection but, if the phenomenon of tax evasion largely increases, the entire public system can collapse. As general social dilemmas, also tax administrators have their strategies to ensure cooperation (compliance): the most common and always present are i.) control mechanisms usually defined as audit processes and ii.) punishment mechanisms basically represented by fines on detected irregularities (basically evasion and avoidance) and/or detention.

As mentioned before, the characteristic of social dilemma makes tax system an interesting case study for laboratory experiments on tax behaviour: laboratory experiments permit to collect precise data on individual tax decisions, data that are not possible to obtain with a field study. It is important to emphasize that the collection of precise data is not the only feature that makes tax experiments so attractive for experimental social scientists. Experimental methods are particularly suitable for studying tax behaviour since they allow to control a variety of factors that can be involved into the decision process: risk aversion, trust, social norms, fairness, altruism, ethics can all easily fit into an experiment on tax compliance. A good experimental design can help to disentangle these factors and it allows to study, in isolation, only the impact of a specific variable on taxpayers' behaviour.

On the other hand, research on tax behaviour is not only a pure academic exercise: since tax behaviour affects the real life of the entire society, finding the right design to rise compliance is a real and actual challenge and could represent the starting point for related research such as natural or field experiments.

The first part of this thesis focuses on experimental investigation of tax behaviour; after Chapter 1 which introduces the literature on tax compliance, Chapters 2 and 3 present the results of two different experiments on tax compliance.

Chapter 2 is based ont the working paper "*Social Esteem versus Social Stigma: the role of anonymity in an income reporting game*", with Luigi Mittone (University of Trento - Department of Economics and Management) and it focuses on the impact of non-monetary (dis)incentives on tax behaviour. Here, participants have been treated with different experimental conditions, which differ in the role played by taxpayers' anonymity. Indeed, subjects have been informed on the possibility of revealing their identity and their fiscal choices through the publication of their pictures, as a consequence of the result of the auditing process. As expected, anonymity plays an important role in the decision to contribute; in addition, we find that negative non-monetary incentive increases tax compliance more effectively than positive non-monetary incentive. We find also that the effect of these non-monetary incentives is mitigated, when too many information are made available. In addition, results show that, when evasion is made public, tax-dodgers are willing to pay in order to keep secret their cheating behaviour and its publication. Interestingly we find a misalignment on the impact of stigmatization: the others' judgment on the individual's evasion is perceived, by the individual, more harshly than her judgment on the others' evasion.

Chapter 3 is based on the work in progress "*Voice and Tax Compliance*", with Erich Kirchler (University of Vienna - Department of Economic Psychology), Christoph Kogler (University of Vienna - Department of Economic Psychology) and Luigi Mittone. The paper's aim is to experimentally test the impact of taxpayers' involvement into the development of the tax system. Reducing the distance between taxpayers and the tax authority can boost the general level of taxpayers' trust in authorities, with the final consequence of higher acceptance of the tax load and higher levels of tax compliance. To test this idea in the paper presented in Chapter 3, participants have, in some manipulations, the opportunity of influencing the government budget spending by deciding where their collected taxes should be allocated (we defined this situation with having Voice on Distribution of tax load); in others, participants had the opportunity to decide separately and consecutively about how much taxes to pay for different requests of the tax administration (having Voice on tax Contribution). In addition, two other factors are introduced and refer to the information provided to the taxpayers: in some manipulations, information refers strictly to a tax context

in others the reference environment is switched to government public expenditure (we called this factor Context Effect). The last factor refers to the order of presentation of the requested payments, which was either in increasing or decreasing order (Order Effect). Results show that having Voice (both on Distribution of tax load and tax Contribution) on the tax system rises tax compliance and pushes taxpayers to virtuous behaviour, probably due to a better perception of fairness and justice. More precisely, treatment variables have different impact according to the participants' gender, having Voice on tax Contribution a stronger impact in males and Voice on tax Distribution in females. Compliance rates are higher when the framing avoids the tax context. Finally, no significant impact of ordering has been found.

Chapter 4 leaves the dimension of social dilemma in order to investigate an other type of conflict of interest that, in reality, characterizes many decisions in economic and financial situations. It is based on the working paper "*Fostering the Best Execution Regime - An Experiment about Pecuniary Sanctions and Accountability in Fiduciary Money Management*" with Matteo Ploner (University of Trento - Department of Economics and Management) and Alec N. Sproten (University of Erlangen-Nuremberg - Chair of Economic Theory). In other words, this chapter is based on a classical agency dilemma: here the roles of individual monetary conflict of interest and the opportunity of opportunistic behaviour are investigated when risky decisions are taken on behalf of others.

In economics, the agency dilemma or the "principal-agent problems" refer to a situation in which an agent, employed by a principal to achieve a specific goal, pursues her own interest instead the ones of the principal. It is not difficult to find situations characterized by this problem in the every day life: classical examples are the relationship employer-employee or insurance contracts. Problems arise when principals have no, or limited, power to control agent's effort and behaviour; in other words, when there is asymmetric information between an agent and the principal.

Asymmetric information is the source of two main problems of agency dilemmas: moral hazard and adverse selection. The most common example of adverse selection is the market of used cars proposed by Akerlof (1970): due to asymmetric information between sellers (agents) and buyers (principals) on the quality of used cars, high quality

cars are not traded in the market, and only low quality cars are sold.

Moral hazard, instead, arises when there is a misalignment of incentives between the party who takes a risky decision and the party who bears the consequences the decision. Examples of moral hazard are frequently related to the insurance industry (Shavell, 1979), but it can, more generally, be applied to most financial decisions. Indeed, as already introduced, asset management or purchases of financial products are operated by individuals who not only do not bear the decisions' consequences, but also have incentives to act against the interests of another party. In other words, when decisions are taken on the behalf of others, individuals are likely to face an agency dilemma. A direct consequence of the dilemma is that financial relationships can be affected by agents' opportunistic behaviour. Situations in which a broker, a financial advisor or a fund manager (the agent) tries to sell a financial product to her client (the principal), although it is clear that the financial product does not match the client's interests, are a prominent example of moral hazard problems. In general, opportunistic behaviour might be possible because the fund manager often enjoys a privileged position (in terms of information) compared to her clients, and she may try to take advantage of this.

Our approach and experimental design allow to disentangle the effects of features that can mitigate the moral hazard problem in a two player game, where an agent invest principal's money on her behalf. We found evidence of agents acting in an opportunistic manner and in their own interests when they can either i.) hide behind the principal's scare knowledge about the environment in which the investment has been conducted or ii.) escape from a principals' reaction with negative payoffs consequences. On the contrary, agents do align their investment strategies with the principals' profiles when they, at the same time, are required to inform the principal on the investment strategy and they can be monetarily punished.

Finally, Section *Concluding Remarks* summarizes the results of the experimental chapters and emphasizes lines of related future research. This Section also introduces and discusses the problem of external validity of laboratory experiments, in particular in experiments on taxation where, given the nature of the typical subject pool, participants may have a relative small experience with the tax system and its rules.

Chapter 1

The puzzle of tax compliance

Tax compliance varies from country to country (WEF, 2011), and all regulators seek to discourage tax evasion. Orviska and Hudson (2003) estimate that tax evasion reduces tax revenues by about 20 percent in developed countries, while in developing countries, the loss is even higher.

Although in many countries these estimates may reflect the current situation, the data on tax evasion is still below the level predicted by standard economic theory. Allingham and Sandmo's (1972) neoclassical model of tax evasion is the starting point for almost all studies on tax compliance.

According to this model, the individual decision whether to evade is a classical problem of choice under uncertainty, which implies a solution based on the maximization of the decision maker's expected utility. Here, the individuals have the characteristics of *homo oeconomicus* (rationality and egoism), and their tendency to evade taxes is basically tempered only by the probability of being audited, the level of the potential fine, and the decision maker's degree of risk aversion. In the real world, since in-depth tax audits are generally infrequent, fines often do not reflect the unpaid taxes and criminal penalties are rarely applied, the model of Allingham and Sandmo suggests that rational individuals should declare an amount of taxable income close to zero.

When it is time to fill out income tax returns, a taxpayer knows that if he or she evades taxes — and the total number of tax evaders remains relatively small — the provision of public goods and services will be not significantly reduced and his or her personal wealth will not be affected. At the same time, the taxpayer knows that if

many people increasingly act in this manner, there will be fewer resources for providing public goods and services, which will be reduced and the entire society will be worse off, including those who have evaded.

Tax behaviour entails a classical social dilemma: a situation in which private and collective interests conflict. From a game theoretical point of view, the optimal strategy for a rational player is to defect, and thus, in such a situation, to evade. For this reason, cooperation — or compliance — must be induced with some control mechanisms: audits and fines are the specified instruments by proponents of the neoclassical economic approach.

1.1 The four basic parameters of tax compliance

Allingham and Sandmo's model assumes that individuals maximize their expected utility in order to decide whether to evade. The expected utility is given by the following equation:

$$E[U] = (1-p)U(W-\theta X) + pU(W-\theta X-\pi(W-X)) \tag{1.1}$$

where p is the *audit probability*, W and X represent *income* (respectively actual income and declared income), θ is the *tax rate*, and π is the *penalty rate* (Allingham and Sandmo, 1972, 324–325). These four parameters are the basis of the taxpayers' decisions in Allingham and Sandmo's theoretical analysis. If there are no doubts about the impact of audit probabilities and fines — which negatively affect tax evasion — "*no clearcut hypothesis emerges as to the connection between the regular tax rate and reported income*" (Allingham and Sandmo, 1972, p. 330).

The puzzle of the impact of the tax rate and income on tax behaviour emerges not only in theoretical research (Yitzhaki, 1974), but also in empirical studies. For example, while most studies argue that a negative relation exists between compliance and marginal tax (e.g., Pommerehne and Weck-Hannemann, 1996; Park and Hyun, 2003), the opposite impact or even no relation has been found by others (e.g., Baldry, 1987; Alm et al., 1995; Anderhub et al., 2001). There are similar findings about income: on the one hand, Anderhub et al. (2001) found that tax evasion is encouraged by high levels of income, but on the other, Park and Hyun (2003) have reported the opposite.

Given the unclear influence of tax rates and income, and the general consensus on the deterrent role of audits and fines, it seems that tax authorities could increase compliance simply by implementing frequent audits and/or more severe fines. In the real world, however, this is not so straightforward. The first consideration is purely practical: audit processes are expensive and do not always detect all evasion. Since audits represent a relevant cost for the tax system (Kirchler, 2007) and tax authorities have budgets constraints, there is, undoubtedly, a trade-off between the number of audits that a tax administration can implement and the expenditure for auditing processes. If few inspections are conducted to contain expenditure, fines cannot be raised to very high levels in order to compensate for low probabilities of detection.

The second consideration involves the potential weak effects and the limitations that audits and fines may also have; indeed, Alm et al. (1995) point out that

> *a government compliance strategy based only on detection and punishment may be a reasonable starting point but not a good ending point. Instead, what is needed is a multi-faceted approach that emphasises enforcement, as well as positive rewards from greater tax compliance, the wise use of the taxpayer dollars, and the social obligation of paying one's taxes* (Alm et al., 1995, p. 15).

1.1.1 Audit rates and penalties

Experimental results on the impact of audit probabilities generally confirm the result of the seminal experiment of Friedland et al. (1978): tax evasion decreases when audit probabilities increase.

For example, Trivedi et al. (2003) studied the impact of personal and situational factors on tax compliance and, in order to do this, the authors implemented experimental treatments with audit probabilities equal to either 0% or 25%. The authors claim that, when a public good structure is not nested in the experimental design, participants do behave in line with the rational model and an increase in audit probability does affect tax compliance. Confirmation of this result can be found, for example, in Park and Hyun (2003) or Alm et al. (2009) in which compliance was also positively

correlated with audit probabilities[1].

If it is true that significant effects on compliance are often found, these are, frequently, smaller than what expected and, as pointed out by Alm (2012), in general the "*impact appears to be small and non-linear, so that the deterrent effect of a higher audit rate eventually diminishes*" (Alm, 2012, p. 66).

Outside the laboratory, field experiments on tax compliance are often focused more on the role of *perceived* audit probabilities, rather than on the *actual* audit probabilities. As in Slemrod et al. (2001), letters sent by tax authorities to taxpayers are used to increase compliance via an increase in the expected audit probability. Slemrod et al. (2001) partially found the expected result: for low- and middle-income taxpayers, the threat of a close examination reduced evasion, but the authors found the opposite effect with high-income taxpayers. Regardless the impact of the letter (with a similar design Fellner et al. (2013) have found much robust effect in the letter treatment) the interpretation of the result is that there is space for a change in the *perceived* — or, as defined by audit Slemrod et al. (2001), "expected" — probabilities of taxpayers.

Misperceptions of real audit probabilities are often found also in laboratory experiments: generally after an audit, evasion rises and stays high for few experimental periods; participants who have experienced an audit seem to consider extremely unlikely to be audited again in the following periods (Guala and Mittone, 2005; Mittone, 2006).

In the light of these considerations, and summarizing the role of audit rates, from a behavioural economics point of view, it can be argued that tax behaviour is driven more by a subjective expectation of a personal audit, rather than the actual and real value of audit probabilities.

Studying the impact of audit probabilities on tax compliance makes sense only if consequences for a detected evasion (fines or criminal conviction) are also considered: it is clear that, if one of the two variables is set to zero, neither the most severe penalty nor the most accurate audit scheme can guarantee full compliance. Most of the studies presented above do indeed consider both variables: results on the deterrent role of fines

[1] In Park and Hyun (2003) audits probabilities were set at 10%, 25% or 40%; Alm et al. (2009) had treatments with audit probabilities equal to 5%, 10%, 30% and 40%.

are not always unanimous. Pommerehne and Weck-Hannemann (1996) is an empirical study of Swiss data on tax compliance, in which the authors claim that the impact of tax penalty on compliance is not significant; the result is partially confirmed in another empirical study: Ali et al. (2001) found that the increase (from 5% to 30% of evaded taxes) that occurred in the USA between 1980 and 1995, did not change tax behaviour overall but affected only the fiscal decisions of high-income taxpayers.

The ambiguous role of penalties is also found in experimental literature: Friedland et al. (1978) argued that fines are marginally better in reducing tax evasions than audits rates and the result is confirmed by Park and Hyun (2003) who claimed that "*the most effective policy tool to induce higher compliance is to levy heavy penalty on unreported income*" (Park and Hyun, 2003, p. 680). Friedland in another experiment on the effect of fines, reported opposite results (Friedland, 1982) with respect to his previous experiment (Friedland et al., 1978). Finally no significant impact has been found for example in Alm et al. (1992a).

As pointed out by Fischer et al. (1992), caution on the roles of audits and fines is required since — if taken togheter — they seem to have a positive impact on reducing tax evasion but the effect could be not as strong as expected.

1.1.2 Tax rate

From a neoclassical point of view, the impact of the tax rate on compliance is straightforward: an increase in the tax rate leads to a decrease in tax evasion (Allingham and Sandmo, 1972; Yitzhaki, 1974). This result is based on the assumption on the decreasing absolute risk aversion of the model's agents: these agents increase their willingness to take risk as long as they become richer. If the tax rate increases, agents become poorer and they take less risk: as a consequence, they evade less. This counterintuitive result has been challenged by empirical and experimental research, which have often found that high tax rates lead to a reduction in the compliance rate; in their analysis of the literature, Andreoni et al. (1998) concluded that:

> *the effect of tax rates on evasion remains unclear. Given the importance of this topic, it surely deserves further investigation* (Andreoni et al., 1998, p. 839).

More recently, this investigation has moved towards the approach suggested by Prospect Theory (Kahneman and Tversky, 1979; Tversky and Kahneman, 1992). According to Prospect Theory, agents are risk-adverse in the gain domain but they becomes risk lovers in the loss-domain; the crucial question is how to identify, in tax compliance decisions, the reference point, which defines the loss and the gain domains.

Bernasconi and Zanardi (2004) used a discretional reference point between zero and the actual income of the agent; they showed that, when the reference point is smaller than the disposable income after having paid the full amount of taxes, agents evade more if there is an increase in the tax rate. Viceversa, if the agents' reference point is bigger than the disposable income under full compliance, higher tax rates lead to a reduction in tax evasion.

If agents consider as reference point the income situation determined by the fiscal law (disposable income under full compliance), any increase of the tax rate leads to a reduction of the disposable income; this reduction is perceived as a loss and, consequently, agents become more risk lovers and more willing to engage evasion (Dhami and al Nowaihi, 2007).

In a recent paper, Bernasconi et al. (2014) allow the reference point to adapt, over time, to a change in the fiscal policy and they analyzed the effect of a change in the tax rate with both a theoretical and an experimental approach. Results of their experiment are in line with the conclusions of their theoretical model: agents react to an increase in tax rate by engaging evasion but, due to the possibility of adaptation, the "*effects of the changes of the reported income are only temporary and tend to vanish over time*" (Bernasconi et al., 2014, p.110). The general recommendation of the authors is very clear: the tax rate is not the right tool for fighting tax evasion.

1.1.3 Income

According to Allingham and Sandmo's (1972) model, there is not a clear theoretical conclusion on the role of actual income on tax evasion: the model predicts that, when actual income changes, the variation on declared income depends on the agent's degree of relative risk aversion.

In another theoretical study (Fishlow and Friedman, 1994), it has been shown that,

when an intertemporal consumption framework is considered, a reduction in actual income leads to a reduction in tax compliance. This conclusion has been challenged both in experimental and empirical studies: for example, Anderhub et al. (2001) experimentally found that tax evasion is discouraged by low levels of actual income; this is a confirmation of the conclusions in empirical studies (e.g., Pommerehne and Weck-Hannemann, 1996).

In their comprehensive literature review — which includes empirical studies, laboratory experiments and also surveys — Andreoni et al. (1998) claim that results on the impact of actual income on tax evasion are too vague and it is impossible to asses what is the relationship between income and evasion.

1.2 Behavioural approach

As pointed out, the neoclassical standard model seems to be unable to explain the behaviour of those individuals who comply and, paradoxically, poses the question of why people pay taxes rather than evade them (Alm et al., 1992b). For this reason, as explained above, lines of research have moved towards the manipulation of the model's variables or the introduction of factors that aim to make the model more realistic, such as changing the perceived audit probabilities (Slemrod et al., 2001), introducing repeated audits (Guala and Mittone, 2005), accounting for marginal tax rates (Pommerehne and Weck-Hannemann, 1996), and developing different penalty schemes (Webley et al., 2010). Manipulating the variables of the basic model may lead to a more realistic model, but also to a model that could result less explanatory in terms of the effects of the variables. In addition, approaches of this kind continue to suffer from the original limitation of the model: individuals respond entirely to economic (dis)incentives.

Other branches of research have moved towards the analysis of some behavioural aspects considered by other social sciences: these behavioural models include — in addition to the classical variables — economic, sociological, and psychological variables such as age and sex (Kastlunger et al., 2010), fairness perceptions, communications (Hasseldine et al., 2007), and social norms and tax ethics (Alm and Torgler, 2011;

Maciejovsky et al., 2012).

1.2.1 Social norms and personal norms

There is no doubt that social norms have gained attention into the debate of economic behaviour also in economic literature (Fehr and Gächter, 1998; Fehr et al., 2002; Fehr and Fischbacher, 2004).

Akerlof (1980) defines a social norm (or social custom) as "*an act whose utility to the agent performing it in some way depends on the beliefs or actions of other members of the community*" (Akerlof, 1980, p. 749). In a tax compliance framework, it is clear that if evasion is perceived as the social norm, the likelihood of evasion increases in those individuals that belong to the community. The risk is a sort of *domino effect*: evasion triggers more evasion if cheating behaviour is, or at least it is perceived, widespread and tolerated.

Alm et al. (1999) theoretically and experimentally approached the dimension of social norms in tax compliance by analyzing the individual possibility of voting on fiscal setting. Without the opportunity of communication, the rejection of more severe rules is considered as the signal that it is "*socially acceptable to evade one's taxes because others will do the same*" (Alm et al., 1999, p. 162). When there is the opportunity of communication, not only agents agree for more severe fiscal enforcement, but also increase their compliance rate. The interpretation of the authors is that the combination of discussion and voting develop a strong social norm which leads to an increase of compliance.

Trivedi et al. (2003) had treatments in which perception of peers' behaviour were manipulated: in a income reporting experiment, some sessions had no information about peers' compliance but in other treatments participants were informed about previous participants that were either highly compliant or non-compliant. Their results are, at least in part, in line with the idea of behaving according to the social norms: when participants are informed about non-compliant behaviour of their peers, tax compliance drastically decreases. No statistically significant differences are detected in compliance behaviour when information on high compliance is provided.

Wenzel (2004), also claims that social norms can have an impact on tax evasion for those taxpayers which strongly identify themselves with the community, but this can also lead to undesired results: if identification is not strong enough, social norms can have a negative (or in the best case, no effect) on tax compliance. Tax authority's communication strategies are, in this case, crucial in order to avoid unexpected results.

As summarized by Kirchler (2007), given the influence of social norms and peer effects, tax authorities must ensure a correct perception on actual compliance rate and must deliver the correct information to each taxpayer: the fight against evasion does not rely only on enforcement but also on a correct information, aimed at the rise of the general civic-mindedness of the community.

It is clear that rising the civic-mindedness of the community does not depend only in the communication about the appropriate social norm: changing the attitude of the taxpayers toward the fiscal system and the tax authority is almost impossible without the complete collaboration of the latter. Tax authority can increase compliance only if community trusts the authority and feel that their taxes are not wasted (Alm, 2012).

Besides the role of social norms, literature often agrees on the important role played, on tax compliance decisions, of personal norms which include, for example, egoism, personal values, moral reasoning and ethic (Kirchler, 2007).

Not surprisingly honesty is significantly associated to compliance when honesty is supported by external factors, such as perception of fairness of the tax system, both in terms of tax burden and interaction between taxpayers and tax authorities (Erard and Feinstein, 1994a).

Engaging evasion entails a violation of norms and, as all the situations that require a forbidden behaviour, the deviation from what is required can rise, into individuals, negative feelings. Empirical studies have found that the anticipation of shame and guilt can be considered as one of the determinant of compliance, as well as the avoidance of social stigma (Erard and Feinstein, 1994b; Orviska and Hudson, 2003). Collective blame as driving force for compliance has also been found in experiments (Bosco and Mittone, 1997), and recently, in relation with violation of personal norms, experimental literature has moved towards the role played by emotions.

In a series of experiments, Maciejovsky et al. (2012) found that emotional priming

is related to tax behaviour: the authors claim that emotions (contrary to cognitive stimuli) do have an impact on tax compliance through an effect on economic variables (fines and audit probabilities). Coricelli et al. (2010) and Coricelli et al. (2014) used emotions as a proxy for what is experienced by cheaters when they break the law and the norms. Emotions were measured via skin conductance responses. Emotions are positively related with evasion (both in terms of probability of under-declaration and in terms of amount evaded), emotional arousal is even stronger when participants face the chance of evaders' public announcements.

Another personal factor that is often considered as a determinant of tax compliance is the tax morale, generally defined as an internalised or intrinsic obligation to pay taxes (Braithwaite and Ahmed, 2005; Alm and Torgler, 2006). For Torgler (2003) the personal feeling of obligation is what determines the behaviour of an "*intrinsic taxpayer*". In contrast to the motivations (conditional cooperation and conformity to the social norm) that push a "*social taxpayer*" to contribute, an "*intrinsic taxpayer*" contributes regardless the enforcement mechanism and social norms. This kind of taxpayer pays according to her strong sense of civic duty (tax morale) and she complies as long as she feels her compliance recognized by the fiscal authority. Again, intrinsic motivations are strictly linked with the relationship taxpayer/tax authority.

In general, literature agrees on the significant negative relation between tax morale and tax evasion (Braithwaite and Ahmed, 2005; Alm and Torgler, 2006; Torgler and Schneider, 2007); the crucial and critical point seems to be how to properly define the concept of tax morale (Feld and Frey, 2002).

1.2.2 Relationship between taxpayers and tax authority

As already pointed out, enforcement mechanisms (audits and fines) are important and represent a pillar for fighting tax evasion, but the role of the tax authority can not be limited to the role of a cop who tries to catch criminals and to stop potential law-breakings.

