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# Essays in Economic Psychology of Tax Evasion Behavior

Antoine Malezieux

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UNIVERSITÉ DE LORRAINE

THÈSE POUR L'OBTENTION DU TITRE DE DOCTEUR EN  
SCIENCES ECONOMIQUES

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# Essais sur la Psychologie Économique du Comportement d'Évasion Fiscale

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Thèse présentée et soutenue publiquement le 23 juin 2017 par

Antoine MALÉZIEUX

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UNIVERSITÉ DE LORRAINE

DOCTORAL THESIS FOR THE DEGREE OF DOCTOR OF  
PHILOSOPHY IN ECONOMICS

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Publicly defended on 23 June 2017 by

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# Résumé

Cette thèse en économie s'efforce d'intégrer les dernières avancées de la psychologie dans l'analyse de l'évasion fiscale. La méthode utilisée est celle de l'économie expérimentale. Le premier Chapitre utilise les acquis de la psychologie différentielle et de la psychométrie pour corréler le comportement d'évasion fiscale observé dans le laboratoire aux traits de personnalité individuels, mesuré grâce à des questionnaires psychométriques standardisés. Ces questionnaires de personnalité sont liés aux émotions morales, aux jugements moraux et à la soumission à la norme. Les résultats montrent d'abord que les questionnaires mesurant les émotions morales expliquent mieux les comportements d'évasion que les autres questionnaires. Ensuite, le pouvoir explicatif de ces traits de personnalité reste très modeste. Cette absence de relation forte suggère que les caractéristiques individuelles sont d'une aide limitée pour comprendre et prévoir le comportement d'évasion fiscale. Cela met donc l'accent sur l'importance du contexte institutionnel dans lequel la soumission fiscale est mesurée. Les deuxième et troisième Chapitres tentent de mieux prendre en compte ce contexte institutionnel, en utilisant la psychologie sociale de l'engagement. Le second Chapitre montre que la modification de l'environnement du contribuable, à travers l'exposition à un serment sur l'honneur à dire la vérité, accroît le niveau d'honnêteté des déclarations fiscales qui lui font suite. Le troisième Chapitre tente d'expliquer la cause du phénomène suivant : la démocratie directe, comme présente dans certains cantons en Suisse, serait la source d'une plus grande soumission fiscale. D'après la littérature existante, sa cause pourrait être soit une coordination sociale entre les agents, soit un effet d'engagement du vote en lui-même. Les résultats montrent que la coordination sociale entre les contribuables ne permet pas d'expliquer ce phénomène, qui reflète plutôt un effet d'engagement de la participation au processus électoral.

**Mots-clés:** *économie comportementale, psychologie économique, évasion fiscale, morale fiscale, moralité, personnalité, serment, engagement, vote, démocratie directe, dilemme social.*



# Abstract

This thesis in economics focuses on recent advances in psychology to extend the economic approach to tax evasion. The essays build on empirical evidence from laboratory experiments. The first Chapter uses differential psychology and psychometrics to correlate tax evasion behavior observed in the lab to individual personality traits, measured thanks to standardized psychometric questionnaires. These personality questionnaires are related to moral emotions, moral judgments and norm submission. The results are twofold. First, moral emotions better explain evasion behavior than any other personality questionnaire. However, secondly, the explanatory power of these personality traits remains very modest. This lack of a strong relationship suggests that individual characteristics are of little help to understand and predict tax evasion behavior. It highlights the importance of the institutional context in which compliance is elicited. The second and third Chapters try to better account for this institutional context, using the social psychology of commitment. The second Chapter shows that a modification of the taxpayer's environment, thanks to the exposition to an oath to tell the truth, increases the level of honesty of subsequent tax reports. Building on these results, the third Chapter investigates the hypothesis that direct democracy, as present in some cantons in Switzerland, could be the source of higher tax compliance. According to the existing literature, its cause could be either social coordination between agents or a commitment effect due to the vote itself. The results show that social coordination between taxpayers does not explain this phenomenon, which rather reflects a commitment effect of participation in the electoral process.

**Keywords:** *behavioral economics, economic psychology, tax evasion, tax morale, morality, personality, oath, commitment, voting, direct democracy, social dilemma.*



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# Introduction

The issue of tax evasion is as old as tax itself (Andreoni, Erard, and Feinstein, 1998). Old Empires, as Babylon in the ancient Mesopotamia, were already experiencing such issue (WILDAVSKY and WEBBER, 1986, p. 58). “*Tax evasion is the crime of not declaring income to a tax authority*” (MURPHY, 2014). This difference between due and paid taxes is also known as the tax gap. It is directly linked to the shadow economy activity. This activity is protean (black market, paying “under the table” or working “off the books”) but globally shows the mere fact of producing an economic good or activity without being taxed by the state. In 2011, the total tax evasion is estimated to exceed 5.10% of the world GDP (3.1 trillion dollars) according to the Tax Justice Network.<sup>1</sup> The size of the shadow economy is globally equal to 18.10% of the world GDP. It means that one dollar out of six in the world is tax free. This rate increases to one euro out of five in Europe, and one euro out of four in Greece or Italy. Tax evasion is a major problem as it deprives governments from public resources.