Research on social an personal norms have highlighted that taxpayers are not always potential criminals that only expect the right moment to break the law: taxpayers are willing to comply when they feel that this is the right behaviour; but this situation is

possible as long as there is a balanced interaction between the two parties (Feld and Frey, 2002). In the model of Kirchler et al. (2008), full compliance is supposed to be obtained through two different channels: *trust in authorities* and *power of authorities*. The authors' suggestion is that if tax authority set its power to the maximum — or in other words, the authority tries to sustain compliance only with severe enforcement mechanisms — taxpayers react egoistically and comply only if forced to do. Contrary, the authority should release its power and interact with taxpayers, treating them more as a client than potential criminals; this will push taxpayers to comply voluntarily.

The idea of a consumer friendly tax authority is common in literature that analyse tax policies (Alm and Torgler, 2011; Alm, 2012), and it has also been approached from an experimental point of view. Alm et al. (2010) experimentally manipulated the uncertainty on the tax liability and the role of the tax authority, which ensures compliance via enforcement or can, in addition, help taxpayers in computing their tax duty. The authors found that uncertainty stimulates evasion if services are not offered but, when tax authority helps taxpayers, the compliance increase, on average, by 20% with respect to the control condition.

In short, and summarizing the above analysis, as pointed out by Alm (2012), tax compliance research must necessarily leave "*the mainstream of economics and (...) move beyond psychology to sociology, anthropology and other social sciences*" (Alm, 2012, p.75).

1.3 Experiments on tax compliance

Starting from the seminal experimental work of Friedland, Maital and Rutenberg at the end of the Seventies (Friedland et al., 1978), experimental social scientists have produced an enormous amount of contributions on the topic of tax compliance. Although some "stylized facts" (for example, higher fines/audits probabilities lead to higher compliance, men evade more than women, not stable effect of tax rate) are robust and generally accepted, some findings are difficult to compare among different pieces of research.

It is my opinion that research in this field lacks a "basic setting", which can be used

as a starting point for the developments of the experiments. This is not the case of other experimental settings, which have more structured and standardized procedures, fact that eases the comparisons of results. It is, in fact, not difficult to incur in tax experiments which differ in their basic structures: the main sources of discrepancy can be found in i.) the implemented terminology, ii.) the way in which taxes are collected and iii.) the use of collected taxes. In the past, instructions and terminology were often neutral and avoided specific links to a tax environment (e.g., Baldry, 1987) but the implementation of a tax related terminology has grown in popularity (for example, Sussman and Olivola, 2011, studied in details the different impacts on compliance of neutral and non neutral terminology). Another possible source of potential confusion is how taxes are collected: generally participants are asked to declare their income, and taxes are collected accordingly, but it is also possible to find settings in which the total levy is communicated to the participants which have to decide how much of the tax to pay (for an example, see Wahl et al., 2010a). Finally, an important difference among experimental settings is the use of the collected taxes. Some experiments do not redistribute the tax funds — either justifying the choice (Coricelli et al., 2010) or not (Coricelli et al., 2014) — while some others pool tax revenues in a common fund which is equally shared by the participants (e.g., Gërxhani, 2007). In several studies, the provision of a public good financed by taxes is the central focus of the research questions (e.g., Alm et al., 1992a; Mittone, 2006). In the experiment with redistribution of tax revenues, these are — as it occurs for players' contributions in public good experiments — usually multiplied by the experimenter before being redistributed.

In my opinion there are, at least, two main reasons for including a public good structure in a tax experiment. Firstly, the redistribution of collected funds makes the artificial setting of the laboratory closer to the external situation which the experiment tries to replicate. In real life taxpayers pay taxes and get something back in terms of services: the better the taxes are managed, the higher the level of public services provided to the community. If the public good structure is nested into the tax game, the marginal per capital return can reflect this dimension: the higher the MPCR, the better the management of public funds, the higher the return for the members of the community. Secondly, a tax evader reflects all the characteristics of a free-rider in public

good experiments: the provision of a public good financed by tax revenues allows the experimenter to capture — if present — these characteristics in the participants, since there is a real incentive for a free-rider to not declare her true income.

In general, it is well established that tax evasion is lower when the experimental setting introduces the provision of a public good (Torgler, 2002), even though, in some papers, tax compliance was not affected by the redistribution of tax revenues (examples are Alm et al., 1995; Park and Hyun, 2003). In these cases, the negative effect of the public good on tax compliance may have been found in participants' strategic free-riding.

Chapter 2

The role of anonymity on tax compliance

with Luigi Mittone

2.1 Introduction

Allingham and Sandmo's (1972) model is the starting point of almost all studies on tax evasion, and it has been extensively criticized from the real beginning (for example, Yitzhaki, 1974): lines of both empirical and experimental research have deeply analyzed the model's variables; this in order to better understand the role of income, tax rate, audit probability and fine rate[1]. Findings, in some cases, are contradictory. If there is not a general consensus on the role played by tax rate and income (e.g., see the contradictory conclusions of Pommerehne and Weck-Hannemann, 1996; Park and Hyun, 2003; Baldry, 1987; Alm et al., 1995; Anderhub et al., 2001), literature agrees on the deterrent impact of the "audit scheme": audit probabilities, sequences of audits, endogenous or exogenous audits, fine rates (see, for example Alm et al., 1993a; Slemrod et al., 2001; Kastlunger et al., 2009).

Regardless the consensus or the disagreement on the effect of some of these variables, it is important to notice that researchers agree on the fact that it is necessary to consider other variables when studying tax compliance. If based only on economic

[1]Comprehensive reviews are, in this topic, Andreoni et al. (1998); Kirchler (2007).

(dis)incentives, not only the model fails in describing the taxpayers' behaviour, but also poses, paradoxically, the question of why people pay taxes rather than evade them (Alm et al., 1992b). Therefore, other branches of research have moved towards the analysis of some aspects considered by other social sciences: such as gender-role orientation (Kastlunger et al., 2010), fairness perception (Wenzel, 2003), communication (Hasseldine et al., 2007), social norms (Fortin et al., 2007; Torgler, 2007) and tax ethics (Alm and Torgler, 2011; Maciejovsky et al., 2012).

It is our opinion that not enough effort has been spent on the role played by social pressure (not necessarily used in a negative sense) on tax compliance. Only recently, many years after a pioneer work on blame of Bosco and Mittone (1997), some studies have started to fill this gap (Coricelli et al., 2010; Maciejovsky et al., 2012; Coricelli et al., 2014).

This is not the situation in public good games literature, where social pressure has been studied first by Masclet et al. (2003) and it has been followed by a large literature[2]. In public good literature, Rege and Telle (2004) is an example of a study centered on sustaining cooperation without monetary punishments, making use of both social approval and social disapproval.

Here we want to stress what, basically all, studies on tax compliance have in common: the emphasis on tax evasion and the idea that taxpayers are, by definition, potential criminals. The focus point is to prevent a potential crime, instead of on pursuing tax compliance through promoting and easing correct behaviour of taxpayers. Contrary to Rege and Telle (2004), in tax compliance literature, cooperation (compliance) is rarely supported by the idea that taxpayers can also be honest and seldom social approval has been used to rise compliance.

In a recent paper, Alm and Torgler (2011) suggest, among other alternatives, to "publicize tax evasion convictions in the media as an alternative, non-monetary type of penalty" (Alm and Torgler, 2011, 646). This disincentive perfectly fits what has been implemented in UK where, in 2012 and in 2013, the Her Majesty's Revenue and Customs (Hmrc) has posted, on its official web-page, the pictures of the most-wanted tax dodgers, asking for citizens' help for their identification and localization.

[2]Chaudhuri (2011) reviews in details last developments in public good experiments.

On the other hand, if it is true that social stigmatization can sustain compliance since taxpayers anticipate negative emotions like shame and blame (Coricelli et al., 2010, 2014), it is also plausible to expect that they also anticipate positive emotion, like respect and esteem, which can be induced with positive non-monetary incentives.

Following the same line of reasoning, mass-media could also be used to publicize full contributors and full compliance[3], persuading in this way a possible double result: sustaining compliance via the anticipation of positive emotions and triggering the idea that tax compliance is a widespread phenomenon in the society (Alm and Torgler, 2011).

Our paper originally contributes in a twofold manner to research of social pressure on tax compliance: first, we compare the impact of negative and positive non-monetary incentives on tax compliance, linked to the loss of anonymity and related to different kinds of social pressure, and second, we measure the (monetary) value that taxpayers associate to the loss of anonymity when asked to pay taxes.

More precisely, we measure i.) the tax-dodgers' willingness to pay for avoiding publicity of their evasion (Value attributed to Individual Anonymity, VIA) and ii.) the taxpayers' willingness to pay for identifying tax evaders (Value attributed to the Others Anonymity, VOA).

Several questions obviously arise: i.) are positive non-monetary incentives or negative non-monetary disincentives more effective in sustaining tax compliance? ii.) Do people care about the loss of anonymity through a public announcement of their tax behaviour, and do they care the judgments of other members of the community? iii.) Is there a gap between VIA and VOA or, more precisely, is there a misalignment in evaluating the same phenomenon (evasion) when consequences (social blame) affect either the individual or the others?

In Section 2.2, we present the experimental protocol used to answer these questions. Section 2.3 contains experimental data, analysis and tests. Finally, Section 2.4 concludes with a discussion of the results.

[3]In March 2012, the Italian tax authority has begun to consider the possibility of introducing a sort of "certificate of fiscal conformity": the businesses which result to have complied with their fiscal duties, will receive the certificate; these businesses can use the certificate to publicize their status among the public.

2.2 Method

2.2.1 Design

We investigate behaviour in a income reporting game, and test the effect of non-monetary incentives on tax compliance.

Non-monetary incentives consist in public announcements on the behaviour of audited taxpayers via publication of their pictures.

The experiment consists of 7 treatments: *Baseline* (B), *Control* (C), *Esteem* (E), *Public* (P), *Stigma* (S), *Anonymous Stigma* (AS) and *Curiosity* (CU). We used a between-subjects design: each session was composed by 16 participants and consisted of 20 rounds; participants were informed that the experimental session was composed by several rounds, but the exact number was not specified.

At the beginning of each round, participants were randomly allocated into groups of 4 members and received an initial endowment (IE) of 1500 ECU. They were required to declare the endowment: a tax rate ($\tau = 55\%$[4]) was applied to the declared income (DI), and taxes were collected. Participants were informed about the probability to be audited ($p = 20\%$) and the amount of fine for evasion ($\theta = 125\%$ of evaded taxes). Collected taxes were then redistributed among the members of the group, after being multiplied by the factor 1.4 (α).

Therefore, the payoff for the participant, at the end of the round, was equal to:

$$\Pi = \begin{cases} IE - \tau DI + \frac{\alpha \sum_{i=1}^{4} \tau DI_i}{4} & \text{if (s)he was not audited} \\ IE - \tau DI + \frac{\alpha \sum_{i=1}^{4} \tau DI_i}{4} - \theta(\tau(IE - DI)) & \text{if (s)he was audited.} \end{cases}$$

The round ended with the communication of the participant's payoff. After this stage and before the start of a new round, participants were randomly reallocated in new groups[5].

[4]Tax rate was set according to a study released in 2012 by Confcommercio (Italian general confederation of commerce, tourism and services), in which it was pointed out that, taking into account the size of the Italian shadow economy, the actual tax burden mean for an Italian taxpayer who fully comply is around 55%.

[5]As in Coricelli et al. (2014), the rematching procedure is used to restore participants' "reputation" in the treatments with non-monetary (dis)incentives. Nevertheless, in the instructions were clearly

In treatments B and C, non-monetary incentives were not used. As explained in Section 2.2.3, treatment B differs from treatment C in the enrolment process: pictures of participants in treatment C were taken, even though these have not been used.

In treatments E, P and S non-monetary incentives were implemented: after the communication of the participant's payoff, and only among the members of the groups, the identity of audited taxpayers were announced. More precisely:

- in treatment E we publicized the identities of audited full contributors,
- in treatment S we publicized the identities of audited tax-dodgers,
- in treatment P we publicized the identities of all audited taxpayers.

In treatment AS, the same non-monetary incentive as in treatment S was implemented, but evaders had the possibility of keeping secret their identities, by acquiring the "right of anonymity". Before running the auditing process, we elicit the evaders' willingness to pay for the anonymity with a BDM procedure (Becker et al., 1964). In other words, contrary to S, in AS, evaders had the possibility of escaping social stigma.

In treatment CU social stigma and social blame were only possible if participants actively decided to discover the identity of the tax-dodgers. In this treatment, participants had to pay a fee in order to know the identity of tax evaders: we elicit their willingness to pay, as in treatment AS, via a BDM procedure.

Table 2.1 resumes the experimental design.

As usual in experiments on tax compliance, non-neutral terms have been used both in instructions and in softwares.

2.2.2 Behavioural predictions

The introduction of a public good financed by tax revenues is necessary for our experimental setting: if there is not an interaction among participants, an exercise on social pressure (of both kinds, i.e., social approval and/or social disapproval) loses a

state that the rematching procedure did not rule out the chance to interact with participants met in previous rounds.

Table 2.1: Experimental Design - Chapter 2

Treatment	# of subjects	# of matching groups	# of tot obs.	pic. for enrollment	anonymity of audited evaders	anonymity of audited full contributors
Baseline (B)	48	6	960	NO	YES	YES
Control (C)	32	4	640	YES	YES	YES
Esteem (E)	32	4	640	YES	YES	NO
Public (P)	32	4	640	YES	NO	NO
Stigma (S)	32	4	640	YES	NO	YES
Anonymous Stigma (AS)	32	4	640	YES	P	YES
Curiosity (CU)	32	4	640	YES	NG	YES

NOTE: P stands for Possible, NG for Not Guaranteed.

substantial part of its appeal[6].

As usual in papers that include the redistribution of collected taxes, our marginal per capital return (MPCR) is $\frac{1}{group\ size}$ <MPCR< 1. Although with this setting the Nash equilibrium — for a rational, selfish and risk neutral player — is not to pay taxes (contribute), research both on tax evasion and on public goods, suggests that a significant proportion of participant will contribute.

Gordon (1989) modified the Allingham and Sandmo (1972) model introducing i.) a psych cost of evasion and ii.) a reputation cost of evasion: both factors negatively affect taxpayer's utility function. The more strongly participants perceive others' judgment, the more likely they avoid evasion. Combining this with previous results on emotions related with public disapproval (Coricelli et al., 2010, 2014), we expect that the introduction of negative non-monetary incentives increases compliance.

The Value attributed to Individual Anonymity (VIA) can be seen as an indirect pecuniary measure of the psychological costs introduced by Gordon (1989); the "right of anonymity" represents a sort of insurance against stigmatization. The possibility of avoiding social blame should decrease tax compliance since, in case of evasion, the reduction (in terms of utility) given by the monetary loss (the fee for the "right of

[6]In addition, public good provision ensures the presence of both monetary and non-monetary (dis)incentives: full contributions have the monetary incentive in the multiplication factor of the public good structure and the non-monetary incentive in the publication of honest behavior; acts of evasion have the monetary disincentive in fines and the non-monetary incentive in the publication of cheating behavior.

anonymity") is smaller than the reduction given by the psychological cost[7]. We thus predict that, when tax dodgers can avoid social stigma, tax evasion increases.

Our design allows to test the impact of positive non-monetary incentive of tax compliance: given previous result on cooperation in public good experiments (see for example Rege and Telle, 2004), we can expect that the anticipation of social approval, in case of publicity of full contribution, increases contributions (compliance). Unfortunately, we do not have an indirect measure of the phycological pleasure of being publicly recognized as a full contributor, factor that may have a positive impact on taxpayer's utility and modify, as Gordon (1989) did for psychological costs, the Allingham and Sandmo (1972) model. This could be a starting point for further research.

Finally, the willingness to pay for identifying tax evaders (Value attributed to the Others Anonymity, VOA) can be considered as a monetary proxy of the value attributed to the psychological pleasure to see who are the tax dodgers in the group[8].

There is an interesting feature of these different psychological carriers of VIA and VOA: regardless the fact that both involve the issue of identifiability, VIA is linked to a loss, the loss of personal good reputation, while VOA is related to a gain, the gain of information about the identity of the tax dodgers. Accepting the standard definition of loss aversion (Kahneman et al., 1991), we predict a statistically significant difference between VIA and VOA and, more precisely, VIA should be higher than VOA.

2.2.3 Participants and procedures

The Experiment was run in Trento (Italy) at the Cognitive and Experimental Economics Laboratory (CEEL) of the University of Trento. The participants were mainly students of University of Trento; most of them took courses at the Department of Eco-

[7]The BDM procedure insures the fact that the amount paid for the anonymity is not bigger than the VIA.

[8]In the case of treatment CU, one could also suppose that some participants can make high offers not because they have an high VOA but because they are applying a sort of social norm reinforcing mechanism. The pursuing of this goal is, in our setting, illusory given that we use a random matching procedure for building the groups at the beginning of each round. Therefore the reinforcement mechanism cannot produce any sure advantage for the punishers, because they could face the chance to never meet any longer the punished taxpayers.

nomics (55%)[9]. The computerized experiment was programmed and conducted using the z-Tree software (Fischbacher, 2007).

A total of 240 participants (119 males and 121 females; mean age of 23 with sd of 3.3) took part in the experiment, divided into 15 sessions of 16 participants. Each treatment had two sessions, except treatment B which had three.

Treatment B was the only one with a "traditional" enrolment: participants were recruited via an announcement through the laboratory mailing list. In treatments C, E, P, S, AS and CU, participants were required to come to the laboratory for the enrolment (one week before the experiment); once in the laboratory, they were informed that they should authorize the experimenter to take a picture that could be used during the experiment[10]. Participants were not informed about the purpose of the picture, they were only informed about the possibility to use the picture during the experiment. Participants were also ensured that, after the experiment, all pictures would be deleted.

The day of the experiment, instructions[11] (for the corresponding treatment) were distributed, participants were left time to read them individually. To establish and ensure common knowledge, instructions were also read aloud, and a questionnaire was submitted, before starting, to check the understanding of the experimental rules.

The experiment lasted about 60 minutes; for their participation subjects received, in addition and regardless the result achieved in the experiment, a show-up fee of 2.5 Euro. Only one of the session's rounds was randomly selected for participants' payment: the result of the selected period was converted in Euro (150 ECU = 1 Euro) and privately paid to the subject. On average, participants earned 11.50 Euro.

[9]More in details, in addition to the economic students, 14% took courses in other social sciences (Sociology, Political science, Psychology and Cognitive Science), 16% in Law, 7% in Engineering, 5% in Humanities, 1% in Hard sciences. Seven participants (3%) graduated shortly before the experiment and declared to be not a student.

[10]None of the participants refused to enrol.

[11]Translated versions of the instructions can be found in the appendix of the chapter.

2.3 Results

We find, overall, high compliance rates in all treatments: the use on non-neutral terms, the public good game structure of the game — in public goods experiments, it is not unusual to incur into the phenomenon of overcontribution (Ledyard, 1995) — and our enrolment procedure may be among the reasons of participants' substantial honest behaviour (Bohnet and Frey, 1999; Levitt and List, 2007).

2.3.1 Descriptive statistics

Table 2.2 reports the proportions of evaders (defined when $DI < 1500$, standard deviations in parentheses) in all 20 rounds and in the first round only, when declarations could not be influenced by previous experiences of audits and peers' behaviour. When considering the first period of the experiment, the proportion of evaders is higher in B than in treatment S and AS (Pearson's Chi-squared test, for both comparisons p-value= 0.04355), and marginally higher than treatment C (Pearson's Chi-squared test, p-value= 0.08197). Statistically significant difference is also found comparing the frequency of full cooperation in the first period in treatment B, with a pooled sample composed by the other treatments, where a picture during the enrolment process was required (Pearson's Chi-squared test, p-value=0.04211). Overall, in all treatments but CU, the proportion of evaders is lower than in B (Pearson's Chi-squared test, p-value<0.01189 for all comparisons). This suggests the presence of an "enrolment" effect: taking a picture during the enrolment process pushes participants to be more compliant.

As already introduced, in all treatments subjects declare a considerable high amount of their initial endowment; this can be emphasized by considering the average declared income at individual level: the maximum reached value is, for each treatment, ECU 1500; this means that in all treatments there is the presence of *perfect full contributors* (players who declared ECU 1500 in all the 20 rounds). On the other hand, the only treatment without the presence of *perfect full evaders* (players who declared ECU 0 in all the 20 rounds) is treatment S. As depicted in Table 2.3, treatment S shows a tendency of higher values for mean, median and other quartiles.

Table 2.2: Proportion of evaders

Treatment	All rounds	First round
B	55.63 (1.60)	54.17 (1.61)
C	41.88 (1.95)	40.63 (1.94)
E	49.22 (1.98)	40.63 (1.94)
P	45.00 (1.97)	34.37 (1.88)
S	30.31 (1.82)	31.25 (1.83)
AS	43.91 (1.96)	31.25 (1.83)
CU	57.34 (1.96)	50.00 (1.98)

Table 2.3: Average Declared Income at Individual Level

Treatment	Min	1^{st} Qu.	Median	Mean	3^{rd} Qu.	Max
B	0	634	988	934	1365	1500
C	0	838	1292	1121	1473	1500
E	0	525	1015	950	1478	1500
P	0	626	1111	1010	1475	1500
S	75	1069	1348	1210	1490	1500
AS	0	597.8	1195	1015	1500	1500
CU	0	461.5	1003	879	1361	1500

To confirm this, we tested whether the publication of tax dodgers' pictures rises honesty and, as a consequence, compliance. We therefore checked whether the average declaration at the individual level of treatment S, statistically differs with the average declarations of the other treatments. The average declaration in treatment S is significantly different compared to treatment B and treatment CU (Wilcoxon rank sum test, p-value = 0.02187 and p-value= 0.01828 respectively) and marginally differs compared to treatments E and P (Wilcoxon rank sum test, p-value = 0.0864 and p-value =

0.0892 respectively).

2.3.2 Determinants of evasion

Table 2.4 presents regression analyses about the determinants of players' tax behaviour.

Table 2.4: Evasion

	Probability to evade (Standard errors in parentheses)	Evaded taxes (Standard errors in parentheses)	
Model:	1	2	3
(Intercept)	1.911 (2.058)	308.039 (43.466)***	242.380 (145.652)·
*C*ontrol	−1.359 (0.833)	−99.417 (68.726)	−86.764 (67.879)
*E*steem	−1.656 (0.835)*	−5.344 (68.726)	−46.605 (68.005)
*S*tigma	−2.443 (0.832)**	−148.444 (68.726)*	−154.919 (67.848)*
*P*ublic	−0.776 (0.820)	−38.618 (68.726)	−3.366 (67.359)
*A*nonymous *S*tigma	−1.566 (0.830)*	−41.085 (68.726)	−37.331 (67.463)
*CU*riosity	−0.812 (0.890)	33.605 (68.726)	3.168 (71.443)
Age	−0.034 (0.078)		4.237 (5.498)
Female	−1.425 (0.477)**		−144.166 (33.784)***
Econ	−0.734 (0.505)·		−61.910 (36.126)
Period	0.090 (0.014)***		8.363 (1.043)***
Just Checked	1.522 (0.125)***		127.472 (8.820)***
Count Checks	−0.290 (0.058)***		−21.722 (4.262)***
Log Likelihood	−1946.004	–	–
Prob > F	0.000	0.007	0.000
R squared	–	0.027	0.098
Num. obs.	4800	4800	4800
Num. groups: ID	240	240	240
Num. groups: Matching Group	30	30	30

$^{***}p < 0.001$, $^{**}p < 0.01$, $^{*}p < 0.05$, $^{\cdot}p < 0.1$

Model 1 refers to the decision of engaging tax evasion. Indeed, Model 1 is a generalized linear mixed model, with a dichotomous dependent variable given by the decision of the subject to evade ($DI < 1500$) or not ($DI = 1500$). Given the nature of the dependent variable, we used in the model a logit link function. In Model 1, potential dependence for the repeated decisions made by participants (20 rounds) is controlled by including random effects at the individual level. Random effects at matching group level are introduced to account for possible lack of independence of taxpayers within a

matching group. Model 1 presents as regressors the explanatory variables given by the experimental treatments (treatment B represents our benchmark), plus other control variables (*Age* measures the age of the participant in years, $Female$ controls for gender and *Econ* is a dummy variable which takes into account whether the participant is a student of Economics or not) and the variables *Period*, *Just Checked* and *Count Checked*. The variable *Period* registers the round of the experiment (from 1 to 20), *Just Checked* captures whether the subject has been caught evading in the previous round and *Count Checked* records the number of audits experienced by the participant.

Compared to the treatment B, where no incentives are applied, both kinds of non-financial incentives, positive (treatment E) and negative (treatment S and AS), reduce the likelihood of cheating. Treatment S is the most effective (in terms of both impact and significance level). This suggests that, when a taxpayer has to decide if engaging tax evasion, stigmatization suppresses cheating's temptations better than good publicity as an honest taxpayer. The determinant role of social stigma in reducing the likelihood of evasion is also supported (as fully discussed in Section 2.3.3) by the reduction in stigmatization's effectiveness when social stigma is made avoidable (treatment AS).

We found that the effects of the non-financial incentives, which worked quite effectively in isolation, vanish when both incentives are applied at the same time: treatment P, in which the pictures of both honest and dishonest taxpayers were displayed, fails to reduce the likelihood of evasion. This phenomenon can be justified by salience (Taylor and Thompson, 1982): information given by the publication of both kinds of taxpayers (cheaters and full-contributors) may have received insufficient attention, since this one was not only focused — like in treatments E, S and AS — on one single characteristic of tax behaviour.

The regression also shows that the possibility of becoming aware of the tax-dodgers' identities (treatment CU) does not reduce the likelihood of evasion, possibly because participants anticipate the overall small willingness to pay for this opportunity. As a consequence, the threat represented by treatment CU is not considered credible and the probability of being exposed to social stigma is perceived very low. In other words, treatment CU fails in reducing the likelihood of tax evasion because public disapproval

is believed to be very unlikely. This point is recalled and better discussed in Section 2.3.3.

Model 1 confirms, in addition, established findings in tax evasion research (e.g., Mittone, 2006): females are less likely than males to engage evasion, the likelihood of compliance decreases immediately after an audit and, as long as the experiment proceeds, the more a subject is checked the smaller the likelihood of a cheating behaviour.

Result 1 *With respect to the probability of evasion, non-financial (dis)incentives work in both directions: nevertheless, non-monetary disincentives are more effective in reducing the likelihood of evasion.*

Model 2 and Model 3 are linear mixed models with the amount of evaded taxes as dependent variable. Also in these models, potential dependence is controlled by including random effects at the individual level and group level. Model 2 presents as regressors only the explanatory variables given by the experimental treatments while Model 3 has all the other control variables. The positive coefficients (marginally significant in Model 3) of the intercept show that participants tend to evade taxes in the baseline B where non-monetary (dis)incentives are not implemented. Furthermore, the certain application of social stigma (treatment S) does significantly reduce the amount evaded taxes. However, when considering the other (dis)incentives, significant reductions are not observed.

Result 2 *With respect to intensity of evasion, publicizing tax dodgers has an impact on participants' honesty by pushing them to evade less taxes.*

If it is not a surprise the fact that E does not significantly impact on evaded taxes (publicity of full contributors does not affect evasion's intensity when a taxpayers has already decided to engage evasion), the nonsignificant impact of AS suggests that intensity of cheating is not affected by stigma if tax dodgers can escape it. This issue is largely discussed in the next Section.

2.3.3 Value of Anonymity

Treatments AS and CU have permitted to investigate more deeply the roles played by anonymity and negative social pressure on tax compliance, having allowed either

the chance for tax evaders of avoiding public blame (treatment AS) or the chance for taxpayers of blaming cheaters (treatment CU).

Contrary to treatment S, in treatment AS players had the opportunity to buy the certainty of not being publicized as cheaters by acquiring the "right of anonymity". Each cheater was informed, before the random auditing process, that in case of inspection her identity will be publicized. They had the possibility of making an offer for acquiring the "right of anonymity" via, as mentioned before, BDM procedure (Becker et al., 1964). The offer range was from zero to X_{max}: the maximum allowed amount was related to the evaded amount and the associated fine, and corresponded to the available income before the auditing process subtracted by the potential fine. More precisely it was calculated as follows:

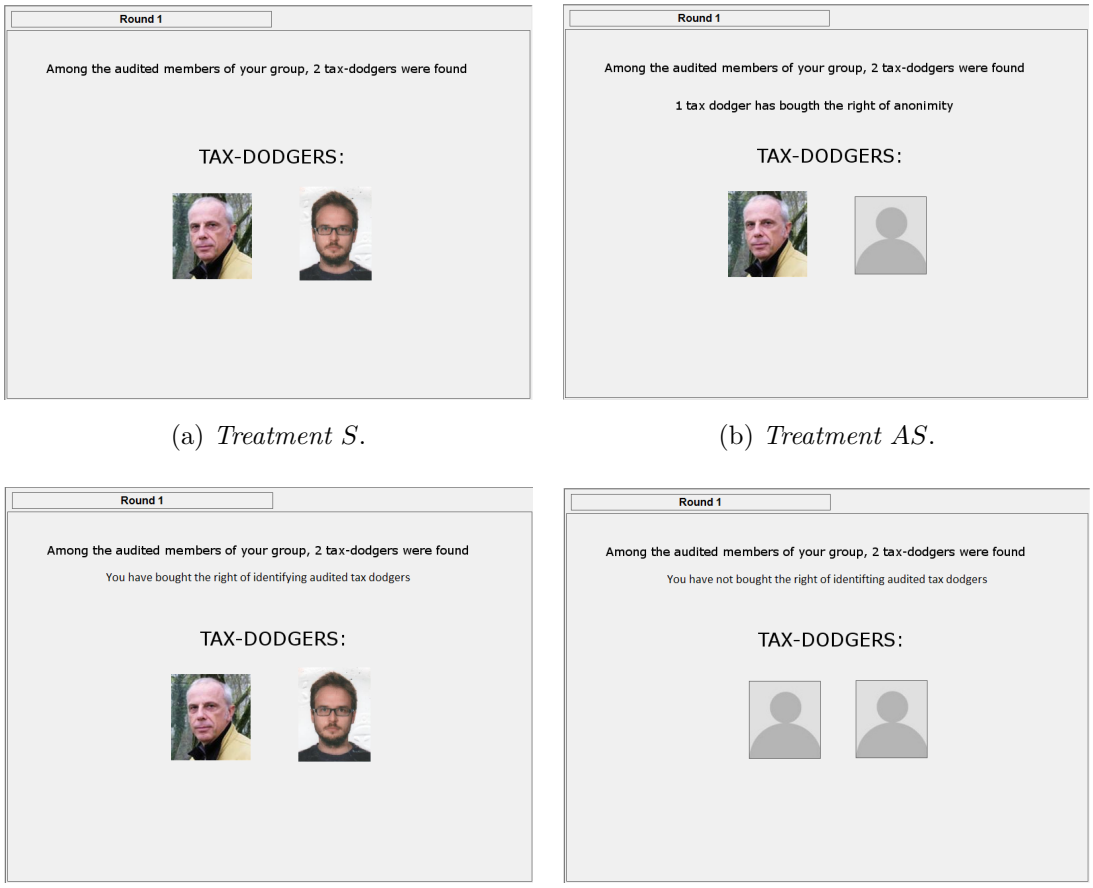
$$X_{max} = IE - \tau DI - \theta(\tau(IE - DI)).$$

After the offer, the program generated a random number between 0 and X_{max}; if the cheater's offer resulted to be equal to or higher than the random number, the player acquired the "right of anonymity": in this case, the program substituted the picture of the cheater with an anonymous picture; the random number had to be paid by the subject as fee for the anonymity. On the contrary, if the offer resulted to be smaller than the random number, cheater's identity was made public and no fee was subtracted to the income of the player.

In treatment CU players had the opportunity to know, with certainty, the identities of the caught (if any) tax evaders of the group. With the same procedure described above (BDM), participants had to state their maximum willingness to pay for knowing the audited tax dodgers' identities.

For a perfect comparison with treatment S, also in treatment AS and in treatment CU the number of the audited tax-dodgers were displayed, regardless of how many players succeeded in the BDM procedures. Figure 2.1 is an example of how identities were publicized in treatments S (top-left), AS (top-right) and CU (bottom left and right).

The numbers of acts of evasion ($Rd < 1500$) are, in treatment AS, systematically higher than the numbers of acts of evasion in treatment S. The average proportion of tax-dodgers is 30.31% in treatment S, and 43.91% in treatment AS. Evasion increases



(a) *Treatment S.* (b) *Treatment AS.*

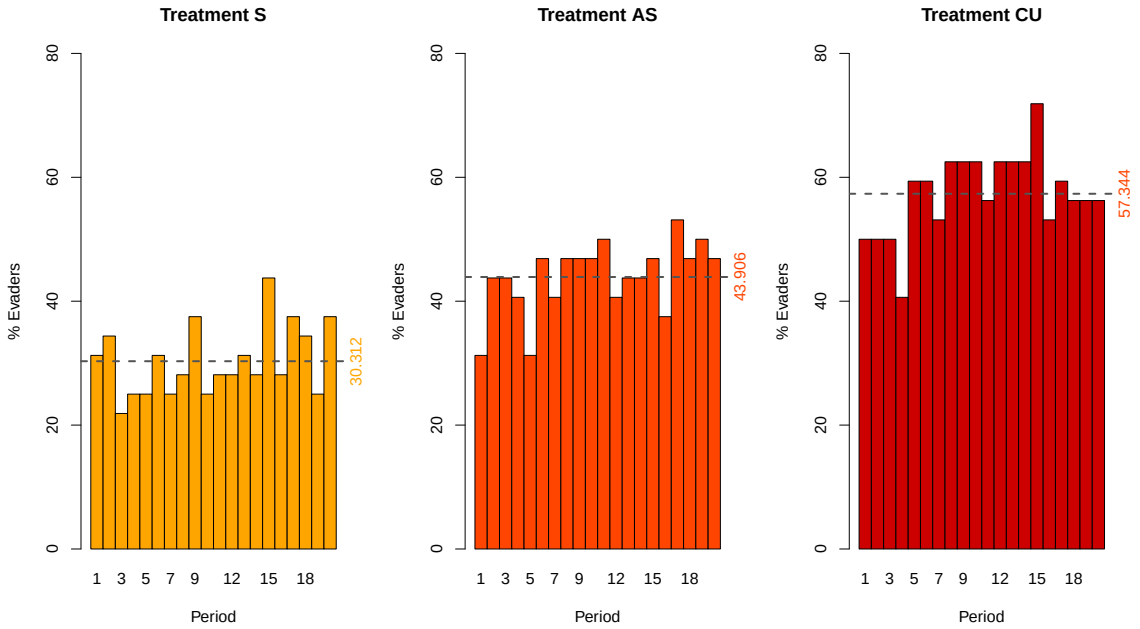
(c) *Treatment CU I.* (d) *Treatment CU II.*

Figure 2.1: Examples of taxdogers' publicity

even more in treatment CU, where average proportion of tax evaders is around 60% (statistically significant differences in all comparisons: Wilcoxon rank sum test, p-value < 0.001 for all comparisons). Figure 2.2 compares acts of evasion among treatment S, AS and CU: within the figures, the dashed lines provide a representation of the average proportion of tax evaders.

In treatment AS, acts of evasion are accompanied by a high interest in acquiring the "right of anonymity" (high VIA). Figure 2.3 resumes the overall interest in anonymity. The left-hand side of Figure 2.3 shows the proportion of positive offers during the periods. On average, around 76% of evaders have shown interest in avoiding social blame by offering, for their picture, an amount bigger than zero. Not only the majority of cheaters was interested in acquiring the "right of anonymity" but, as depicted by the right-hand side of Figure 2.3, offers could have been effective, on average, in acquiring

Figure 2.2: Acts of evasion: Treatments S, AS and CU compared.



the anonymity once every two trials (overall average successful probability = 48.39%).

To better understand the value of anonymity for tax evaders, we have defined four different kinds of tax evaders, according to their number of acts of evasion during the 20 experimental periods[12].

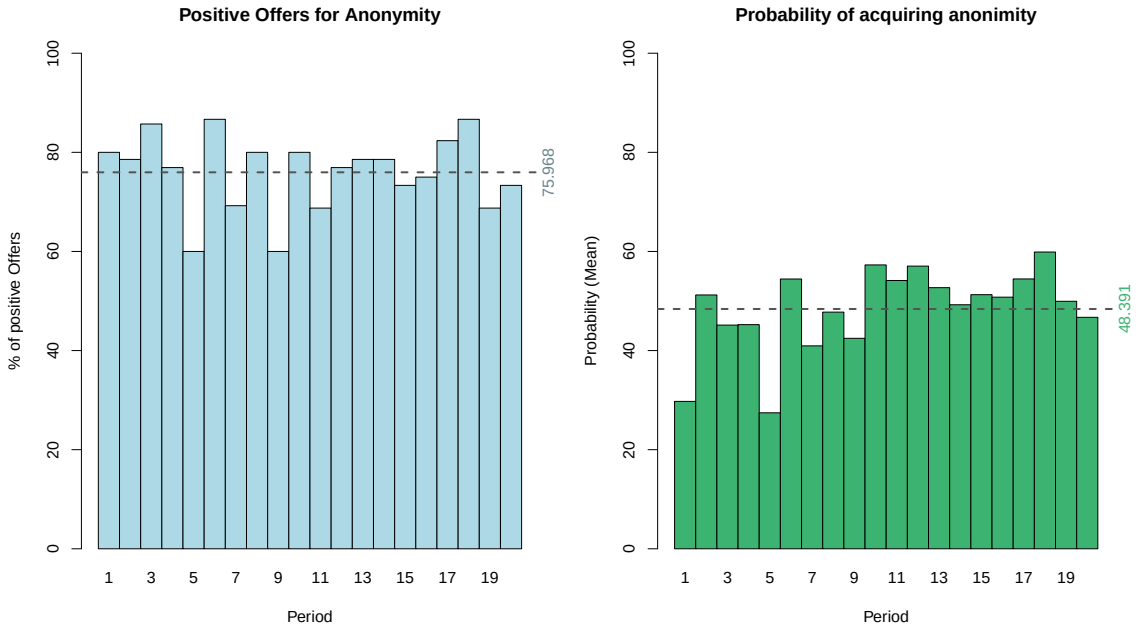
Taxpayer *Type 1* is a taxpayer who evaded no more than 5 times; taxpayer *Type 2* evaded more than 5 times but less than 11; a taxpayer who evaded from 11 to 15 times (both included) is classified as taxpayers *Type 3* and, finally, taxpayer *Type 4* evaded more than 15 times. Figure 2.4 shows the distribution of the average offers[13] as percentage of the player's available income at the moment of the offer (X_{max}): in addition, the value of average offers for each type of taxpayer is reported within the corresponding bar.

Average offers decrease as cheating becomes more systematic. The average offer of taxpayers *Type 1* is not significantly different compared to the average offer of taxpayers *Type 2* (Wilcoxon rank sum test, p-value = 0.559), but is significantly higher than offers made by taxpayers *Type 3* and *Type 4* (Wilcoxon rank sum test, p-value = 0.056 and

[12]Identifying a complete taxpayers' taxonomy is often not easy: example of categorization are Torgler (2003) and Mittone (2002).

[13]Values are calculated at individual level, only when the players have effectively evaded.

Figure 2.3: Treatment *AS*: Positive offers for anonymity and average probability of acquisition.



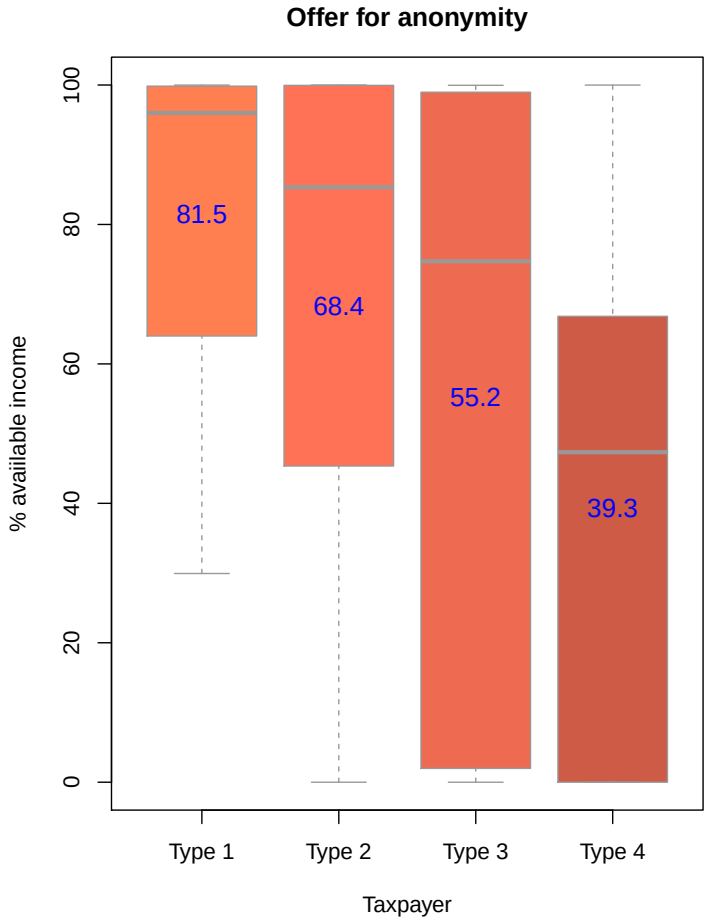
p-value < 0.001). Statistically differences are detected when comparing offers made by taxpayers *Type 2* and *Type 3* (Wilcoxon rank sum test, p-value $= 0.027$), *Type 2* and *Type 4* (Wilcoxon rank sum test, p-value < 0.001) and *Type 3* and *Type 4* (Wilcoxon rank sum test, p-value $= 0.007$).

Result 3 *The possibility of avoiding social blame leads to an increase in the number of acts of evasion and to a correspondingly number of positive offers for anonymity. Occasional tax-dodgers offer more than frequent cheaters in order not to be publicized when caught evading.*

The number of positive offers in treatment *CU* drops with respect to treatment *AS* but seems to remain notable. It is important to notice that the positive offered amounts are, in this case, generally very low: on average around 8% of the offers could have been effective for buying the identity of the tax dodgers. Figure 2.5 resumes offers in treatment *CU*.

If anonymity is the *status quo*, participants do not show a high interest in knowing the identities of tax evaders (low VOA) and the belief that this is the common sense

Figure 2.4: Percentage of available income offered for acquiring the right of anonymity.



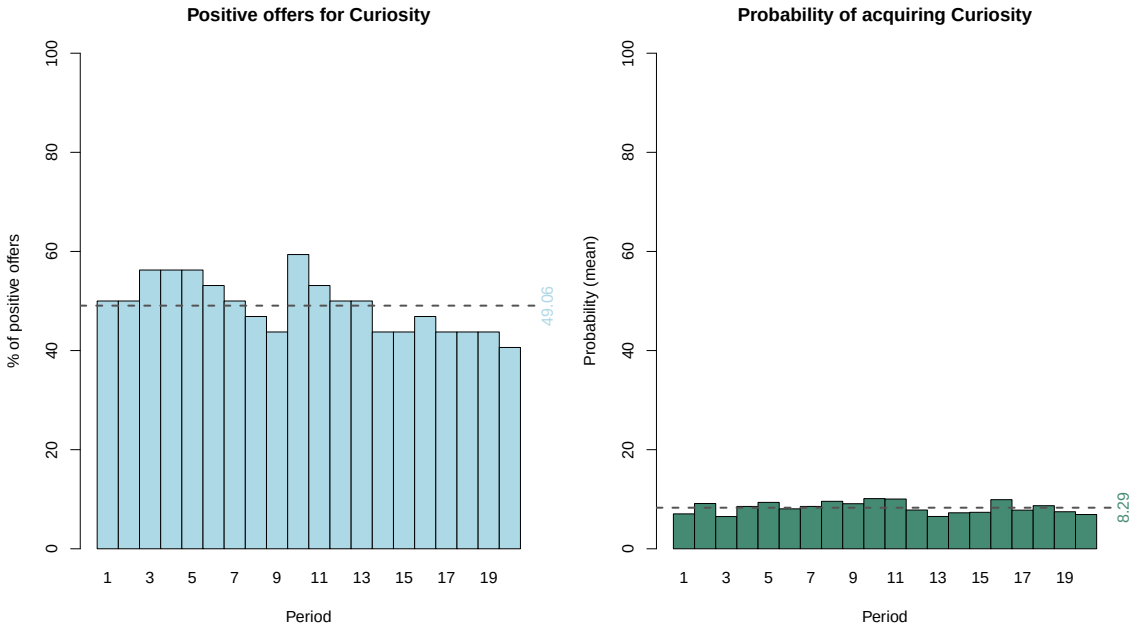
seems to be widespread. At the end of the experiment, we asked to guess the average offer made by participants during the all experiment[14]: the average guess was 14.58% (SD, 16.08), and half of the subject guessed a value smaller than 10% of the available income (actual mean offer equal to 8.29%). The combination of the audit probability and the low (perceived) VOA reduces the threat of social stigma and its effect on compliance.

Result 4 *Taxpayers are willing to ensure themselves against the others' social blame, even if they show a very small interest in the opportunity of blaming the others.*

In other words, there is a misalignment between VIA and VOA: even though there

[14]This task was incentivized with an additional payment of 1 euro, if the guess was in the range +/-5% of the actual offer.

Figure 2.5: Treatment *CU*: Positive offers for anonymity and average probability of acquisition.



is a general small interest in knowing who is a tax evader, large majority of taxpayers do not want to be publicly recognized as a cheater. We than conclude that, despite the low values of VOA, the threat of social stigma has a real impact in sustaining tax compliance and reducing tax evasion, and it gives the best results with unsystematic cheaters.

2.4 Discussion and Conclusion

The aim of this work was to contribute in experimental research on social pressure in tax compliance. Our experimental setting has involved, contrary to recent works, non-financial incentives aimed to rise both negative and positive pressure (social approval and/or social disapproval). As in Coricelli et al. (2010) and Coricelli et al. (2014), social stigma rises tax compliance but also social approval decreases the likelihood of cheating behaviour. Nevertheless, once tax evasion has been engaged, non-financial incentives have an effective impact in reducing the intensity of evasion (amount of evaded taxes) only if stigmatization is exogenously guaranteed (S): when it depends

by an active behaviour of either the evader (AS) or the other taxpayers (CU), the amount of evaded taxes does not statistically decreases.

For what concerns the probability of evasion, if it is true that both incentives work when applied separately, changes in tax behaviour are not statistically detected when applied at the same time. Surprisingly, when both incentives are at work (treatment P) no significantly differences are detected compared to the control group: we interpret this phenomenon as a lack of attention on the provided information (Taylor and Thompson, 1982). If stigmatization and/or social approval lose their *appeal*, the related non-monetary incentives fail in sustaining compliance: to understand if this is the case, could be a starting point for further research.

Our experimental design, has permitted not only to test the impact of negative and positive incentives, but it also has allowed to understand which is the value that taxpayers give to social disapproval (VIA and VOA). Avoiding stigmatization and social blame is particularly important for occasional tax-dodgers: for acquiring the "right of anonymity", taxpayers with less than five acts of evasion, offered more than the double (in terms of percentage of available income) than the taxpayers with 16 or more acts of evasion. There are two possible explanations for this phenomenon: i.) the unsystematic tax-dodgers evade less because they are more risk adverse or ii.) they are more compliant because their ethic drives their behaviour toward the "right thing to do" or, in other words, toward compliance. If more honest behaviour was only a result of difference in attitudes toward risk, differences in offers for the anonymity would be not observed. This is not the case of our experiment: here, unsystematic tax-dodgers evade less not because they are more risk adverse, but because they recognize evasion as an unethical behaviour and, for this reason, they are more than willing to buy the anonymity when there is the risk of being publicly recognized as a dishonest person. When unsystematic tax-dodgers engage evasion, they want to be sure that their acts will be maintained private (highest VIA). It is important to highlight the fact that avoiding individual stigmatization works even if individuals are not really interested in blaming the others and believe that the others are not interested in blaming tax cheaters (low VOA). Tax authorities can, for this reason, exploit this misalignment between the value attributed to Individual Anonymity and the value attributed to

the Others Anonymity for sustaining tax compliance via public stigmatizations of tax-dodgers.

2.5 Appendix

These are translated versions (originally in Italian) of the instructions used in the experiment presented in Chapter 2. The instructions changed accordingly to the treatment, differences are indicated in the text.

`Intructions`

Thank you for taking part in this experiment. For your participation you have earned 2.5 Euro; you can earn an additional amount of money accordingly to the decisions taken — by you and others participants — during the experiment. During the experiment you are not allowed to speak with other participants: for any questions please ask the experimenter. Please, read the following instructions carefully: you have at your disposal 5 minutes. When the 5 minutes are expired, in order to ensure common knowledge among participants, an experimenter will read aloud the instruction. Before the beginning of the experiment, you will be asked to answer few control questions on the rules of the experiment.

The experiment is composed by several rounds, in each of them 4 participants form a group.

Rules remain the same through all the experiment but the composition of the groups will randomly change each round.

`Treatment B and C`

Identities of the members of the groups will never be revealed.

`Treatment E, P, S, AS and CU`

At the beginning of each round, identities of the members of the groups will not be revealed. At the end of the round there is the opportunity of revealing some of the

identities (only among the group) according to the rules explained in the following parts.

Identities will be publicized via publication of the pictures taken during the enrolment for the experiment. We want to highlight the fact that these pictures will be used only for this experiment and they will be delated after the experimental session.

The number of rounds is predetermined: nevertheless you will not be informed about the number of rounds.

In each round you are endowed with 1500 ECU (IE) and you are required to declare this endowment (DI). Taxes (T) are collected according to DI and correspond to 55% of DI. This tax rate (55%) is in line, according to a recent study of Confcommercio, with the mean tax burden in Italy.

Taxes are subtracted by your IE and put in a common account (CA) together with the taxes paid by the other members of your group. To simulate public services that are financed by taxes, CA will be increased and equally divided among the members of the group: each one will receive an amount of ECU equal to the 35% of the original amount of CA.

After the redistribution, your personal income (PI) will be:

$$PI = IE - T + 35\%^{*}CA$$

where,

IE**:** is the initial endowment

T**:** are the taxes paid according to the declared income (DI) ($T = 55\%^{*}DI$)

CA**:** is th amount of the common account

With a probability of 20%, your declaration will be checked: if your declared income is smaller than the initial endowment (thus, $DI < IE$), you will have to pay a fine (F) equal to 125% of evaded taxes, or in other words, the difference between what is required ($\tau = 55\%^{*}IE$) and what it has been paid ($T = 55\%^{*}DI$).

At the end of the round, your final payoff (FP) is equal to:

1. if you have not been audited $\rightarrow FP = PI$
2. if you have been audited and
   - **a)** you did not evade $\rightarrow FP = PI$
   - **b)** you did evade $\rightarrow FP = PI - F$

where F is the fine ($F = 125\%^{*}(\tau - T)$).

`Treatment AS`

If you evade and the evasion is discovered, the other members of your group will be informed about your evasion via publication of your picture. You can avoid the publication by making an offer to acquire the "right of anonymity".

Before the random audit process, you can state how much you are willing to pay in order to buy the "right of anonymity".

The offer (OFF) should be between zero and a maximum amount (MAX), calculated by subtracting from your initial endowment the paid taxes and the potential fine that you have to pay in case of audit.

Your offer (OFF) will be compared to a number (RND), randomly generated between zero and MAX. If your offer is equal or bigger than the random number, you acquire the 'right of anonymity" and in case of an audit, your identity will be not revealed to the others. The fee for the "right of anonymity" is equal to the randomly generated number (RND). If you do not acquire the 'right of anonymity" no fees are required and, in case of an audit, your identity will be publicized .

`Treatment CU`

You have the opportunity of knowing the identities of audited tax evaders (if any) of your group by making an offer to acquire the "right of identifying".

Before the random audit process, you can state how much you are willing to pay in order to identify audited tax evaders.

The offer (OFF) should be between zero and a maximum amount (MAX), calculated by subtracting from your initial endowment the paid taxes and the potential fine that you have to pay in case of audit (which is zero in case of no evasion).

If the auditing process finds one o more evaders in your group, your offer (OFF) will be compared to a number (RND), randomly generated between zero and MAX. If your offer is equal or bigger than the random number, you acquire the 'right of identifying" and you will know the identities of the audited tax evaders. The fee for the "right of identifying" is equal to the randomly generated number (RND). If you acquire the 'right of identifying" but the auditing process does not find any tax evaders, no fees are required.

When the randomized audit process is over, privately you will informed if you have been audited and on the amount of your final payoff.

`Treatment E`

In addition, the identities of audited members, **who resulted to be full compliant**, will be publicized via the publication of their pictures.

`Treatment P`

In addition, the identities of audited members, will be publicized via the publication of their pictures. Together with the picture, a message will inform you if the member was found to be compliant or evader.

`Treatment S`

In addition, the identities of audited members, **who resulted to be evader**, will be publicized via the publication of their pictures.

`Treatment AS`

In addition, the identities of audited members, **who resulted to be evader and not acquired the right of anonymity**, will be publicized via the publication of their pictures.

`Treatment CU`

In addition, if you have acquired the right of identifying evaders, the identities of audited evaders will be publicized via the publication of their pictures.

When communications are over, the round finishes and another one will start with the same rules but with different groups: groups are randomly generated. In terms of rounds' final payoff, what happens in one round does not have any influence on others.

When the predeterminate number of rounds is reached the experiment is over. ONLY ONE round will be randomly selected for your payment: the final payoff, in ECU, of the related round will be converted into Euro according to the following exchange rate:

$$150 \text{ ECU} = 1 \text{ Euro} .$$

You will be privately paid at the end of the experiment.

If you have any questions, please ask the experimenter.

Chapter 3

The role of direct participation on tax compliance

with Erich Kirchler, Christoph Kogler and Luigi Mittone

3.1 Introduction

From the seminal work of Becker (1968) on theory of crime and its application on tax evasion developed by Allingham and Sandmo (1972), research on tax compliance has definitively moved from a strict economic approach towards approaches of other social sciences. The literature agrees on the fact that the neo-classical approach cannot, if taken in isolation, explain the general level of tax compliance among societies (Alm et al., 1992): with the actual levels of tax and penalty rates but, above all, probability of being detected the Allingham and Sandmo's model predicts compliance rates close to zero . Moreover research - theoretical, empirical and experimental - on the four basic factors of the neo-classical model (tax rate, audit probability, fine on detected evasion and level of taxable income) has often found contradictory results (for a more detailed dicussion, see Andreoni et al., 1998; Kirchler et al., 2010; Alm, 2012).

For this reason, many lines of research have introduced psychological and sociological aspects into the taxpayer decision process. For instance, the attention has been focused on the role played by norms — both personal norms (e.g., Erard and Feinstein, 1994b; Trivedi et al., 2003) and social norms (e.g., Wenzel, 2005) — and their impact

on tax morale, which is generally defined as an internalized or intrinsic obligation to pay taxes (Braithwaite and Ahmed, 2005; Alm and Torgler, 2006).

Sometimes, personal norms, which are built on personal values as egoism, ethics and honesty (Kirchler, 2007), can be sufficient to raise taxpayer's compliance, if they succeed in triggering the individual's personal feeling of obligation. When a taxpayer is not intrinsically motivated by her personal norms (Torgler, 2003), identification within a community, realization of the importance of social welfare, and conditional cooperation can increase compliance via the influence of social norms (Wenzel, 2004).

Another important aspect ignored by the neo-classical approach is the relationship between the taxpayer and the tax authorities: as pointed out by Feld and Frey (2002), personal motivations (personal norms) or alignments to a socially accepted behavior (social norms) are not the only factors that shape taxpayers' behavior, which also "*depends on the interaction of taxpayers with tax authorities*" (Feld and Frey, 2002, p. 97). Tax compliance can be sustained, for example, by a cooperative relationship between taxpayers and tax authorities, which leads to the perception of a fair tax system (Erard and Feinstein, 1994a) or citizen's involvement in the constitution of the tax system (Feld and Frey, 2002).

With regard to tax compliance, three different concepts of fairness are distinguished: *procedural*, *distributive* and *retributive justice* (see, for example, Wenzel, 2003, for a more detailed discussion). For the aim of this paper, we are focusing our attention on procedural justice, which involves taxpayers' acceptance of the determination and the collection of the fiscal levy. Research has often focused his attention on distributional justice — involving costs and benefits of compliance — but perceptions of how collected resources are used could also play a prominent role in fiscal policy development (MacCoun, 2005).

In laboratory experiments, the dimensions of perceived fairness of tax system and procedural justice have been often studied by allowing participants (taxpayers) to modify tax system rules via voting mechanisms. From a theoretical point of view, the more individuals are involved in the development of the fiscal rules, the higher their perceptions of procedural justice. A high level of fairness perception should enhance trust in authorities and it should, finally, result in a higher level of tax compliance. In the

literature, there is a general consensus with regard to the positive relationship between participation and compliance: having the right to vote on the tax systems increases taxpayers' willingness to comply (e.g., Alm et al., 1993b; Feld and Tyran, 2002; Wahl et al., 2010b).

Direct participation in the development of the tax system can increase taxpayers' fairness perception: if taxpayers are consulted, for example, in the distribution of collected resources, the general level of perceived fairness increases via a boost in procedural justice or, in other words, because of the higher weight of citizens' opinions (MacCoun, 2005; Tyler, 2006). If taxpayers can express their consent concerning the tax system and the tax authority respects the voice of the taxpayers, the likelihood of full compliant behavior increases (Vihanto, 2003). Indeed, acts of evasion can, as emphasized by Erard and Feinstein (1994a), be considered as signs of disapproval toward the rules imposed by tax authority and not only mere attempts of maximizing the taxpayer's utility, as predicted by the neoclassical model.

It is clear that direct participation, perceived fairness and procedural justice directly influence trust in authorities and approval of the tax system, which are unavoidable elements for voluntary cooperation (Kirchler et al., 2008).

In the present paper, we investigate taxpayers' compliance with and without direct participation regarding the tax system. Djawadi and Fahr (2013), have also studied the impact of trust and knowledge on tax compliance by experimentally manipulating taxpayers' power in deciding about government budget spending. One crucial difference of our experimental design is the possibility of checking for taxpayers' disapproval on two dimensions: participants' disapproval of the rules of the tax system as well as their disapproval on the allocation of the tax burden. Unlike Djawadi and Fahr (2013), our exercise on taxpayers' influence on the tax system's structure has been done not only with respect to voice of public expenditure but also with respect to taxes that taxpayers face in reality. As shown in previous studies, tax evasion can be triggered by tax aversion since taxpayers seem to dislike taxes more than equivalent costs (Sussman and Olivola, 2011). The difference in the framing might decrease, ceteris paribus, tax evasion. Framing is also manipulated by presenting to taxpayers the required payments in increasing or decreasing order.

In summary, we are interested in testing the impact (and the interaction) of taxpayers' knowledge and involvement in the tax system, as well as the framing of the information that the tax authorities may provide to taxpayers on tax compliance. In order to do this, we analyze the impact of four different factors: *Voice on Distribution of tax load*, *Voice on tax Contribution* (taxpayers' knowledge and involvement in the tax system), *Context Effect* and *Order Effect* (information framing). All the factors, together with the experimental design, are described in detail in the next section. Section 3.3 presents experimental data, analysis and tests. Finally, Section 3.4 concludes with a discussion of the results .

3.2 Method

3.2.1 Participants

The experiment was conducted in the Social Science Research Lab at the Department of Economic Psychology at the University of Vienna[1]. Overall, 123 students of the University of Vienna (83 females and 40 males) with a mean age of 26.66 (SD = 4.90) were recruited using the ORSEE system (Greiner, 2004) and the experiment was programmed with the help of the experimental economics software z-Tree (Fischbacher, 2007). Most of the students took courses in social sciences (Political Science, Anthropology, Sociology etc.), with 22.8% studying psychology. The vast majority of participants was Austrian (62.6%), and most of the remaining students were from Germany (17.1%) and other countries of the European Union (11.4%). Participation in the present experiment was remunerated depending on performance in the preceding effort task and decisions in the tax paying stage.

[1]Since the experiment was run at the Department of Economic Psychology at the University of Vienna, some technicalities may result unusual for experimental economists. Some discrepancies are highlighted and justified in the text.

3.2.2 Experimental Design and procedure

On their arrival in the laboratory, participants were assigned to cubicles and presented with written instructions for the experiment[2]: after privately reading the instructions, participants were asked to answer some control questions on the rules of the experiment. Subsequently, as an effort task, subjects were given a short text about the life of the famous Austrian painter Gustav Klimt. Participants had 6 minutes to read the text, and afterwards they had to answer 10 multiple choice questions referring to this text. Performance in this task determined the income for the second part of the experiment. For each correct answer, an additional 100 ECU (Experimental Currency Units) were added to the initial endowment of 500 ECU. Thus, participants' income varied between 500 and 1500 ECU.

The effort task used during the experiment is a simplified version of the tasks implemented in Rauhut and Winter (2010) and Becker (2012). It may be argued that our topic was not as specific as the ones of Rauhut and Winter (2010) and Becker (2012) and this may have influenced participants' performances: of course, we cannot deny the fact that participants' previous knowledge of Klimt's life might have partly determined the result of the task. It is also true that it is almost impossible to find an effort task where participants' personal skills have no influence on performances. We implemented the effort task mostly to replicate the fact that tax authority does not observe taxpayers' income; endowing participants with a fixed income at the beginning of the experiment fails, of course, in replicating this issue[3]. In addition, participants did not interact among themselves (and this was common knowledge from the beginning of the session), and thus, we argue that it is very unlikely that our effort task — contrary to other experimental settings in which participants' interaction is on board — affected participants' behaviour and expectations during the experiment.

The second part of the experiment consists of a repeated tax game: participants received their respective income and were obliged to pay taxes in four consecutive

[2]Appendix contains a translated version of the instructions.

[3]Random allocation of income is sometimes implemented to replicate tax authority's inability to observe incomes. Our setting allows participants to perceive their endowments as something deserved rather than something randomly earned.

periods (in each period participants were endowed depending on the result of the effort task). In all periods, the participants were informed about the tax rate of 50%, an audit probability of 10%, and a fine of 1.5 times the evaded amount in case of detected evasion. The participant was asked to state how much taxes she wanted to pay; period's payoff was then accordingly computed:

$$\Pi = \begin{cases} E - T_p & \text{if (s)he was not audited} \\ E - T_p - 1.5(T_r - T_p) & \text{if (s)he was audited} \end{cases}$$

where E stands for *Endowment*, T_p stands for *paid Tax* and T_r stands for *required Tax*.

Feedback on period payoff was only provided at the end of the experiment, i.e. after period 4, in order to avoid unwanted effects of audits interfering with the experimental manipulations (cf., Guala and Mittone, 2005; Maciejovsky et al., 2012; Mittone, 2006).

One of the four periods was randomly selected to determine the participants' real payment. The exchange rate was 200 ECU = 1 €. Furthermore, an additional show-up fee of 5 Euros was paid, and in total average earnings amounted to 8.80 €[4].

In the second part of the experiment, the influence of four different factors on tax compliance was investigated: i.) *Voice on tax Contributions* (*VC*), ii.) *Voice on Distribution of tax load* (*VD*), iii.) *Context Effects* (*CE*), and iv.) *Order Effects* (*OE*).

Voice on tax Contributions (VC) was manipulated between groups: during the entire session, participants either had *VC* or not. *Voice on tax Contributions* affects the way in which taxpayers are required to pay their taxes. A participant has *VC* when she has the possibility to decide separately and consecutively about how much taxes to pay for different purposes. On the contrary, when a participant has no *VC*, she is still informed about the purposes the tax due is paid for, but she is only allowed to make one aggregate compliance decision. As an example, consider two hypothetical taxpayers: one with *VC* (Taxpayer A) and one without (Taxpayer B) with the same tax requirement, for simplicity 100 ECU. Both taxpayers receive the same piece of

[4]This could be considered one of the discrepancies between methods in experimental economics and experimental psychology. The mean earned by participants was, on average, less than the show-up fee. This fact is not unusual among psychologists, where remuneration is often based on participation rather than on performance.

information about the justification of their tax requirements, for instance 50% of the total (50 ECU) is required for financing Social Security, 30% (30 ECU) for Education and 20% (20 ECU) for National Defense. Taxpayer A is required to pay taxes three times (How many taxes do you want to pay for financing Social Security (maximum allowed 50 ECU)/Education (maximum allowed 30 ECU)/National Defense (maximum allowed 20 ECU)?), while Taxpayer B is required to pay one all-embracing tax (How many taxes do you want to pay (maximum allowed 100 ECU)?). Regardless the way in which taxes are collected, both taxpayers are considered to comply if their tax payments are equal to 100 ECU.

Voice on Distribution of tax load (VD) was introduced as a within-participants factor in the experimental design. *Voice on Distribution of tax load* affects the way in which taxes are allocated. In two of the four periods (rounds 1 and 3), the distribution of the taxes' allocation was connected to a concrete and fixed pattern, whereas in the other two periods (rounds 2 and 4) participants could change this pattern deliberately, and decide where their taxes should be allocated. Recalling the previous example of Taxpayers A and B, when taxpayers have no *VD*, they received the justification of their tax requirements by the tax authority: 50% is required for financing Social Security, 30% for Education and 20% for National Defense, with these values not modifiable (fixed pattern). On the contrary when taxpayers have *VD*, they are required to finance the same items (Social Security, Education and Defense) but they are allow to decide the size of each financing: limits were not imposed to the items as long as the total amount was exactly equal to the total tax requirement (100%). This means that, for example, Taxpayer A can decide to finance only Education (100% of tax requirement) and set the financing for Social Security and National Defense to 0%. Taxpayer B can equally finance the three sectors by setting 33.3% to Social Security, 33.3% to Education and 33.4% to National Defense. In the rounds where participants had *VD*, the stage of taxes' payment followed the stage of taxes' allocation.

As a third factor, the *Context Effect* — Tax (T) versus Public Expenditures (PE) — was manipulated within participants. In two information on the distribution of the due tax burden was related to proportions of different forms of taxes, while in the other two periods the information about the distribution of the tax load was connected to

diverse sectors of public expenditures.

Furthermore, to control for *Order Effects*, the information information about the justification of tax requirements presented between groups either in decreasing (DEC) or in increasing (INC) order throughout the four taxpaying periods of the experiment.

As can be inferred from Table 3.1, the two group factors (*Voice on tax Contributions* and *Order Effect*) were combined to form four different groups. The within-participants factor *Context Effect* was counterbalanced in all four groups: for these reasons, the experiment consisted in 8 different sessions.

In order to increase external validity, the items of both PE and T were referring to the current situation in Austria[5]. The values reported in Table 3.2, represent the proportion of total tax duty addressed for the related item. Participants were aware of the percentages and were provided with a brief description of each item (for both contexts)[6].

With regard to within-participants factor VD, the standard distribution pattern was always presented first (in rounds 1 and 3), and the possibility to change this distribution was only allowed in the following periods (rounds 2 and 4). Starting with the possibility to choose the distribution pattern of the tax load and then present the standard distribution pattern would implicate the problem that the discrepancy between the chosen and the fixed pattern would differ between participants. Thus, changes in compliance behaviour might be either due to the fact that the possibility to

[5]For what concerns the Public Expenditure context, the items of the list and their shares were collected from the official website of the Austrian government. For the Tax context, official data on average shares of taxes on total tax burden was not available. For this reason, we used an approximation of real values. Although at the moment of the experiment (June 2013), inheritance tax was not included in the Austrian tax system, given the ongoing debate on the reintroduction of this tax, we decide to introduce it.

[6]This point can be also considered a discrepancy between methods applied by economists and psychologists, since the collected taxes were not addressed to the different purposes but they were kept by the experimenter. Regardless the decision of using percentages close to the Austrian reality, participants were aware that we were referring to a hypothetical tax system. For this reason, during the entire experiments, participants were aware that collected taxes were not used to finance the Austrian government or any other tax system but they were kept by the experimenter who represented, in the hypothetical tax system, the tax authority.

Table 3.1: Experimental Design - Chapter 3

Session	N	Round 1	→	Round 2	→	Round 3	→	Round 4
1	20	VC: NO VI: NO Domain: PE Order: DEC		VC: NO VI: YES Domain: PE Order: DEC		VC: NO VI: NO Domain: T Order: DEC		VC: NO VI: YES Domain: T Order: DEC
2	10	VC: NO VI: NO Domain: PE Order: INC		VC: NO VI: YES Domain: PE Order: INC		VC: NO VI: NO Domain: T Order: INC		VC: NO VI: YES Domain: T Order: INC
3	16	VC: NO VI: NO Domain: T Order: DEC		VC: NO VI: YES Domain: T Order: DEC		VC: NO VI: NO Domain: PE Order: DEC		VC: NO VI: YES Domain: PE Order: DEC
4	16	VC: NO VI: NO Domain: T Order: INC		VC: NO VI: YES Domain: T Order: INC		VC: NO VI: NO Domain: PE Order: INC		VC: NO VI: YES Domain: PE Order: INC
5	14	VC: YES VI: NO Domain: PE Order: DEC		VC: YES VI: YES Domain: PE Order: DEC		VC: YES VI: NO Domain: T Order: DEC		VC: YES VI: YES Domain: T Order: DEC
6	15	VC: YES VI: NO Domain: PE Order: INC		VC: YES VI: YES Domain: PE Order: INC		VC: YES VI: NO Domain: T Order: INC		VC: YES VI: YES Domain: T Order: INC
7	16	VC: YES VI: NO Domain: T Order: DEC		VC: YES VI: YES Domain: T Order: DEC		VC: YES VI: NO Domain: PE Order: DEC		VC: YES VI: YES Domain: PE Order: DEC
8	16	VC: NO VI: NO Domain: T Order: INC		VC: NO VI: YES Domain: T Order: INC		VC: NO VI: NO Domain: PE Order: INC		VC: NO VI: YES Domain: PE Order: INC

decide on the distribution is refused or by discrepancy effects between the chosen and the fixed distribution pattern. Hence, the fixed distribution was always presented in advance, and the possibility to change was given in the subsequent round.

Table 3.2: Ordering

Public expenditure domain	
Decreasing	*Increasing*
Local community (23%)	Defense (2%)
Social Security and Health (18%)	Agriculture (2%)
Pension (15%)	State Security and Law (3%)
Education and Science (13%)	Fees for the European union (3%)
Interest of government debt (6%)	Public administration (4%)
Traffic and Transports (6%)	Economy and housing (5%)
Economy and housing (5%)	Traffic and Transports (6%)
Public administration (4%)	Interest of government debt (6%)
Fees for the European union (3%)	Education and Science (13%)
State Security and Law (3%)	Pension (15%)
Agriculture (2%)	Social Security and Health (18%)
Defense (2%)	Local community (23%)
Tax domain	
Decreasing	*Increasing*
Dividend tax (25%)	Mineral oil tax (1%)
Corporate tax (25%)	Car tax (1%)
Income tax (25%)	Capital tax (1%)
VAT/Sales tax (10%)	Inheritance tax (1%)
Inheritance tax(5%)	Local tax (3%)
Local tax (3%)	Land acquisition tax (3%)
Land acquisition tax (3%)	Inheritance tax(5%)
Inheritance tax (1%)	VAT/Sales tax (10%)
Capital tax (1%)	Income tax (25%)
Car tax (1%)	Corporate tax (25%)
Mineral oil tax (1%)	Dividend tax (25%)

At the end of the experiment participants were presented a questionnaire including one general item to measure levels of risk aversion (e.g., "Generally speaking, would you characterize yourself as someone who is willing to take risks, or as someone who is avoiding risks?") and a scale consisting of 7 items to assess risk aversion in different

domains (e.g., driving, financial decisions, tax evasion) in the different treatments on a Likert-type scale from 1 (absolute risk aversion) to 9 (absolute risk seeking), as well as demographic characteristics of participants. All items from the questionnaire are listed in the appendix. Experimental sessions lasted between 30 and 45 minutes.

3.3 Results

Table 3.3 shows the mean compliance rate[7] for all levels of the four treatment variables VC, VD, CE and OE.

Table 3.3: Mean compliance rate (N=123)

Factor	*Mean Compliance Rates*			
Voice on Contribution (VC)	No	46.76%	Yes	55.57%
Voice on Distribution (VD)	No	47.63%	Yes	54.63%
Context Effect (CE)	T	47.54%	PE	54.72%
Order Effect (OE)	DEC	51.02%	INC	51.26%

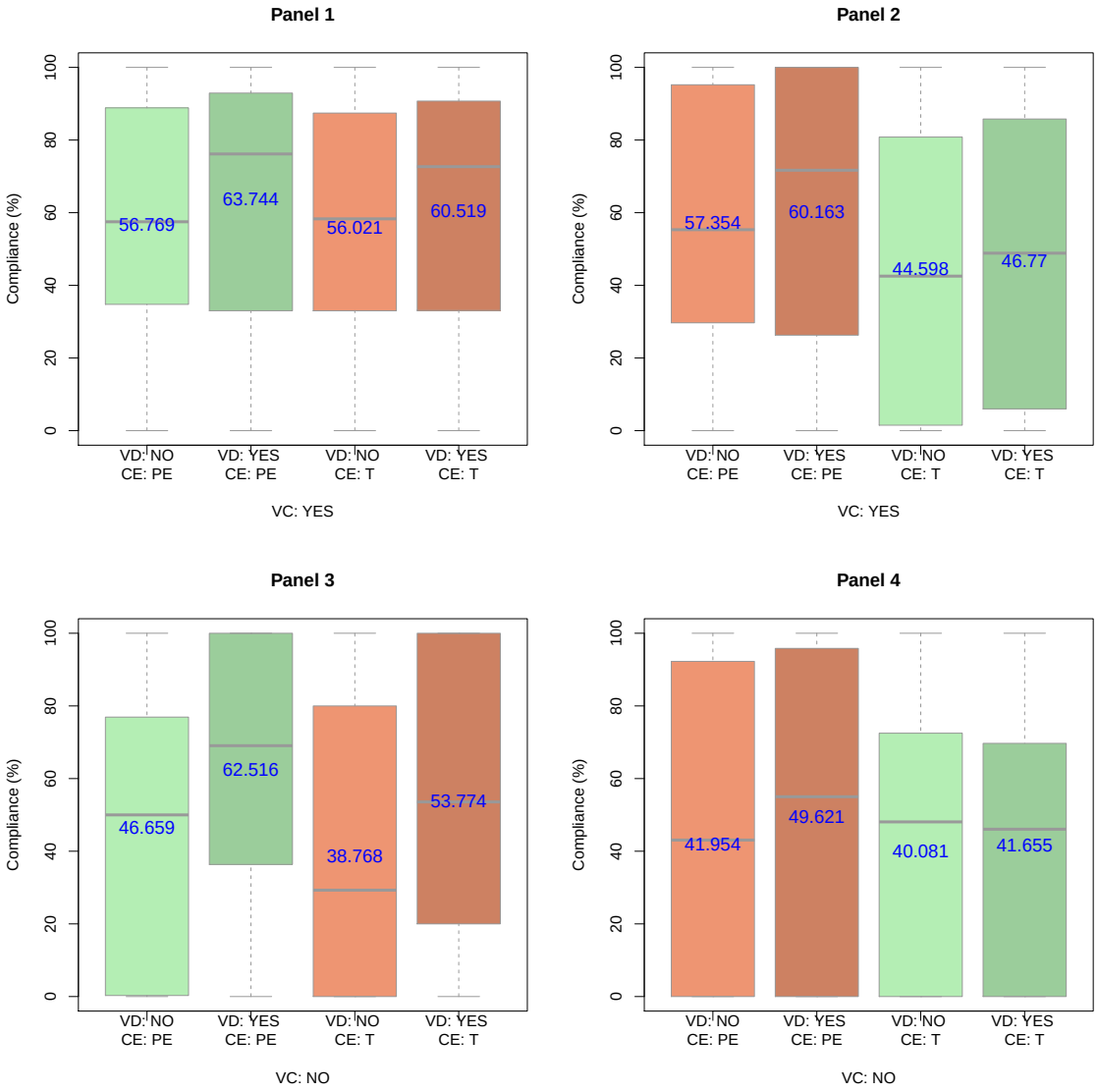
Figure 3.1 provides a summary description of the distribution of compliance rate for distinct experimental conditions (VC[8]) and for each within-participants factor (VD and CE). The boxplots in Figure provide a conventional graphical representation of distribution quartiles of individuals' compliance. Furthermore, average values for each within-participants factor are reported within the figure. In addition, the figure highlights which experimental conditions were played first: green bars refers to the conditions played in the first two rounds, red bars to those played in the second two. Panel 1 and Panel 2 refer to the manipulation with *Voice on tax Contribution*, whereas Panel 3 and Panel 4 to the conditions without VC. In each Panel, the first two bars summarize the compliance rate within the Public Expenditure context, while the second two bars to the Tax context. As a consequence of the fixed structure of the

[7]Compliance rate is defined as $\frac{paid\ Tax}{required\ Tax}$; a value of 1 (or 100%) means that the participant was a full contributor; smaller values identify evasion.

[8]As will be discussed later on, OE has been omitted since its unsignificant impact.

experiment (the decisions with a standard distribution pattern were always followed by decisions with a personal distribution), the first and the third columns of each Panel refer to the manipulation without *Voice on Distribution of tax load*, while the second and the fourth columns contains data on tax compliance with VD.

Figure 3.1: Compliance rates



From a pure descriptive analysis, ceteris paribus, compliance is generally higher under the condition of VC (comparison Panel 1 with Panel 3 and Panel 2 with Panel 4). Comparisons within conditions with and without VC (Panel 1 with Panel 2 and Panel 3 with Panel 4, respectively) suggest that when the context of Public Expenditure

(PE) is approached first that the context of Taxes (T), compliance tends to be higher. When the budget spending refers to PE, compliance rises if compared to situations in which budget spending refers to T.

To better understand the role and to test the impact of our four treatment factors, and due to the special nature of the experimental design, a mixed models analysis of variance with the dependent variable compliance was performed.

The results reveal a significant effect of voice on contribution ($F(1, 476) = 7.68$, $p < 0.01$), voice on distribution ($F(1, 476) = 3.78$, $p = 0.05$), and decision-context ($F(1, 476) = 3.97$, $p < 0.05$), but no significant effect of order of presentation ($F(1, 476) = 13.53$, $p = 0.86$). Table 3.4 contains the details of the analysis.

Table 3.4: Mixed Model Analysis of Variance

	Model 1	Model 2	Model 3
	Pooled (N=123)	Female (N=83)	Male (N=40)
Compliance Rate	F-test (p-value)	F-test (p-value)	F-test (p-value)
Voice on Contribution (VC)	7.68 (0.01)	0.68 (0.41)	6.63 (0.01)
Voice on Distribution (VD)	3.78 (0.05)	3.93 (0.05)	0.27 (0.60)
Context Effects(CE)	3.97 (0.05)	5.82 (0.02)	0.06 (0.81)
Order Effects (OE)	0.03 (0.86)	0.55 (0.46)	0.18 (0.68)
VC x VD	0.59 (0.44)	0.33 (0.57)	0.30 (0.59)
VC x CE	0.08 (0.78)	0.03 (0.88)	0.00 (1.00)
VC x OE	8.05 (0.01)	17.87 (0.00)	0.10 (0.77)
VD x CE	0.17 (0.70)	0.02 (0.88)	0.13 (0.72)
VD x OE	0.21 (0.65)	0.00 (1.00)	0.58 (0.45)
CE x OE	1.03 (0.31)	1.52 (0.22)	0.10 (0.77)
VC x VD x CE	0.03 (0.86)	0.11 (0.74)	0.36 (0.55)
VC x VD x OE	0.18 (0.67)	0.01 (0.93)	0.28 (0.60)
VC x CE x OE	0.02 (0.88)	0.30 (0.58)	0.13 (0.72)
VD x CE x OE	0.00 (1.00)	0.01 (0.93)	0.10 (0.77)
VC x VD x CE x OE	0.09 (0.77)	0.67 (0.41)	0.28 (0.60)

Thus, participants show higher compliance when they have the possibility to decide on paying taxes separately, for instance regarding different public expenditure domains, compared to paying one aggregate tax and just being informed about the use of the tax money. In addition, allowing to change the pattern of distribution of the tax load breeds more tax honesty as well. Moreover, providing a context presenting different forms of taxes as the purpose of tax levying yields lower compliance than revealing the sectors of public expenditures the money will be invested in.

Furthermore, a significant interaction voice on contribution x order was identified ($F(1, 476) = 8.05$, $p < 0.01$). In conditions of decreasing order of presentation there was no difference in compliance between having voice on contribution and not having voice on contribution (mean compliance voice on contribution/decreasing order = 50.89%; mean compliance no voice on contribution/decreasing order = 51.12%). However, in conditions of increasing order of presentation having voice on contribution resulted in a higher level of compliance compared to no voice on contribution (mean compliance voice on contribution/increasing order = 60.10%; mean compliance no voice on contribution/increasing order = 40.72%). No other significant interactions could be observed.

In addition, a strong effect of the covariate gender was revealed, with women being clearly more honest than men (mean compliance females: 57.16%; mean compliance males: 38.62%). Since the distribution of females and males was nearly the same in all 8 treatment groups, i.e., 2/3 females and 1/3 males, and we controlled statistically for the influence of gender, the basic results are not be affected by the identified gender difference in compliance.

Nevertheless, separate analyses of females and males revealed an interesting pattern of results (see Table 3.4, Models 2 and 3): in the female sub-sample (N = 83), the more context related factors VD ($F(1, 316) = 3.93$, $p < 0.05$), CE ($F(1, 316) = 5.82$, $p < 0.05$), and the interaction$VCxOE$ ($F(1, 316) = 17.87$, $p < 0.001$) were identified as significant, but there was no significant main effect of voice on contribution observable ($F(1, 316) = 0.68$, $p = 0.41$). Due to the small sample size the analysis of the male sub-sample was less meaningful, but interestingly the only factor confirmed as significant was voice on contribution ($F(1, 144) = 6.63$, $p < 0.05$). Referring to

voice on distribution, the observed differences in the male sample are similar to the female subsample (mean compliance voice on distribution = 41.26%; mean compliance no voice on distribution = 35.97%), while the difference between decision-contexts was rather negligible (mean compliance tax context = 37.84%; mean compliance public expenditures = 39.40%). All means of compliance for females and males separately are summed up in Table 3.5. Altogether, some systematic gender differences with regard to the experimental manipulations could be identified. Analysis of the risk-aversion

Table 3.5: Mean compliance rates by gender

	Females (N=83)		*Males (N=40)*	
Voice on Contribution (VC)	No	55.65% (31.68%)	Yes	58.50% (48.00%)
Voice on Distribution (VD)	No	53.25% (35.97%)	Yes	61.07% (41.26%)
Context Effect (CE)	Tax	52.22% (37.84%)	Public Exp.	62.10% (39.40%)
Order Effect (OE)	Decreasing	58.01% (38.77%)	Increasing	56.29% (38.39%)

measures did not reveal any differences with regard to the between factors voice on compliance (single item: $F(1, 118) = 0.47$, $p = 0.49$; risk-scale $F(1, 118) = 0.34$, $p = 0.56$), order of presentation (single item: $F(1, 118) = 1.79$, $p = 0.18$; risk-scale $F(1, 118) = 2.57$, $p = 0.11$), and their interaction (single item: $F(1, 118) = 0.02$, $p = 0.88$; risk-scale $F(1, 118) = 0.76$, $p = 0.38$), as well as gender (single item: $F(1, 118) = 0.53$, $p = 0.47$; risk-scale $F(1, 118) = 0.29$, $p = 0.59$). Thus, different risk attitudes cannot account for the systematic differences in compliance identified in the experiment.

3.4 Discussion and Conclusion

Experimental research on tax compliance usually considers only one tax, generally income tax, and avoids situations in which, like in reality, the total tax burden is composed by several taxes and different payments. In our experimental design, we overcome this limitation by presenting the participant's total tax duty as a collection of different tax collections. In some treatments, participants had the opportunity to

comply by paying, item by item, their total tax due: in other words, they had *Voice on tax Contribution* (VC). In other manipulations, they were asked to comply, as usual in laboratory experiments, by paying an all-embracing tax: in this case, participants had not VC. Results show that tax compliance is significantly higher when participants had *Voice on tax Contribution* (VC). As in other similar studies (for example, Djawadi and Fahr, 2013), we found that compliance is also sustained by increasing procedural justice. When participants have the opportunity of a direct participation into the rules of the tax system (they have *Voice on tax Distribution*, VD), tax evasion is significantly lower.

Another confirmation of previous result is participants' tax aversion (Sussman and Olivola, 2011): ceteris paribus, when tax due was linked to the concept of taxes, compliance was smaller than the situation in which the information was about public expenditure.

The way in which information was provided to participants (increasing/decreasing order) had only in one case an effective impact: with respect to an increasing order of information, a significant difference in compliance is detected when comparing groups with *Voice on tax Contribution* and groups without. Having *Voice on tax Contribution* triggered people to be more compliant probably due to the fact that payments started with the ones with the lowest amounts: the initial relatively low requests maybe were not perceived as unfair and onerous by the participants who triggered compliant behaviour. Once this virtuous pattern was initialized, participants may have continued to comply also with requests of higher amounts. On the contrary, in case of decreasing order, requests started with important shares of participants' income: perception of rather exaggerated requests probably triggered cheating behaviour for the first beginning, and that trend might have never been halted.

Different impacts of treatment factors are found according to the participants' gender: in addition to the classical finding of higher compliance rates in females than in males (see for example Alm et al., 2009; Torgler and Valev, 2010), we found that females were more reactive to our manipulations. A specific study on difference in gender with this setting, could be an interesting starting point for further research.

As already pointed out, this paper was an attempt to develop an experiment that

overcomes some limitations of experiments in tax compliance, in which only one tax is generally required to be paid. A more detailed development, including different audits probabilities for different payments, regarding *Voice on tax Contribution* could help experimental research to shrink the distance between reality and the experimental environment and increase external validity.

3.5 Appendix

These are translated versions (originally in German) of the instructions used in the experiment presented in Chapter 3. The instructions changed accordingly to the treatment, differences are indicated in the text.

`Instructions`

Thank you for taking part in this experiment. A certain amount of money will be paid as a result of decisions made in the experiment: during the experiment, ECU (Experimental Currency Units) will be used; at the end of the session, your earning in ECU will be converted in Euro for your real payoff: 200 ECU will be changed to 1 Euro. Apart from that there is a showup fee of 5 Euro. If you would earn 1000ECU you would get 10 Euro in the end (5 Euro showup fee, and 5 Euro for the 1000ECU).

During the experiment, please i) switch off your mobile devices, ii) do not speak to your neighbours and iii) do not leave your seat. If you have any questions just raise your hand and one of our experimenters will answer your questions.

The experiment is made of two parts.

PART ONE

The first part lasts 10 minutes.

First you have 6 minutes time to read a text, if you decide to read carefully the provided text, you will increase your chance to earn a bigger amount of money: expired the 6 minutes, you have 4 minutes to answer 10 multiple choice questions about the text (2 minutes for the first 5 questions, and 2 minutes for the second 5 questions). Every right answer adds 100 ECU to your basic income of 500 ECU; the following table resumes the possible scenarios after the initial questionnaire.

Correct Answers	Your Initial Endowment
0	500
1	600
2	700
3	800
4	900
5	1000
6	1100
7	1200
8	1300
9	1400
10	1500

The initial endowment you earn, will be the starting point for all the 4 rounds of the second part.

PART TWO

You are going to finish each round of the second part with a certain amount of ECU. Final earnings in one round do not affect earnings in the other round. However, only one round is going to be randomly selected for the actual payment. You are going to know which round has been selected only at the end of the experiment.

In every round, you will be asked to pay a tax equal to 50% of the income earned in PART ONE. You can freely pay as much as you want: paid taxes will be than deducted from your initial endowment. With a probability of 10%, your payment will be audited: if evasion (e.g., you have paid less taxes than requested)is detected, a fine will be deducted by you initial endowment. The amount of fine is equal to 1,5*evaded taxes. (this means that you have to pay back the evaded amount plus an additional amount equal to the 50% of evaded taxes).

The final earning of the round is therefore equal to:

- in case of NO audit: **Final Earning = Initial Endowment - Paid Taxes**

- in case of audit: **Final Earning = Initial Endowment - Paid Taxes - Fine**

NO VOICE ON TAX CONTRIBUTION
(if Tax Context was played first, instructions changed accordingly)

In the first 2 rounds, you have to pay the tax, for financing several item of public expenditures. In the second 2 rounds, you have to pay the tax, as a collection of the several taxes that, in reality, taxpayers are required to pay. You can find details on each items of expenditure and each taxes in the provided sheet.

Although audits are conducted at the end of each round, you are going to know if a round has been audited only at the end of the experiment. At the end of the rounds, another questionnaire will start. Finished the questionnaire the amount in ECU of the selected round will be exchanged in Euro and privately paid to you.

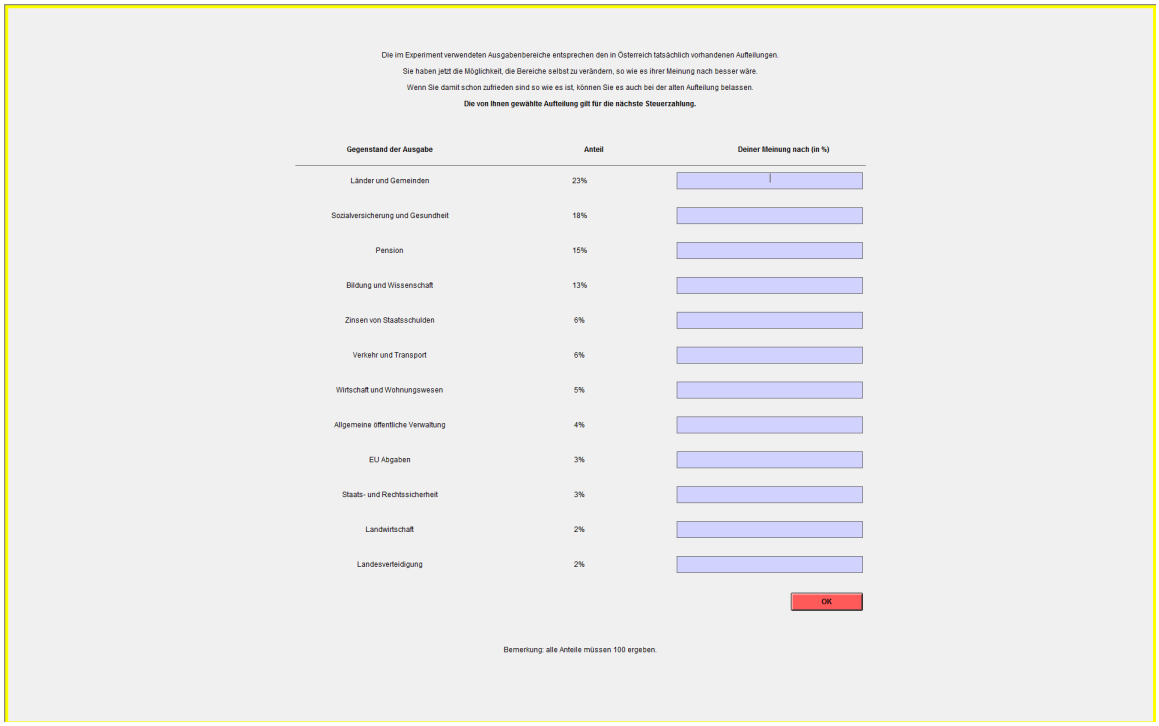
VOICE ON TAX CONTRIBUTION
(if Tax Context was played first, instructions changed accordingly)

In the first 2 rounds, you have to pay a sequence of payments which are required, for financing several item of public expenditures. In the second 2 rounds, you have to pay a sequence of taxes, which are, in reality, the taxes that taxpayers are required to pay. You can find details on each items of expenditure and each taxes in the provided sheet. The total tax burden of the sequence of payments is equal to the required amount of taxes (50% of the income earned in PART ONE).

Although payments are separate, audits are conducted at individual level: this means that if the round is selected for the audit, each declaration will be checked. At the end of each round, you are going to know if a round has been audited only at the end of the experiment. At the end of the rounds, another questionnaire will start. Finished the questionnaire the amount in ECU of the selected round will be exchanged in Euro and privately paid to you.

NOTE: Details on the manipulation VOICE ON TAX DISTRIBUTION were provided directly in the software.

The following screenshot is an example of the experimental software.



Chapter 4

Punishment and accountability in asset management

with Matteo Ploner and Alec N. Sproten

4.1 Introduction

The recent financial crisis has fostered a widespread debate about the role of financial institutions in the diffusion of highly risky assets among investors. Mass media often indulge in a stereotypical representation of financial intermediaries as ruthless individuals, eager to take advantage of their client's good faith to pursue their greedy goals.[1] While such a representation is questionable and potentially detrimental, it seems not disputable that financial intermediation often embeds a strong conflict of interest between investors and those managing their resources. Among others, Rajan (2006) points out how current incentives in financial intermediation may lead to distortions in terms of risk borne by investors and managers.

Financial intermediation well fits into what, in the economic literature, is known as an *agency dilemma* or a *"principal-agent" problem*: an agent works on behalf of a principal, with work being beneficial to the principal and detrimental to the agent. Rewards serve as means to align conflicting interests of the two parties. However,

[1]The pervasiveness of such a representation is testified by the wide success of popular culture products like films (e.g., Scorsese, 2013) and non-fiction books (e.g., Lewis, 2014).

agents may behave opportunistically and shirk when actions of the agent are not fully observable by the principal and/or effective sanctions are not available.

We focus in this article on a very specific, yet common, kind of agency dilemma: asset management. Assets are managed by investment managers and brokers (agents) who often have different goals than the asset holders and investors (principals), especially in the retail sector. To elaborate, investment managers may have an incentive to invest their client's money in very risky assets — even if these do not match the investor's risk propensity — because their remuneration is based on a management fee which is proportional to traded wealth, and on a performance fee which is, generally, left-truncated. In other words, managers increase their profits by investing more of their clients' money but do not bear the downside risk of the investments undertaken.

Identifying and mitigating the potential conflicts of interest between investors and investment managers is one of the main goals of financial regulators. A prominent example is given by the directive 2004/39/EC (OJ L 145 21.04.2004) issued by the European Parliament in April 2004, best known as Markets in Financial Instruments Directive (MiFID). The directive introduces guidelines for the regulation of the financial services industry in the European Economic Area, and promotes a *"best execution"* code of conduct: when managing other people's money, managers are always required to take decisions in the investor's best interests.[2] MiFID's best execution regime calls for the implementation of transparency and disclosure practices aimed at building an investment portfolio meeting the characteristics and needs of each specific investor, with specific attention to risk bearing capacity.

We present here an experimental study of a decision setting involving two individuals that captures the basic conflict of interest typically inhering in asset management. An individual (agent) has to choose how much of the resources of another individual (principal) to invest in a risky prospect. The principal advises the agent about her desired investment level, but the agent is free to define the actual investment. The reward induces a selfish payoff-maximizing agent to invest all principal's resources in the risky asset, irrespective of the principal's advice. Typically, this will result in an excessive exposure to risks for the principals.

[2]OJ L 145 21.04.2004, p. 4.

A field of research related to our study is that on *delegated risky decisions*. In such a setting, one party has to choose about a risky investment, knowing that the outcomes of the investment will affect another party. In these studies, payoffs of the two involved parties are usually not interdependent, there is thus no conflict of interests. In this setting, both Brennan et al. (2008) and Chakravarty et al. (2011) find that more risk is taken when investment decisions involve other's money than when they involve own money. In contrast, Eriksen and Kvaløy (2010) find that people take less risk when they are responsible for the earnings of others. The work of Agranov et al. (2014) shows that there is a discrepancy in risk propensity between choices for oneself and for others, both when a conflict of interests is present and when the incentives of the principal and the agent are aligned. The authors label this tendency "*other people's money effect*".

Similar to Agranov et al. (2014), we implement an experiment with an explicit conflict of interests between the principal and the agent. However, we focus on policy interventions aimed at re-aligning conflicting interests and at protecting principal's interests. In a recent experimental work, Pollmann et al. (2014) study the impact of alternative reward schemes on delegated risky decisions. When the agent can reward the principal for the outcome of a risky choice (ex-post accountability), choices for oneself and others do not substantially differ. However, when rewards are given before knowing the actual result of the investment (ex-ante accountability), principals tend to be extremely cautious in terms of risk taken for the other.

We study the role of accountability, but take a different perspective than Pollmann et al. (2014). First, our principals explicitly communicate to their agent their desired level of risk for a specific investment. Second, albeit principals are always informed of the consequences of the investment, we experimentally manipulate principal's knowledge about choices made by the agent. When principals are not aware of choices made by the agent they cannot fully assess whether a negative outcome is due to chance or to an overly risky decision of the agent. Third, we experimentally manipulate the monetary consequences of sanctions imposed by the principal on the agent. Punishment inflicted after knowing the outcome of the investment can either be expensive for the principal and for the agent or it can be purely symbolic, with no monetary

consequences for both parties.

Our experiment shows that agents are largely pursuing their own interest, imposing more risk on their principal than what requested. However, when agents' actions are fully disclosed and principals may inflict pecuniary sanctions to agents, these tend to comply with principals' requests. From this we conclude that, in an agency dilemma capturing basic features of financial intermediation, the combination of accountability and monetary punishment is an effective measure to protect principal's interests.

The remaining of the paper is organized as follows: Section 4.2 contains the experimental procedure, results are discussed in Section 4.3 and Section 4.4 concludes.

4.2 Method

4.2.1 Experimental Design

We investigate behavior in risky choices in a two-player game: one player is the decision maker (henceforth, the agent) and has to decide how much invest in four different prospects on behalf of the second player (henceforth, the principal).

The prospects (Prospect A, Prospect B, Prospect C, and Prospect D) are modified versions of the lottery used in Gneezy and Potters (1997): with probability $P(L)$ the amount invested is lost and with probability $1 - P(L)$ the investment earns two and a half times the invested amount. As shown by Table 4.1, the prospects differ in the probability of facing an unsuccessful investment ($P(L)$), with Prospect A having the highest probability of facing a loss and Prospect D having the lowest value; this directly affects the expected returns (ER) of investments: although all prospects can potentially deliver the maximum profit, the expected return radically differs across them, as shown by column ER in Table 4.1.

The initial endowments are 300 ECU for the principal and 100 ECU for the agent. As mentioned above, the agent invests on behalf of the principal: as a matter of fact, the agent sets $X \in \{0, 1, \ldots 200\}$, which represents the amount of her principal's endowment invested in a prospect.

Table 4.1: The 4 Prospects

	$P(L)$	$1 - P(L)$	ER
Prospect A	6/8	2/8	-37.5%
Prospect B	5/8	3/8	-6.2%
Prospect C	3/8	5/8	56.2%
Prospect D	2/8	6/8	87.5%

The size of X directly affects the principal's payoff (Π_P), which is equal to:

$$\Pi_P = \begin{cases} 300 - X & \text{with probability } P(L) \\ 300 - X + 2.5X & \text{with probability } 1 - P(L). \end{cases}$$

Thus, risk borne by the principal monotonically increases in the size of X. Differently, the agent's payoff is not affected by the result of the investment, but it depends only on the amount invested (X). To elaborate, the agent's payoff (Π_A) is equal to:

$$\Pi_A = 100 + 0.5 \cdot X.$$

The decision process consists of two stages: first, the principal advises the agent about the desired investment level in each prospect (X_D); second, the agent is informed about the principal's four desired investment levels and determines X for each of the four prospects, irrespective of X_D.

Given the implemented procedure, each principal states a desired investment level $X_D \in \{0, 1, \ldots 200\}$ for each of the four prospects, and the agent chooses an actual investment level $X \in \{0, 1, \ldots 200\}$ for each of the prospects. After the decisions are made, only one prospect is randomly selected to compute Π_P and Π_A, with all prospects having the same likelihood of being selected.

Two main dimensions are experimentally manipulated in a between-subjects fashion: *Accountability* and *Punishment*. In *Accountability*, we alter the way in which feedbacks are given to the principal: in condition *Unaware*, the principal is only informed about the result of the investment (i.e., how much it has been invested and if

the investment was successful or unsuccessful) but no information is given about which prospect was selected. In condition *Aware*, the principal receives the same piece of information as in *Unaware*, but in addition is also informed about the selected prospect.

In *Punishment*, we manipulate the monetary consequences of sanctions inflicted by the principal to the agent. The general structure of this manipulation follows the procedure adopted by Masclet et al. (2003). In condition *Non-monetary*, the principal can express her approval or disapproval about her agent's decision by distributing disappointment points (τ_N): 0 points if she does not disapprove the decision, 10 points if she highly disapproves the decision. Disappointment points are communicated to the agent, but they do not modify players' payoffs. In condition *Monetary*, the principal can sanction the agent for her decision by distributing punishment points (τ_M, from 0 to 10 points), with each received point reducing agent's payoff of 10%. However, punishment is costly also for the principal, as illustrated in Table 4.2.

Table 4.2: Nonmonetary and Monetary Punishment

Non monetary Punishment											
Disappointment Points (τ_N)	0	1	2	3	4	5	6	7	8	9	10
Disappointment Costs for Principal	0	0	0	0	0	0	0	0	0	0	0
Monetary Punishment											
Punishment Points (τ_M)	0	1	2	3	4	5	6	7	8	9	10
Punishment Costs for Principal (κ)	0	12	16	20	24	28	36	44	56	76	100

By combining the two dimensions *Accountability* and *Punishment*, we obtain four experimental treatments.

- In Treatment UN, the principal remains unaware of the selected prospect and chooses τ_N which does not affect Π_P and Π_A.
- In Treatment UM, the principal remains unaware of the selected prospect and chooses τ_M which affects Π_P and Π_A. Final payoffs are $\Pi_P - \kappa$ for the principal $\Pi_A(\frac{10-\tau_M}{10})$ for the agent.

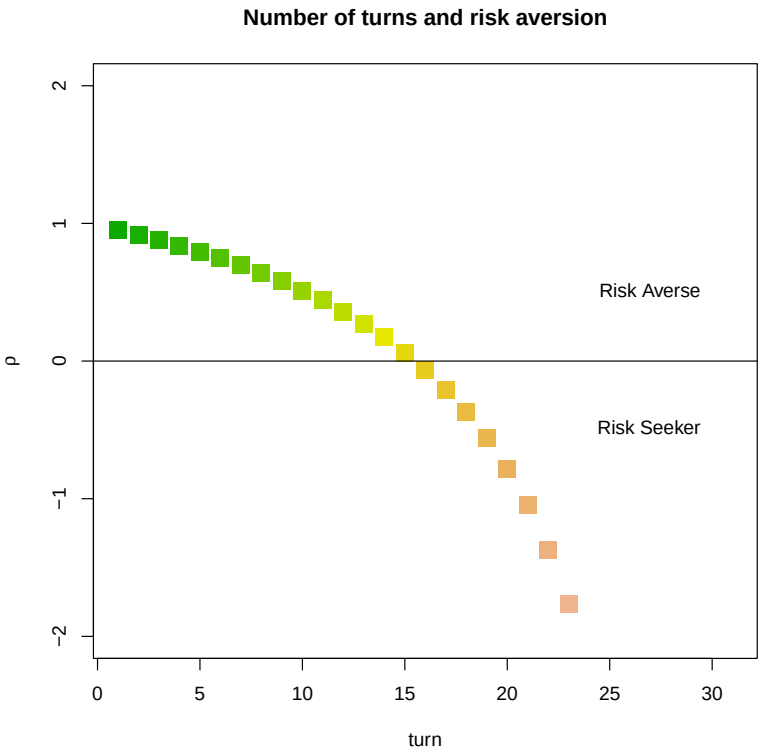
- In Treatment AN, the principal is informed about the selected prospect and chooses τ_N which does not affect Π_P and Π_A.

- In Treatment AM, the principal is informed about the selected prospect and chooses τ_M which affects Π_P and Π_A. Final payoffs are for principal: $\Pi_P - \kappa$, and for agent: $\Pi_A(\frac{10-\tau_M}{10})$.

At the end of the session, regardless the role played during the first part, we elicit the degree of risk aversion of each participant, with a modified version of the task proposed by Figner et al. (2009). In our task, a participant is presented with 32 cards on the computer screen, face down: 31 cards are gain cards and 1 is a loss card. The participant can turn over as many cards as she wants (from 0 to 32), knowing that for each gain card, she will earn 0.10 Euro. However, if she finds the loss card she loses everything. The participant selects the cards she wants to turn and then the selected cards are simultaneously turned face up. Then, earnings in the task are computed. The number of turned card provides us with a direct measure of participants' risk attitude: a risk neutral subject is expected to turn 16 cards, while risk averse (seeker) subjects should turn less (more) than 16 cards, as as displayed in Figure 4.1.

After payoff-relevant choices were collected, the Sensitivity for Punishment / Sensitivity for Reward questionnaire (SPSR, Torrubia et al., 2001) and a questionnaire to collect demographic data were administered to participants. Sensitivity for punishment is defined as the passive avoidance of aversive consequences or novelty and the worry produced by the threat of punishment or failure. Sensitivity for reward is defined as the reactivity to individual rewards. In more economic terms, the sensitivity for punishment measures how strongly a person anticipates to experience disutility when confronted with negative consequences of a decision. Sensitivity for reward, on the other hand, measures the utility that a person expects to experience from a beneficial action. The SPSR consists of 48 yes/no questions, of which 24 measure sensitivity for punishment and 24 measure sensitivity for reward. Answers are commonly coded as 1 for "yes" and 0 for "no" and summed up to reach a maximum value of 24 on each dimension: the higher the score, the higher the sensitivity to punishment/reward.

Figure 4.1: Stopping Card and Risk Propensity



4.2.2 Behavioral Predictions

The benchmark prediction against which we are going to evaluate behavior in the experiment is based on common knowledge of selfishness. An agent who aims at maximizing her own payoff is going to invest all principal's resources (i.e., $X = 200$), irrespective of the desired investment submitted by the principal, of the expected returns of the investment, and of the treatment condition. In a strictly selfish-rational framework, punishment is a non-credible threat as it delivers negative returns to the principal. Aware of this, the agent will not refrain from investing all principal's resources, irrespective of the advised level.

Assumptions of selfish rationality provide us with a testable hypothesis. However, relying on previous evidence we expect to observe substantial deviations from the course of actions described above. For what concerns alternative monetary consequences of punishment, previous works have shown that individuals may undertake costly actions

to sanction unfair behavior of the counterpart. A widely-known example in this direction is provided by rejections in the Ultimatum Game (Güth et al., 1982). Evidence of non-selfish punishment has been collected also in other types of strategic interactions. As an example, Masclet et al. (2003) and Fehr and Fischbacher (2004) show that in Prisoner's Dilemma-like interactions monetary punishment leads to higher cooperation and to more pro-social behavior than non-monetary sanctions. Several motivations for the adoption of non-selfish punishment have been identified in the literature. Among the most credited, it is possible to identify those based on distributional concerns, i.e., inequity aversion (e.g., Fehr and Schmidt, 1999; Bolton and Ockenfels, 2000) and on emotions, i.e., hanger (e.g., Sanfey et al., 2003; Grimm and Mengel, 2011). Thus, relying on previous evidence, we predict that principals dissatisfied with agent's decision may undertake monetary punishment, even though this is economically not justifiable. This should discourage agents from undertaking opportunistic investment decisions. As a consequence, we expect to observe smaller deviations of actual investments from desired investment in condition *Monetary* than in condition *Non-monetary*.

Distinct levels of awareness about choices of the agent should not affect agent's behavior as they do not affect monetary payoffs. However, when considering an extension of the utility function that takes into account beliefs about the counterpart (e.g., Battigalli and Dufwenberg, 2007), different predictions for condition *Aware* and *Unaware* can be obtained. Charness and Dufwenberg (2006) experimentally show that individuals are reluctant to let their counterparts down and adapt their actions to others' expectations to avoid feeling guilty. We speculate that, in our study, agents who deviate from principal's advice should feel more guilty in condition *Aware* than in condition *Unaware*. In the latter, agents can "hide" behind positive value prospects in which larger investments are more acceptable and, generally, more in line with principal's expectations. Further support to this conjecture is given by experimental works showing that individuals try to exploit uncertainty in strategic interactions to alter beliefs of the counterpart about the opportunistic content of their actions (e.g. Güth et al., 1996). Thus, we predict that actual investments are closer to desired investments in condition *Aware* than in condition *Unaware*.

4.2.3 Participants and Procedures

The experiment was run at LERN (Laboratory for Experimental Research Nuremberg) of the University of Erlangen-Nuremberg (Nuremberg, Germany); the participants were students of the same university. The recruitment was conducted via ORSEE system (Greiner, 2004) and the experiment was programmed and conducted using z-Tree software (Fischbacher, 2007). In total, 192 participants took part in the experiment, equally divided into the four treatments.

Upon their arrival, participants were asked to sit in cubicles and were provided with the instructions: a member of the staff read aloud the instructions and participants had the opportunity to privately ask clarifications on the design. The experimental session did not start until each participant correctly answered eight control questions on the rules of the experiment.

In order to avoid possible demand effects, we used neutral terms both in the software and in the instructions. Thus, instead of using a loaded terminology involving terms like fund manager, client, and investment, we employed terms like Player A, Player B, and prospect.

Participants were informed that the experiment was composed by two independent parts, but instructions for the risk elicitation task were distributed only at the end of the first part.

In addition to a show-up fee of 2.50 Euro, participants received both payoffs, for the first part and for the second part.[3] On average, sessions lasted 45 minutes and mean individual total earnings amounted to 9.20 Euro.

[3]The exchange rate for the first part was 40 ECU = 1 Euro. Earnings in the second part were directly in Euro.

4.3 Results

4.3.1 Investments

Descriptive Statistics

Figure 4.2 provides a convenient graphical representation of distribution quartiles of *desired* (X_D) and *actual* (X) investments for distinct experimental conditions and distinct prospects. Desired investment is defined as the ECU amount that a principal suggested to her agent for the investment in the prospect, while actual investment is the ECU amount that an agent invested in the prospect. The orange bars refer to the prospects with negative expected returns, while the green bars to those with positive expected returns; in addition, light colours are used to represent desired investments, while dark colours are used for actual investments. Average values are reported within the figure.

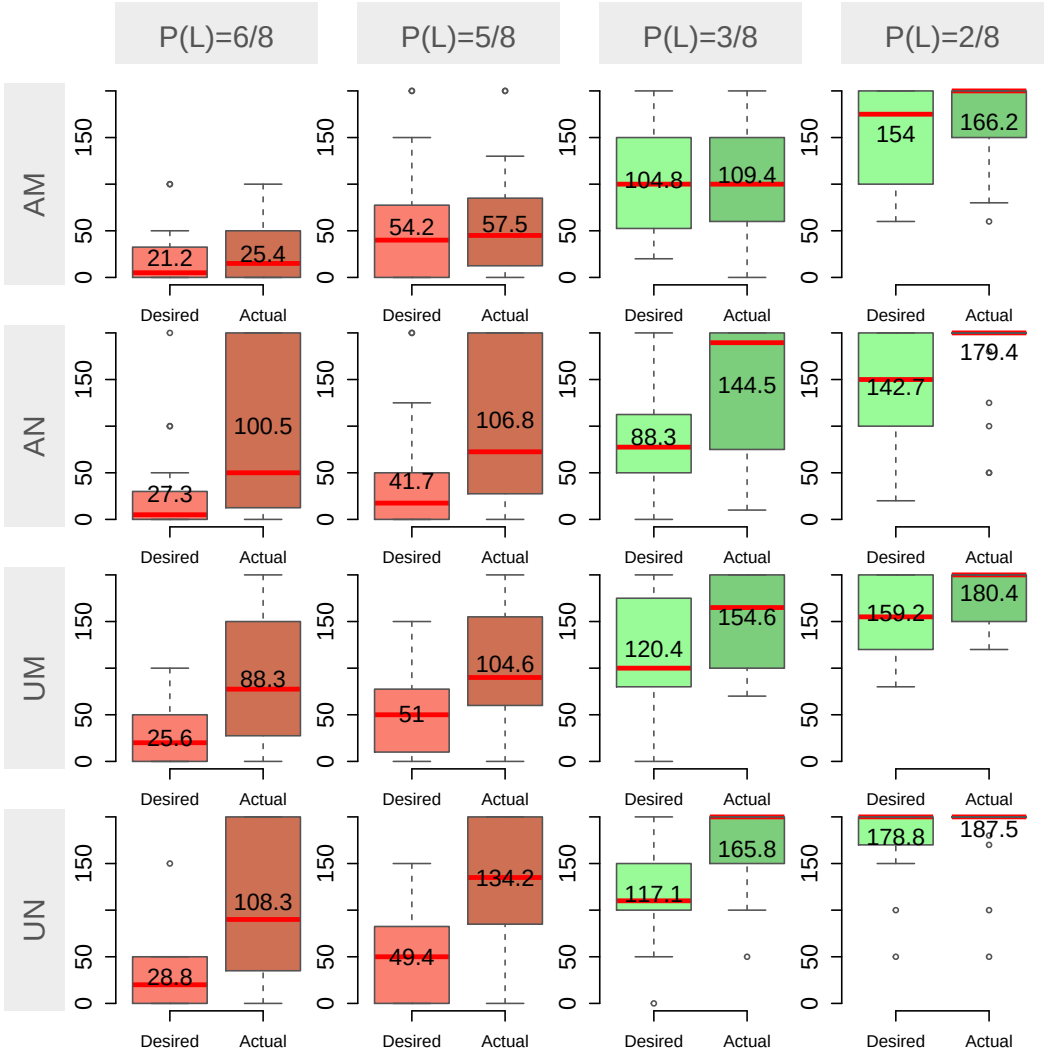
As shown by Figure 4.2, in each condition, principals wish to allocate higher shares of their wealth to prospects delivering higher expected returns: a monotonic pattern is observed across all conditions. The lowest average desired investment can be observed in AM for $P(L) = 6/8$ and the highest desired investment is found in UN for $P(L) = 2/8$.

A comparison of individual-level average desired investments across conditions shows that a statistically significant difference is observed only between UN and AN (Wilcoxon Rank Sum test, p-value=0.010; all other p-values ≥ 0.077).[4] The difference between these two conditions is driven by the higher desired investments in UN than in AN, for positive value prospects. Indeed, a series of non-parametric tests comparing each prospect across the two experimental conditions shows that a statistically significant difference is observed only for $P(L) = 3/8$ and $P(L) = 2/8$ (Wilcoxon Rank Sum test, p-value=0.027 and p-value=0.026, respectively; all other p-values ≥ 0.300).

For what concerns agents' behavior, similar to what happens for desired investments, a monotonic pattern of actual investments for increasing levels of expected

[4]When not specified, all tests are two-tailed and the significance level is set at the conventional 5%.

Figure 4.2: Desired and Actual Investments



returns is observed. However, average actual investment are larger than average desired investments. Notably, for $P(L) = 2/8$, the median investment is equal to the maximum investment possible in all conditions. The boxplots also highlight higher dispersion of values for actual investments compared to the values of desired investments, in particular for prospects with a negative expected value.

A comparison of individual-level average investments across prospects shows that investments in condition AM are statistically different (smaller) from investment in all other conditions (Wilcoxon Rank Sum test, all p-values ≤ 0.022), while no statistically

significant differences are observed for all other comparisons (Wilcoxon Rank Sum test, all p-values ≥ 0.172).

Figure 4.3 provides a representation of the discrepancies between *actual* investments (X) and *desired* investments (X_D), for each prospect and each experimental condition. The dashed horizontal line in each graph captures no discrepancy between actual and desired investments ($X = X_D$), while values above (below) the line testify of larger (smaller) investments made by the agent relative to what asked by the principal.

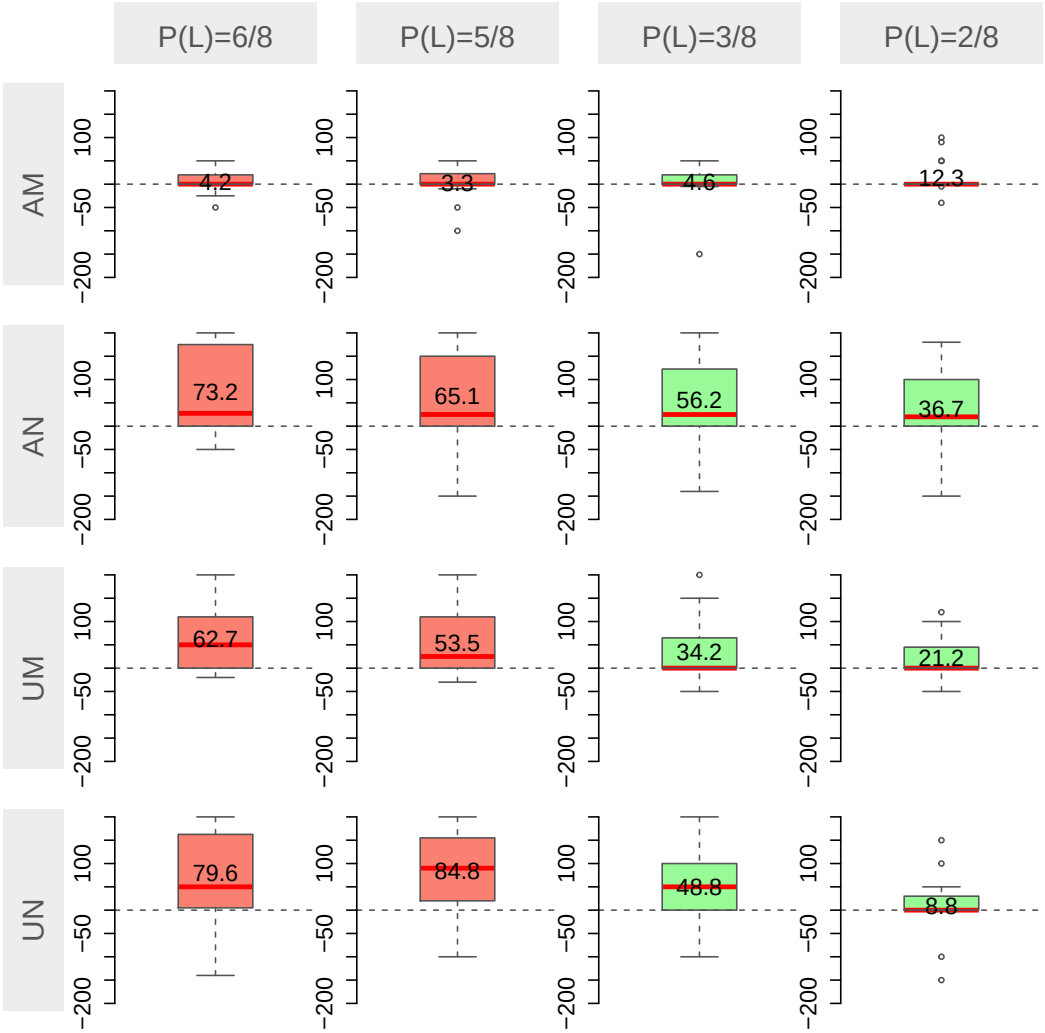
As in Figure 4.2, prospects with negative and positive expected return of investments are differentiated by colours and average values are reported within the figure.

Figure 4.3 provides evidence that the median difference (captured by the red bold horizontal line) between investments implemented by the agent and desired investment is positive in all but one experimental condition: in AM it is always equal to 0. Thus, agents tend to undertake higher risks than explicitly requested by their principals, when no monetary retaliation is possible and/or the agent cannot be made fully accountable for her actions. In terms of relative deviations from the desired investment, the lowest average deviation is observed in AM (14.3%), while the highest deviation is observed in AN (126.3%).

The difference between condition AM and other conditions gathered from Figure 4.3 is confirmed by a series of non-parametric tests showing that discrepancies are not significantly different from zero for all prospects in AM (Wilcoxon Rank Sum test, p-values ≥ 0.05). For other conditions, discrepancies are generally different from zero (Wilcoxon Rank Sum test, all p-values ≤ 0.036), with the exception of prospect D in UN (Wilcoxon Rank Sum test, p-value=0.306).

A series of non-parametric tests shows that, for negative value prospects, discrepancies in condition AM differ from those in all other conditions (Wilcoxon Rank Sum test, all p-values ≤ 0.020), while no significant differences are observed for all other comparisons (Wilcoxon Rank Sum test, all p-values ≥ 0.139). For positive value prospects, a significant difference between AM and AN and UN is observed for prospect $P(L) = 3/8$ (Wilcoxon Rank Sum test, p-value=0.007 in both comparisons), while no significant differences are observed for all other comparisons (Wilcoxon Rank Sum test, all p-values ≥ 0.221). Finally, for prospect $P(L) = 2/8$ a significant

Figure 4.3: Discrepancy between Actual and Desired Investments



difference is observed only when comparing AM and AN (Wilcoxon Rank Sum test, p-value = 0.039). When pooling data across prospects, AM is significantly different from the other conditions (Wilcoxon Rank Sum test, all p-values ≤ 0.025), while no significant difference is observed for other comparisons (Wilcoxon Rank Sum test, all p-values ≥ 0.363).

The analysis reported above shows that agents tend to over-invest relative to what asked by their principal, in all conditions but AM. The impact of accountability and monetary sanctions in the realignment of conflicting interests is confirmed also by

the comparison of discrepancies across experimental conditions. Section 4.3.1 further investigates the determinants of agents' choices and highlights the main results of our experiment.

Determinants of Actual Investments

Table 4.3 displays regression outcomes of a Tobit mixed model controlling for repeated choices at the individual level. The use of a Tobit model is justified by the consistent number of observations equal to extreme values (0 and 200 ECU), especially for the prospects with positive expected returns.

Three distinct estimations are presented: *Pooled* takes into account all prospects, *Prospects (-)* takes into account prospects with $ER < 0$ (i.e., P(L)=5/8 and P(L)=6/8), and *Prospects (+)* takes into account prospects with $ER > 0$ (i.e., P(L)=3/8 and P(L)=2/8). The lower panel of Table 4.3 displays the outcome of a series of linear hypotheses tests comparing the impact of the two treatment dummies and of choices in condition AM and in other experimental conditions.

The dependent variable in the model ($Actual.Inv$) is given by the investment implemented by the agent. This variable provides us with an indirect measure of the opportunistic stance taken by the agent at the expenses of the principal, in terms of risk borne.

The main explanatory variables are given by the two dummies capturing dimensions which are experimentally manipulated: concerning *Accountability*, variable *Aware* is equal to 1 when choices are collected in condition *Aware* and equal to 0 when collected in condition *Unaware*; concerning *Punishment*, variable $Monetary$ is equal to 1 when choices are collected in condition *Monetary* and equal to 0 when collected in condition *Non-monetary*. The interaction term *Aware*×*Monet.* captures the impact of the interaction between these two variables.

A set of control variables is added to the regression estimates of Table 4.3: $Desired.Inv$ captures the desired investment of the principal; *Risk.tolerance* captures the degree of risk tolerance via the number of cards turned in the modified CCT administered at the end of the experiment; *Age* and $Female$ provide us with a control on age and gender of the agent; *Sense.punish* and *Sense.reward* are the scores obtained from the

Table 4.3: Determinants of Actual Investment (Tobit Model)

	Model 1	Model 2	Model 3
Actual.Inv	Pooled	Prospects [−]	Prospects [+]
(Intercept)	90.943 (39.524)*	64.339 (26.735)*	25.674 (91.692)
*A*ccountability	5.849 (9.386)	−15.125 (6.619)*	25.884 (19.217)
*M*onetary	6.496 (9.380)	−28.717 (6.06)***	−18.000 (23.595)
Acc× *Mon*	−79.755 (13.472)***	−67.552 (8.942)***	−43.607 (42.205)
Desired	1.085 (0.053)***	0.864 (0.056)***	1.037 (0.113)***
Risk.seekingness	−5.880 (0.742)***	−0.294 (0.437)	−1.117 (1.389)
Age	8.267 (1.271)***	0.935 (0.848)	4.457 (2.863)
Female	−29.845 (8.639)***	−26.763 (5.895)***	−24.354 (21.545)
Sense.Punish	−4.969 (0.775)***	0.235 (0.468)	−1.221 (1.498)
Sense.Reward	−1.364 (0.848)	2.103 (0.624)***	−0.142 (2.324)
N [lc, un, rc]	384 [28, 204, 152]	192 [27, 119, 46]	192 [1, 85, 106]
	Linear Hypothesis Tests (χ^2)		
Acc vs. *Mon*	0.1	4.5*	4.1*
AM vs. UN	46.4***	259.0***	1.9
AM vs. AN	54.8***	181.3***	5.8*
AM vs. UM	54.5***	181.2***	0.2

$^{***}p < 0.001$, $^{**}p < 0.01$, $^{*}p < 0.05$, $^{\circ}p < 0.1$

questionnaires and measure attitudes of the agents towards punishment and reward, respectively.

In *Pooled*, the positive coefficient of the intercept shows that agents tend to invest more than what requested in the baseline condition UN. Furthermore, *Aware* and *Monetary* do not significantly impact on actual investments, when considered in isolation. However, when considering the interaction between the two variables, a significant reduction in actual investments is observed when both accountability and monetary sanctions are in place. This is confirmed also by the linear hypothesis tests showing that condition AM significantly differs from all other conditions.

Result 1 *Overall, accountability and the threat of monetary sanctions help realign agents' behavior and principals' interests only when both are in place.*

When taking into account only negative-value prospects (*Prospects* [−]), the coefficient of the intercept speaks of a sustained over-investment in the baseline condition. However, both accountability and monetary sanctions restrain the opportunistic behavior of agents. The interaction between the two explanatory variables further strengthens the restraining effect. The linear hypothesis tests corroborate evidence gathered from regression estimates and also show that monetary sanctions have a stronger impact than accountability in terms of realignment of conflicting interests.

Result 2 *For negative-value prospects, in which the conflict of interest is higher, both accountability and the threat of monetary sanctions help realign agents' behavior and principals' interests, with a stronger effect when both measures are in place.*

In the set of positive-value prospects (*Prospects* [+]), no significant over-investment is registered and no significant effects are observed for accountability and monetary sanctions. This is mainly due to the fact that the desired investment level is already close to the maximum investment level. The weaker impact of treatment variables, relative to negative-value prospects is confirmed also by the linear hypothesis tests comparing condition AM to other conditions: a statistically significant difference is observed only when comparing AM and AN.

Result 3 *For positive-value prospects, in which the conflict of interest is low, no significant over-investment is observed.*

In terms of control variables, higher levels of desired investments induce higher levels of investments, across all kinds of prospects. Agents are not insensitive to principal's interests, but tend to add a mark-up to the expressed level of investment. Demographic measures impact on choices when pooling all prospects together, with older agents investing more of their principal's resources and females investing less. As expected, a stronger sensitivity for punishment limits the opportunistic behavior of the agents and a stronger sensitivity for reward promotes more goal oriented behavior in the set of negative-value prospects.

Surprisingly, risk tolerance exerts a negative impact on the level of investment. Thus, the more risk tolerant an agent is, the less of her principal's money she is going

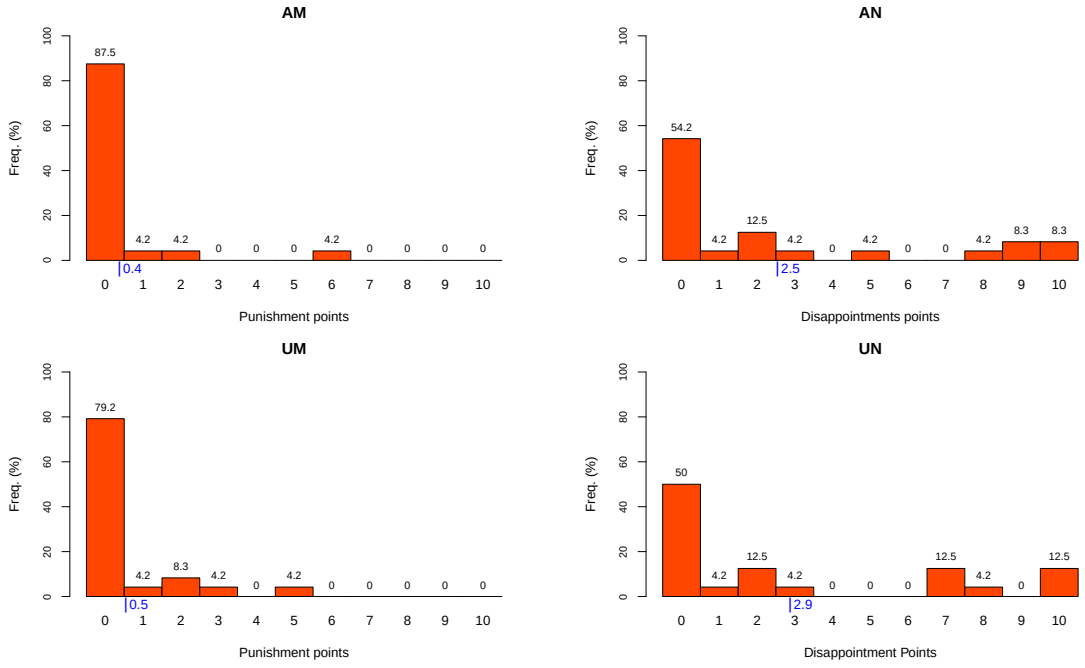
to invest.[5]

4.3.2 Punishment

Descriptive Statistics

Figure 4.4 shows the distribution of punishment (τ_M) and disappointment (τ_N) points, across experimental conditions. The height of each bar provides a direct representation of the relative frequency of the corresponding punishment level, while the vertical bar underneath the horizontal axis represents the average punishment.

Figure 4.4: Punishment



In each condition, the majority of participants decides not to punish the agent,

[5]A possible interpretation for this result is the potential reverse causality linking the measure of risk tolerance and the investment level. Given that the risk tolerance measure was collected after the investment task, we cannot exclude that those agents investing earning less from the investment task were trying to "compensate" by taking more risk in the modified CCT. This is a common methodological problem faced when taking repeated measures in a an experiment. To rule-out endogeneity issues in our regression estimates, we estimated our models omitting the risk control. Results are robust to this change in model specification.

as shown by the frequency of choices in correspondence to 0 points. However, when punishment has direct monetary consequences about 80% of principals choose not to punish their agent, while when no monetary consequences are associated to sanctioning about 50% choose not to punish their agent. This is also reflected in average points addressed to the agent, which are close to zero for conditions AM and UM and equal to 2.5 and 2.9 in conditions AN and UN, respectively.

The striking difference between conditions with and without monetary consequences that emerges from Figure 4.4 is confirmed by a series of non-parametric tests comparing AM and AN, and UM and UN (Wilcoxon Rank Sum test, p-value = 0.008 and p-value = 0.017, respectively). Furthermore, no significant differences are detected when comparing AM and UM, and UN and AN (Wilcoxon Rank Sum test, p-value = 0.455 and p-value = 0.780, respectively).

Determinants of Punishment

A regression analysis about determinants of principal's punishment behavior is presented in Table 4.4: the dependent variable *Punishment* counts the number of points addressed by a principal to her agent. Given the nature of the dependent variable and the substantial number of zero counts, a Negative Binomial Hurdle Model (NBHM) has been implemented.[6] Accordingly, the column to the left in Table 4.4 (*Zero Model*) provides us with a measure of the likelihood of observing punishment, while column to the right (*Count Model*) refers to the size of the punishment imposed on the agent.

Concerning the explanatory variables, in addition to treatment dummies and control variables (specified as in the previous section), we focus on two characteristics of the investment. Specifically, *Success* is equal to 1 when the investment was successful (0 otherwise) and *Diff* capture the discrepancy between actual and desired investment (as before, positive values stand for an agent's over-investment with respect to her principal request). *Success* and *Diff* enter also as interaction with *Aware*.

[6]Hurdle models better deal with the issues of over-dispersion and excess of zeros, as compared to other models for count data (Mullahy, 1986). The model captures a two-stage process in which the principal first decides whether to punish or not the agent (Zero models) and then chooses the level of punishment (Count Model). Tests on over-dispersion show that Negative Binomial is the correct specification (over-dispersion due to excess of zeros) for the count component.

Table 4.4: Hurdle Regression (Negative Binomial)

Punishment ∼	*Zero Model*	*Count Model*
(Intercept)	1.863 (4.048)	0.842 (1.837)
$Diff$	−0.004 (0.005)	0.001 (0.001)
Success	−2.226 (0.841)**	−2.960 (1.784)$^{\circ}$
Monetary	−2.019 (0.668)**	−0.870 (0.309)**
Aware	−1.975 (0.900)*	−0.455 (0.326)
Risk.tolerance	−0.109 (0.066)	0.012 (0.030)
Age	0.038 (0.133)	0.050 (0.056)
Female	0.694 (0.692)	0.617 (0.319)$^{\circ}$
Sense.punish	−0.137 (0.079)$^{\circ}$	−0.080 (0.033)*
Sense.Reward	0.145 (0.090)	−0.003 (0.032)
Aware × *Succ*	−0.137 (1.434)	2.158 (1.852)
Aware × $Diff$	0.039 (0.013)**	0.002 (0.003)
Log(theta)	–	3.313 (1.267)**
Num. obs.	96	96

$^{***}p < 0.001$, $^{**}p < 0.01$, $^{*}p < 0.05$, $^{\circ}p < 0.1$

Regression outcomes of Table 4.4 show that *Monetary* has a negative impact on punishment, both on the decision to undertake them and on their size. Thus, agents are less likely to sanction, and do it more moderately, when the action is expensive.

Result 4 *Less sanctioning is observed when punishment is expensive for both parties than when it is purely symbolic.*

The estimated coefficient of *Aware* is negative, showing that more sanctioning is observed when the principal does not know for sure the prospect to which the choices of the agents apply. On the other hand, *Aware* has a positive impact on the choice to sanction when in interaction with the difference between desired investment and actual investment. This suggests that principals who are better informed about actions of their

agents are more selective in punishing and tend to direct their disappointment towards discrepancies between advised and actual investments.

Result 5 *Agents tend to punish their agents more when they are less aware about investment choices. However, higher awareness promotes a more targeted sanctioning behavior directed towards agents that largely deviate from the advised investment level.*

Interestingly, the estimated coefficient of *Success* shows that success of the investment reduces both the likelihood of observing punishment (Zero Model) and its size (Count Model). To this it should be added that the estimated coefficient of the interaction between *Aware* and *Success* is not statistically significant. Thus, agents seem to value more consequences of the investments than intentions of the agent when choosing about punishment.

Result 6 *Principals are less likely to punish their agent when the investment is successful than when is not, irrespective of the degree of awareness about agents' behavior.*

Finally, a stronger sense of punishment induces a more moderate access to sanctions. This is most likely due to the fact that, among those with a stronger sense of punishment, psychological "returns" from sanctions are higher.

4.4 Discussion and Conclusion

Recent experimental studies have shown that incentive structures strongly affect behavior in markets and may lead to excessive speculation (e.g., Kleinlercher et al., 2014). We focus in this paper on a simple incentive structure that captures essential elements of financial intermediation. In our experiment, agents invest the money of principals on their behalf and get a management fee proportional to the invested amount. However, agents do not share with their principals the risk of the investment and they are not required to give information about the investment strategy. With such an incentive structure, agents largely violate investment requests of their principals. They tend to allocate large amounts of principal's resources in investments with expected negative outcomes.

In light of the strong violation of investor's interests, we asses the role of monetary sanctions and of accountability (i.e., transparency) in the protection of investors. In the presence of strong conflicts of interest, the two measures effectively protect investor's interests only when jointly present. To elaborate, agents are induced to respect the dispositions of their principals only when principals have access to an effective punishment device and are made aware of actual choices made by the principals. More transparency does not represent a strong enough threat to induce a more respectful behavior on the side of agents, unless it is matched by access to effective sanctions.

From an economic point of view, monetary punishment implies a loss of efficiency. However, monetary punishment is rarely implemented as it represents a credible threat in the eyes of the agents, in particular when principals are fully informed about agents' behavior. Furthermore, monetary punishment and transparency increase the welfare of the agents by realigning the amount of risk desired to the amount of risk actually borne.

Discriminating among alternative motivations for punishment goes beyond the scope of this paper. However, the fact that significantly less punishment is observed after a successful investment provides more support to the interpretation based on inequity aversion than to that based on emotional reactions. Indeed, the loss of utility originating from payoff differences is likely to be lower when the investment is successful than when it is not (Fehr and Schmidt, 1999). Differently, emotional reactions should not heavily depend upon outcomes of the investment, but upon the "breach of faith" by the agent when she chooses to deviate from the advised investment level. Evidence collected calls for further research on this issue.

We also identify a few individual traits that affect agent's opportunistic behavior. Interestingly, females tend to deviate less from principal's advise than males. This represents a stimulating finding when taking into account the highly unbalanced gender composition of the financial industry (e.g., Eriksen and Kvaløy, 2010). In terms of general disposition, agents attaching a higher value to being punished over-invest less that agents with a low sensitivity for punishment. For investments in which the conflict of interest is stronger, agents that attach a higher value to rewards are more likely to behave selfishly and to over-invest.

Increasing transparency in order to align the investment with the characteristics of the investor is, without doubts, a positive and important step towards her protection. Despite that, financial regulators must be aware of the importance of the sanctioning system since, together with transparency, it is a key element for protection of investors. Back to the MiFID, European regulators refer to law and authorities of the member states to implement sanctioning procedures. However, legal uncertainty and discrepancies across member states may weaken the effectiveness of the sanctioning mechanism and considerably reduce investors' protection.

4.5 Appendix

These are translated versions (originally in German) of the instructions used in the experiment presented in Chapter 4. The instructions changed accordingly to the treatment, differences are indicated in the text.

`Instructions`

Thank you for taking part in this experiment. In addition to the show-up fee (2.5 Euro), you will receive an amount of money which will be paid as a result of decisions made in the experiment. During the experiment, you are not allowed to talk to other participants. Whenever you have a question, please raise your hand and an experimenter will come to answer your question.

The experiment is composed by two independent parts: in both parts you will earn money; during the first part, ECU (Experimental Currency Units) will be used: at the end of the sessions, your earnings in ECU will be converted in Euro for your real payoff (40 ECU = 1 Euro). In the second part Euro will be used. Earnings in one part do not depend on the result of the other.

Your final and total earning is the sum of the results of the two parts. You will get the instruction for the second part at the end of the first.

PART ONE

In this part, two participants will interact. One of the two participants will be randomly assigned to role *A* and the other participant in the pair to role *B*. The identity of the other in the pair will never be revealed.

You will be informed about your role at the beginning of the experiment and it will be displayed on the screen of your computer: other participants in the room will never know the role you are randomly assigned to.

Role A

If you are assigned to *Role A*, you will receive an initial endowment of 300 ECU. The other in the pair, assigned to *Role B*, can invest up to 200 of your ECU in a risky

prospect.

The investment can be *unsuccessful* (you can lose money) or *successful* (you can gain money): with some probability the investment earns two and a half times (2.5×) the invested amount; however, when the investment is unsuccessful, the invested amount is lost.

Your ECU can be invested in four distinct prospects: *Prospect A*, *Prospect B*, *Prospect C*, and *Prospect D*. The prospects differ in the probability of facing an unsuccessful investment, with Prospect A having the highest probability of facing a loss (6/8 or 75%) and Prospect D having the lowest probability of facing a loss (2/8 or 25%). This directly affects the expected returns (ER) of investments: in Prospect A the expected returns are equal to -37.5% for each ECU invested, while in Prospect D the expected returns are equal to +87.5% for each ECU invested. This implies that, on average, when you invest 1 ECU in A you get 0.62 ECU out of the investment, while when you invest in D you get 1.88 ECU. Thus, while in all prospects can potentially deliver the maximum profit, the average outcome differs across them.

The following table provides you with a summary of the four prospects:

	Probability of losing	Probability of gaining	ER
Prospect A	6/8	2/8	-37.5%
Prospect B	5/8	3/8	-6.2%
Prospect C	3/8	5/8	56.2%
Prospect D	2/8	6/8	87.5%

Only one of the four Prospects will be selected for implementation. Each of the four prospects has a positive probability of being chosen.

Before B invests your ECU in the selected prospect, you have the possibility to state how much of your endowment (from 0 to a maximum of 200 ECU) you would like B to invest in each of the four prospects.

After your declarations and before knowing which prospect will be palyed, B will decide how much to invest in each prospect. Please note that B is not bound by your suggestion and can choose any amount between 0 and 200 ECU. Your final payoff

directly follows the result of the investment:

1. if the investment is *unsuccessful*, your final payoff will be:
   300 - the amount invested

2. if the investment is *successful*, your final payoff will be:
   300 - the amount invested + 2.5× the amount invested

After the communication on your final payoff

`Treatment UN and UM`

(for you, the selected prospect will remain unknown),

`Treatment AN and AM`

and on the selected prospect

you will have the opportunity to

`Treatment UN and AN`

register your approval or disapproval about B's decision by distributing disappointment points. You can assign a number of points to B if you disapprove his or her decision: 0 points if you do not disapprove the decision, 10 points if you highly disapprove the decision.

Disappointment Points	0	1	2	3	4	5	6	7	8	9	10

`Treatment UM and AM`

punish B for his/her decision by distributing punishment points. The larger the number of punishment points assigned to B the heavier the punishment: each received point reduces your B's payoff by 10%.

Punishment is costly for you: the more you punish, the higher is your cost. The following table gives you an overview of the cost of punishment and its corresponding punishment points.

Punishment Points	0	1	2	3	4	5
Punishment Costs (for A)	0	12	16	20	24	28
Punishment Points	6	7	8	9	10	
Punishment Costs (for A)	36	44	56	76	100	

Your final payoff corresponds to the result of the investment minus the cost of punishment (i.e. how much punishment points you decide to assign to B).

Role B

If you are assigned to *Role B*, you will receive an initial endowment of 100 ECU. You are asked to choose how to invest A's ECU (from 0 to a maximum of 200 ECU).

Before the investment decision you will be informed about A's investment prefer-

ences for each Prospect. You are asked to choose an investment level for each of the four prospects, before actually knowing which prospect is going to be implemented. After you have chosen, you are informed which of the four prospects is going to be implemented.

Your decision affects both your payoff and the payoff of A (see above for how the A's payoff is determined).

Your payoff depends only on how much you decide to invest and not on the characteristics of the selected prospect: the higher the amount invested, the higher your final payoff.

More precisely your final payoff is equal to: *100 + 0.5× amount invested*.

After your investment,

`Treatment UN and UM`

only the outcome of the investment, but not the selected Prospect, will be announced to A,

`Treatment AN and AM`

the outcome of the investment and the selected Prospect, will be announced to A,

who will have the opportunity to

`Treatment UN and AN`

communicate his/her approval or disapproval of your decision (see above for how A can state his/her disapproval). The disapproval has no influence on your payoff.

`Treatment UM and AM`

punish your decision by reducing your payoff (see above for how a A can punish B).

The following table summarizes the final payoffs of A and B, in case of an unsuccessful investment and in case of a successful investment (NOTE: x stands for the amount invested by B; it can be set between 0 and 200).

`Treatment UN and AN`

Role	*Unsuccessful Investment*	*Successful Investment*
A	$300 - x$	$300 - x + 2.5 \times x$
B	$100 + 0.5 \times x$	$100 + 0.5 \times x$

`Treatment UM and AM`

Role	*Unsuccessful Investment*
A	$300 - x - PunishmentCost$
B	$(100 + 0.5 \cdot x) \cdot (10 - PunishmentPoints)/10$
Role	*Successful Investment*
A	$300 - x + 2.5 \cdot x - PunishmentCost$
B	$(100 + 0.5 \cdot x) \cdot (10 - PunishmentPoints)/10$

In order to ensure that you correctly understood the rules of the experiment, you will be asked to answer some control questions before the beginning of the experiment. The experiment will start only when all participants properly answered to the control questions.

If you have questions, please do not hesitate to ask one of the experimenters by raising your hand.

PART TWO[7]

In this part, you do not interact with other participants and you are going to participate in a card game.

In this game, you will turn over cards to win Euro.

You will see 32 cards on the computer screen, face down. You will decide how many of these cards to turn over. Each card is either a gain card or a loss card (there are no neutral cards). There are 31 gain cards and 1 loss card in the deck of 32. For each gain card you will find, you will gain 0.10 Euro but if you find the loss card you will earn nothing. What you don't know is which of the 32 cards that you see face-down are the gain cards and which is the loss card.

You indicate the cards (from 0 to 32) you want to turn over by clicking on them. Then, the selected cards will be turned over and you will discover if you have chosen

[7] adapted version of the original instruction on http://columbiacardtask.org/

the loss card.

The task starts with a score of 0 Euro.

This game is for real money and requires some concentration. Please minimize distractions in your environment and notice that once a card has been selected, it is not possible to deselect it.

Concluding Remarks

This dissertation focuses on experimental approach to social and agency dilemmas. From an applied perspective, experimental methods allow to disentangle the role of different factors that may play a role in real situations like tax compliance or asset management: in numerous occasions, individuals or organizations may need an enforcement to comply with laws, regulations or principals' dispositions.

Experimental methods permit to obtain precise data in situations in which — and this is particulary true for the studies on tax compliance — individuals try to hide non compliant behaviour. Indeed, by definition, it is very difficult — if not impossible — to obtain, in the field, complete and precise data on behaviour that people on purpose conceal.

The thesis begins with an analysis of the social dilemma involved into the decision to comply with the tax system (Chapter 1, 2, 3) and finishes with a study on an individual dilemma common in financial relationships (Chapter 4).

This last part contains an overview of the main findings and a discussion on their implications and limitations.

Overview and implications of the main findings

Chapter 2 analyzed the impact of anonymity on tax compliance. The research idea derived from different real world enforcements (positive and negative non-monetary incentive) such as the publication of the British tax dodgers by the HMRC (negative incentive) and the — currently unrealized — idea of an official certificate of fiscal conformity for the virtuous Italian firms, professionals and self-employed (positive incentive). Our results suggest that both incentives have an impact on tax compliance

but the threat of publicizing tax dodgers is more effective in reducing tax evasion. The study presented in Chapter 2 highlighted a discrepancy between the value that individuals confer, in case of tax evasion, to their own anonymity and the value that they confer to the others' anonymity. Interestingly individuals are generally not interested in knowing the identity of tax dodgers but, although this scarce general interest for recognising cheaters, they are extremely cautious in hiding their identity when they decide to evade.

On the light of this, the negative enforcement mechanism adopted by the British tax authority seems to be justified by, at least, two factors: i.) it has a stronger impact on compliance than the positive incentive and ii.) it is based on the general individual fear of being recognized as a tax dodger and not on the status of the others. Tax authorities often face the problem of scarce resources for their activities, including controls, and may benefit from such a negative non monetary form of incentives: the enforcement has not a bearing on the cost of controls and may increase total tax return if tax-dodgers accept to pay the fee for anonymity.

Chapter 3 has focused the attention on the role played by direct participation of taxpayers in the determination of the tax system's setting. Fairness perception of the tax system — in other words, taxpayers' concerns about, among many, the collection of taxes (tax burden), their investment and redistribution and the consequences of cheating behaviour — is an important driver for taxpayers' trust in authorities. It is well established that trust in authorities is one of the two main factors, together with power of authorities, of tax compliance (Kirchler et al., 2008): the higher taxpayers' fairness perception, the higher taxpayers' trust in authorities and, as final consequence, the higher taxpayers' compliance rate. Direct participation into the development of the tax system could be one tool to induce fairness perception into taxpayers. In our work, we give the opportunity to our participants to *raise their voice* on the government budget spending (*Voice on Distribution of tax load*) and on the individual tax burden (*Voice on tax Contributions*). Our results confirm, in general, the idea "more participation implies more trust that implies more compliance". Evidences of different impacts of our manipulation with respect to the participants' gender have been found: having *Voice on tax Contributions* seems to rise compliance more in females than in males.

Chapter 4 investigated the role of accountability and monetary sanctions in protecting investors from the tendency of selfish behavior of their investment managers. In a setting with the basic characteristics of asset management, including the monetary conflict of interest between the parties involved, managers do invest a larger share — compared to what required — of investors' money in more in risky prospects: the tendency of decreasing risk aversion when managing others' money is confirmed by our experiment. A combination of accountability and monetary punishments well hinders this tendency. First, the "*other people's money effect*" (Agranov et al., 2014) is reduced when the investor is fully informed on the investment strategy of manager; and the discrepancy between the desired investment and the actual investment is made available to both parties involved. In addition, even if it entails a reduction for both players' payoffs, monetary punishment pushes managers towards the requested behavior; as a result, when the two measures are contemporarily applied actual investments align with desired investments and investors' interests receive the best protection against managers' opportunistic behavior.

Limitations and further research

Probably the most common critique on experimental studies is on *external validity* or, in other words, how close behaviour in the laboratory is to the behaviour in the real world (Levitt and List, 2007). If this is a common comment for all experimental research, it is particular stressed in research on tax compliance since participants, mostly students, have seldom handled the problem of tax payments. On this point, Alm (2012) and Alm et al. (2013) argue that students-participants do behave — in laboratory experiments — as non students-participants and, even most important, experimental and empirical data (at least in tax compliance research) indicate "*largely similar patterns*" (Alm et al., 2013, p. 24).

It is important to bear in mind that nobody argues that behaviour in the laboratory perfectly matches the behaviour in the real world; on the contrary, experiments might help to understand if one policy could have an impact on a certain variable. If the answer is "yes" research can continue, for instance, with the implementation of a field

experiment.

This does not mean that experiments should be completely unrelated to the real world: for example experiment in Chapter 3 overcomes some limitations of experimental research in tax compliance. The total tax burden is made, like in reality, by different payments and not by one all-embracing tax but, this setting, can be fine tuned: in our experiment, regardless the sequence of different payments, audits were still conducted at individual level. This implies that, the individuals where randomly selected for audits and, in case of a control, all the declarations were checked. Different, but not necessarily independent, audits probabilities for the different payments can represent the natural evolution of the research on trust in compliance.

As already recalled, Chapter 3 has also highlighted some evidences of different impact of our manipulation according to participants' gender: since this was not a study strictly related to gender difference, a more specified research on this direction could be a natural development of the research introduced in Chapter 3.

Further research is also needed with respect to the topic presented in Chapter 4: research has seldom focused its attention of delegated decisions with the presence of monetary conflict of interests. As before, our setting could be manipulated in order to include, if it is necessary, other features that characterize financial relationships by incorporating into the design, for example, a second source of income for the agent; this time related to the results of the investment (performance fee).

Another line of research that could start from the structure of the experiment presented in Chapter 4, is based on the agent's lying opportunity: in our setting agents maximized their payoffs by ignoring the dispositions of their principals; it could be interesting to study if agents are willing to lie to their principals in order to influence their decisions toward investments which have the highest return for the agents themselves but clearly do not fit principals' investment profiles.

Bibliography

Agranov, M., Bisin, A., and Schotter, A. (2014). An experimental study of the impact of competition for other people's money: the portfolio manager market. *Experimental Economics*, 17(4):564–585.

Akerlof, G. A. (1970). The market for" lemons": Quality uncertainty and the market mechanism. *The quarterly journal of economics*, pages 488–500.

Akerlof, G. A. (1980). A theory of social custom, of which unemployment may be one consequence. *The quarterly journal of economics*, 94(4):749–775.

Ali, M., Cecil, H., and Knoblett, J. (2001). The effects of tax rates and enforcement policies on taxpayer compliance: A study of self-employed taxpayers. *Atlantic Economic Journal*, 29(2):186–202.

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

Alm, J. (2012). Measuring, explaining, and controlling tax evasion: lessons from theory, experiments, and field studies. *International Tax and Public Finance*, 19:54–77. 10.1007/s10797-011-9171-2.

Alm, J., Bloomquist, K. M., and McKee, M. (2013). On the external validity of laboratory policy experiments. Technical report, Mimeo.

Alm, J., Cherry, T., Jones, M., and McKee, M. (2010). Taxpayer information assistance services and tax compliance behavior. *Journal of Economic Psychology*, 31(4):577–586.

Alm, J., Cronshaw, M. B., and McKee, M. (1993a). Tax compliance with endogenous audit selection rules. *Kyklos*, 46(1):27–45.

Alm, J., Jackson, B. R., and McKee, M. (1992a). Estimating the determinants of taxpayer compliance with experimental data. *National Tax Journal*, 45(1):107–114.

Alm, J., Jackson, B. R., and McKee, M. (1993b). Fiscal exchange, collective decision institutions, and tax compliance. *Journal of Economic Behavior & Organization*, 22(3):285–303.

Alm, J., Jackson, B. R., and McKee, M. (2009). Getting the word out: Enforcement information dissemination and compliance behavior. *Journal of Public Economics*, 93(3Ű4):392 – 402.

Alm, J., McClelland, G. H., and Schulze, W. D. (1992b). Why do people pay taxes? *Journal of Public Economics*, 48(1):21–38.

Alm, J., McClelland, G. H., and Schulze, W. D. (1999). Changing the social norm of tax compliance by voting. *Kyklos*, 52(2):141–171.

Alm, J., Sanchez, I., and de Juan, A. (1995). Economic and noneconomic factors in tax compliance. *Kyklos*, 48(1):3–18.

Alm, J. and Torgler, B. (2006). Culture differences and tax morale in the United States and in Europe. *Journal of Economic Psychology*, 27(2):224–246.

Alm, J. and Torgler, B. (2011). Do ethics matter? Tax compliance and morality. *Journal of Business Ethics*, 101(4):635–651.

Anderhub, V., Giese, S., Güth, W., Hoffmann, A., and Otto, T. (2001). Tax evasion with earned income - an experimental study. *FinanzArchiv: Public Finance Analysis*, 58(2):188–206.

Andreoni, J., Erard, B., and Feinstein, J. (1998). Tax compliance. *Journal of Economic Literature*, 36(2):818–860.

Baldry, J. C. (1987). Income tax evasion and the tax schedule: Some experimental results. *Public Finance = Finances publiques*, 42(3):357–83.

Battigalli, P. and Dufwenberg, M. (2007). Guilt in Games. *American Economic Review*, 97(2):170–176.

Becker, A. (2012). Accountability and the fairness bias: the effects of effort vs. luck. *Social Choice and Welfare*, pages 1–15.

Becker, G. M., DeGroot, M. H., and Marschak, J. (1964). Measuring utility by a single-response sequential method. *Behavioral Science*, 9(3):226–232.

Becker, G. S. (1968). Crime and punishment: An economic approach. *The Journal of Political Economy*, 76(2):169–217.

Bernasconi, M., Corazzini, L., and Seri, R. (2014). Reference dependent preferences, hedonic adaptation and tax evasion: Does the tax burden matter? *Journal of Economic Psychology*, 40(0):103 – 118. Special Issue on Behavioral Dynamics of Tax Evasion.

Bernasconi, M. and Zanardi, A. (2004). Tax evasion, tax rates, and reference dependence. *FinanzArchiv / Public Finance Analysis*, 60(3):pp. 422–445.

Bohnet, I. and Frey, B. S. (1999). The sound of silence in prisoner's dilemma and dictator games. *Journal of Economic Behavior & Organization*, 38(1):43 – 57.

Bolton, G. E. and Ockenfels, A. (2000). Erc: A theory of equity, reciprocity, and competition. *American Economic Review*, 90(1):pp. 166–193.

Bosco, L. and Mittone, L. (1997). Tax evasion and moral constraints: Some experimental evidence. *Kyklos*, 50(3):297–324.

Braithwaite, V. and Ahmed, E. (2005). A threat to tax morale: The case of australian higher education policy. *Journal of Economic Psychology*, 26(4):523–540.

Brennan, G., González, L. G., Güth, W., and Levati, M. V. (2008). Attitudes toward private and collective risk in individual and strategic choice situations. *Journal of Economic Behavior & Organization*, 67(1):253 – 262.

Chakravarty, S., Harrison, G. W., Haruvy, E. E., and Rutström, E. E. (2011). Are you risk averse over other people's money?. *Southern Economic Journal*, 77(4):901 – 913.

Charness, G. and Dufwenberg, M. (2006). Promises and partnership. *Econometrica, Econometric Society*, 74(6):1579–1601.

Chaudhuri, A. (2011). Sustaining cooperation in laboratory public goods experiments: a selective survey of the literature. *Experimental Economics*, 14(1):47–83.

Coricelli, G., Joffily, M., Montmarquette, C., and Villeval, M. (2010). Cheating, emotions, and rationality: an experiment on tax evasion. *Experimental Economics*, 13(2):226–247.

Coricelli, G., Rusconi, E., and Villeval, M. C. (2014). Tax evasion and emotions: An empirical test of re-integrative shaming theory. *Journal of Economic Psychology*, 40(0):49–61. Special Issue on Behavioral Dynamics of Tax Evasion.

Dhami, S. and al Nowaihi, A. (2007). Why do people pay taxes? prospect theory versus expected utility theory. *Journal of Economic Behavior & Organization*, 64(1):171–192.

Djawadi, B. M. and Fahr, R. (2013). The impact of tax knowledge and budget spending influence on tax compliance. Technical report, Discussion Paper Series, Forschungsinstitut zur Zukunft der Arbeit.

Erard, B. and Feinstein, J. S. (1994a). Honesty and evasion in the tax compliance game. *The RAND Journal of Economics*, 25(1):pp. 1–19.

Erard, B. and Feinstein, J. S. (1994b). The role of moral sentiments and audit perceptions in tax compliance. *Public Finance = Finances publiques*, 49(Supplement):70–89.

Eriksen, K. W. and Kvaløy, O. (2010). Myopic investment management. *Review of Finance*, 14(3):521–542.

Fehr, E. and Fischbacher, U. (2004). Social norms and human cooperation. *Trends in cognitive sciences*, 8(4):185–190.

Fehr, E., Fischbacher, U., and Gächter, S. (2002). Strong reciprocity, human cooperation, and the enforcement of social norms. *Human nature*, 13(1):1–25.

Fehr, E. and Gächter, S. (1998). Reciprocity and economics: The economic implications of homo reciprocans. *European Economic Review*, 42(3-5):845–859.

Fehr, E. and Schmidt, K. M. (1999). A theory of fairness, competition, and cooperation. *The Quarterly Journal of Economics, MIT Press*, 114(3):817–868.

Feld, L. P. and Frey, B. S. (2002). Trust breeds trust: How taxpayers are treated. *Economics of Governance*, 3(2):87–99.

Feld, L. P. and Tyran, J.-R. (2002). Tax evasion and voting: An experimental analysis. *Kyklos*, 55(2):197–221.

Fellner, G., Sausgruber, R., and Traxler, C. (2013). Testing enforcement strategies in the field: Threat, moral appeal and social information. *Journal of the European Economic Association*, 11(3):634–660.

Figner, B., Mackinlay, R. J., Wilkening, F., and Weber, E. U. (2009). Affective and deliberative processes in risky choice: age differences in risk taking in the columbia card task. *Journal of Experimental Psychology: Learning, Memory, and Cognition*, 35(3):709.

Fischbacher, U. (2007). z-tree: Zurich toolbox for ready-made economic experiments. *Experimental Economics*, 10(2):171–178.

Fischer, C. M., Wartick, M., and Mark, M. M. (1992). Detection probability and taxpayer compliance: A review of the literature. *Journal of Accounting Literature*, 11:1. Copyright - Copyright University of Florida, Accounting Research Center 1992; Zuletzt aktualisiert - 2010-06-09; SubjectsTermNotLitGenreText - US.

Fishlow, A. and Friedman, J. (1994). Tax evasion, inflation and stabilization. *Journal of Development Economics*, 43(1):105 – 123.

Fortin, B., Lacroix, G., and Villeval, M.-C. (2007). Tax evasion and social interactions. *Journal of Public Economics*, 91(11Ű12):2089 – 2112.

Friedland, N. (1982). A note on tax evasion as a function of the quality of information about the magnitude and credibility of threatened fines: Some preliminary research. *Journal of Applied Social Psychology*, 12(1):54–59.

Friedland, N., Maital, S., and Rutenberg, A. (1978). A simulation study of income tax evasion. *Journal of Public Economics*, 10(1):107–116.

Gërxhani, K. (2007). Explaining gender differences in tax evasion: the case of tirana, albania. *Feminist Economics*, 13(2):119–155.

Gneezy, U. and Potters, J. (1997). An experiment on risk taking and evaluation periods. *Quarterly Journal of Economics*, 112(2):631–645.

Gordon, J. P. (1989). Individual morality and reputation costs as deterrents to tax evasion. *European economic review*, 33(4):797–805.

Greiner, B. (2004). An online recruitment system for economic experiments. In Kremer, K. and Macho, V., editors, *Forschung und wissenschaftliches Rechnen.*, pages 79–93. GWDG Bericht 63, Göttingen.

Grimm, V. and Mengel, F. (2011). Let me sleep on it: Delay reduces rejection rates in ultimatum games. *Economics Letters*, 111(2):113–115.

Guala, F. and Mittone, L. (2005). Experiments in economics: External validity and the robustness of phenomena. *Journal of Economic Methodology*, 12(4):495–515.

Güth, W., Huck, S., and Ockenfels, P. (1996). Two-level ultimatum bargaining with incomplete information: an experimental study. *The Economic Journal*, 106(436):pp. 593–604.

Güth, W., Schmittberger, R., and Schwarze, B. (1982). An experimental analysis of ultimatum bargaining. *Journal of Economic Behavior & Organization*, 3(4):367 – 388.

Hasseldine, J., Hite, P., James, S., and Toumi, M. (2007). Persuasive communications: Tax compliance enforcement strategies for sole proprietors. *Contemporary Accounting Research*, 24(1):171–194.

Kahneman, D., Knetsch, J. L., and Thaler, R. H. (1991). Anomalies: The endowment effect, loss aversion, and status quo bias. *The journal of economic perspectives*, pages 193–206.

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

Kastlunger, B., Dressler, S. G., Kirchler, E., Mittone, L., and Voracek, M. (2010). Sex differences in tax compliance: Differentiating between demographic sex, gender-role orientation, and prenatal masculinization (2d:4d). *Journal of Economic Psychology*, 31(4):542–552.

Kastlunger, B., Kirchler, E., Mittone, L., and Pitters, J. (2009). Sequences of audits, tax compliance, and taxpaying strategies. *Journal of Economic Psychology*, 30(3):405–418.

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

Kirchler, E., Hoelzl, E., and Wahl, I. (2008). Enforced versus voluntary tax compliance: The "slippery slope" framework. *Journal of Economic Psychology*, 29(2):210–225.

Kirchler, E., Muehlbacher, S., Kastlunger, B., and Wahl, I. (2010). Why pay taxes: A review of tax compliance decisions. In Alm, J., Martinez-Vazquez, J., and Torgler, B., editors, *Developing Alternative Frameworks for Explaining Tax Compliance*, pages 15–31. London: Routledge.

Kleinlercher, D., Huber, J., and Kirchler, M. (2014). The impact of different incentive schemes on asset prices. *European Economic Review*, 68(C):137–150.

Ledyard, J. (1995). Public goods: A survey of experimental research. In Kagel, J. and Roth, A., editors, *The Handbook of Experimental Economics*. Princeton: Princeton University Press.

Levitt, S. D. and List, J. A. (2007). What do laboratory experiments measuring social preferences reveal about the real world? *The Journal of Economic Perspectives*, 21(2):pp. 153–174.

Lewis, M. (2014). *Flash Boys: A Wall Street Revolt*. W. W. Norton & Company.

MacCoun, R. J. (2005). Voice, control, and belonging: The double-edged sword of procedural fairness. *Annu. Rev. Law Soc. Sci.*, 1:171–201.

Maciejovsky, B., Schwarzenberger, H., and Kirchler, E. (2012). Rationality versus emotions: The case of tax ethics and compliance. *Journal of Business Ethics*, 109(3):339–350.

Masclet, D., Noussair, C., Tucker, S. J., and Villeval, M. C. (2003). Monetary and nonmonetary punishment in the voluntary contributions mechanism. *American Economic Review*, 93(1):366–380.

Mittone, L. (2002). Individual styles of tax evasion: an experimental study. CEEL Working Papers 0202, Cognitive and Experimental Economics Laboratory, Department of Economics, University of Trento, Italia.

Mittone, L. (2006). Dynamic behaviour in tax evasion: An experimental approach. *The Journal of SocioEconomics*, 35(5):813–835.

Mullahy, J. (1986). Specification and testing of some modified count data models. *Journal of econometrics*, 33(3):341–365.

Orviska, M. and Hudson, J. (2003). Tax evasion, civic duty and the law abiding citizen. *European Journal of Political Economy*, 19(1):83 – 102.

Park, C.-G. and Hyun, J. K. (2003). Examining the determinants of tax compliance by experimental data: a case of korea. *Journal of Policy Modeling*, 25(8):673–684.

Pollmann, M. M., Potters, J., and Trautmann, S. T. (2014). Risk taking by agents: The role of ex-ante and ex-post accountability. *Economics Letters*, 123(3):387–390.

Pommerehne, W. W. and Weck-Hannemann, H. (1996). Tax rates, tax administration and income tax evasion in Switzerland. *Public Choice*, 88(1-2):161–70.

Rajan, R. G. (2006). Has finance made the world riskier? *European Financial Management*, 12(4):499–533.

Rauhut, H. and Winter, F. (2010). A sociological perspective on measuring social norms by means of strategy method experiments. *Social Science Research*, 39(6):1181 – 1194.

Rege, M. and Telle, K. (2004). The impact of social approval and framing on cooperation in public good situations. *Journal of Public Economics*, 88(7-8):1625–1644.

Sanfey, A. G., Rilling, J. K., Aronson, J. A., Nystrom, L. E., and Cohen, J. D. (2003). The neural basis of economic decision-making in the ultimatum game. *Science*, 300(5626):1755–1758.

Scorsese, M., DiCaprio, L., Aziz, R., McFarland, J., Tillinger Koskoff, E. (Producers) and Scorsese, M. (Director). (2013). *The Wolf of Wall Street* [Motion picture]. United States: Appian Way, EMJAG Productions, Red Granite Pictures, Sikelia Productions.

Shavell, S. (1979). On moral hazard and insurance. *The Quarterly Journal of Economics*, 93(4):pp. 541–562.

Slemrod, J., Blumenthal, M., and Christian, C. (2001). Taxpayer response to an increased probability of audit: evidence from a controlled experiment in Minnesota. *Journal of Public Economics*, 79(3):455–483.

Sussman, A. B. and Olivola, C. Y. (2011). Axe the tax: taxes are disliked more than equivalent costs. *Journal of Marketing Research*, 48(SPL):S91–S101.

Taylor, S. E. and Thompson, S. C. (1982). Stalking the elusive 'vividness' effect. *Psychological Review*, 89(2):155 – 181.

Torgler, B. (2002). Speaking to theorists and searching for facts: Tax morale and tax compliance in experiments. *Journal of Economic Surveys*, 16(5):657–683.

Torgler, B. (2003). Tax morale, rule-governed behaviour and trust. *Constitutional Political Economy*, 14(2):119–140.

Torgler, B. (2007). *Tax compliance and tax morale: a theoretical and empirical analysis*. Edward Elgar.

Torgler, B. and Schneider, F. (2007). What shapes attitudes toward paying taxes? evidence from multicultural european countries*. *Social Science Quarterly*, 88(2):443–470.

Torgler, B. and Valev, N. T. (2010). Gender and public attitudes tpward corruption and tax evasion. *Contemporary Economic Policy*, 28(4):554–568.

Torrubia, R., Avila, C., Moltó, J., and Caseras, X. (2001). The sensitivity to punishment and sensitivity to reward questionnaire (spsrq) as a measure of gray's anxiety and impulsivity dimensions. *Personality and Individual Differences*, 31(6):837–862.

Trivedi, V. U., Shehata, M., and Lynn, B. (2003). Impact of personal and situational factors on taxpayer compliance: An experimental analysis. *Journal of Business Ethics*, 47:175–197. 10.1023/A:1026294332606.

Tversky, A. and Kahneman, D. (1992). Advances in prospect theory: Cumulative representation of uncertainty. *Journal of Risk and uncertainty*, 5(4):297–323.

Tyler, T. R. (2006). Psychological perspectives on legitimacy and legitimation. *Annu. Rev. Psychol.*, 57:375–400.

Vihanto, M. (2003). Tax evasion and the psychology of the social contract. *The Journal of Socio-Economics*, 32(2):111–125.

Wahl, I., Kastlunger, B., and Kirchler, E. (2010a). Trust in authorities and power to enforce tax compliance: An empirical analysis of the Şslippery slope frameworkŤ. *Law & Policy*, 32(4):383–406.

Wahl, I., Muehlbacher, S., and Kirchler, E. (2010b). The impact of voting on tax payments. *Kyklos*, 63(1):144–158.

Webley, P., Robben, H., Elffers, H., and Hessing, D. (2010). *Tax Evasion: An Experimental Approach*. Cambridge: Cambridge University Press.

WEF (2011). The global competitiveness report 2010-2011. Technical report, World Economic Forum.

Wenzel, M. (2003). Tax compliance and the psychology of justice: mapping the field. In Braithwaite, V., editor, *Taxing Democracy: Understanding Tax Avoidance and Evasion*, chapter 3, pages 41–70. Aldershot, UK: Ashgate Publishing.

Wenzel, M. (2004). An analysis of norm processes in tax compliance. *Journal of Economic Psychology*, 25(2):213–228.

Wenzel, M. (2005). Misperceptions of social norms about tax compliance: From theory to intervention. *Journal of Economic Psychology*, 26(6):862 – 883.

Yitzhaki, S. (1974). Income tax evasion: A theoretical analysis. *Journal of Public Economics*, 3(2):201–202.