The discipline that studies tax evasion and compliance in the lab, behavioral public economics (sometimes referred to as behavioral public finance), is now an established subdiscipline of experimental economics. Research—and especially research in experimental economics—addressed quite early the problem of tax evasion. It will soon be 40 years since the publication of the first tax evasion game results, from Friedland, Maital, and Rutenberg (1978), in the *Journal of Public Economics*.<sup>2</sup> As noted by Torgler (2016), the number of tax experiments increased steadily since the 90s for the laboratory tax experiments, and the increase is even more striking when considering the field tax experiments (see respectively Figure 1 and 2). Since the seminal work of Friedland, Maital, and Rutenberg (1978), the research on tax evasion has known

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<sup>1</sup>This computation is the result of applying an average tax rate (28.10%) on the estimation of the total shadow economy (11 trillion dollars) in the world (see *Tax Justice Network* from 11/2011).

<sup>2</sup>As a comparison, the first versions of ultimatum and dictator games—probably the most known and played games in experimental economics—happened “only” in 1982 and 1986 (Güth, Schmittberger, and Schwarze, 1982; Kahneman, Knetsch, and Thaler, 1986).

Figure 1: Yearly number of published laboratory tax compliance experiments (Torgler, 2016)

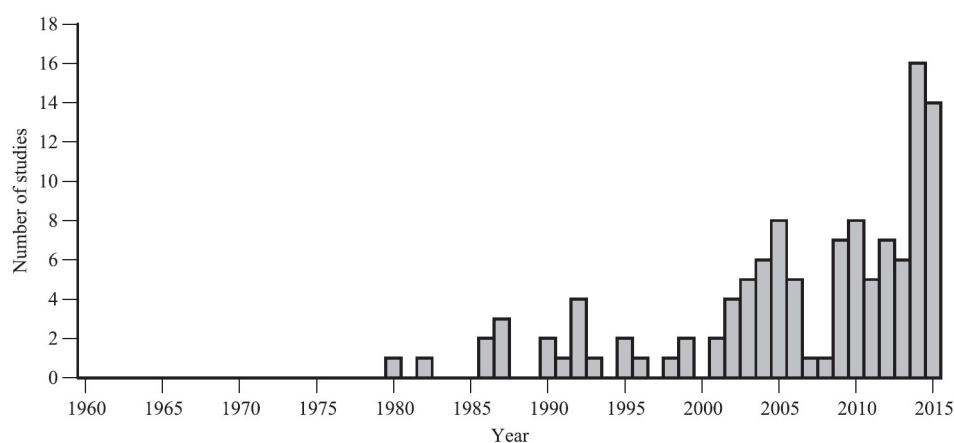
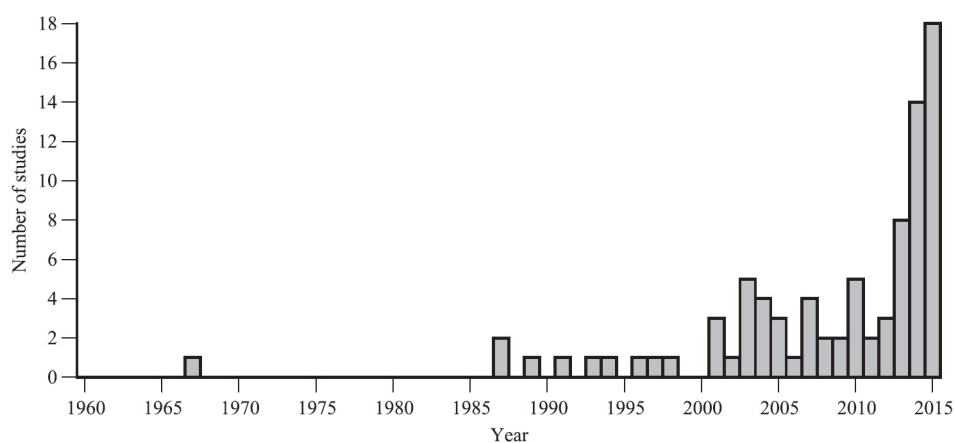


Figure 2: Yearly number of field experiments on tax compliance (Torgler, 2016)



several changes for the past forty years..

This success of tax experiments has probably two main reasons. First, as it deprives governments from resources, big interests are at stake in reducing tax evasion and attention has been focused on all the possible ways to do so, including experimental economics. Public administration thus financed behavioral research to find solutions to fight tax evasion or simply provide a more taxpayer-friendly service. Second, there is a need for observable and reliable data about tax evasion, this kind of dishonest behaviors being by nature impossible or very complex to measure in the field (Muehlbacher and Kirchler, 2016). Tax evasion games have been used to substitute to field data and make experimentation possible. Selection bias on the available data makes it difficult to capture the bigger picture of tax evasion, field data only coming from evaders who are caught. Lab experiments also allow to isolate the causal inference of treatments, “*whereas existing institutions are adopted endogenously*” (Falk and Heckman, 2009, p. 536). For example, in real life, audits rates can be reinforced when evidences of an increased criminal

activity appear. Lastly, the lab allows to test many different institutions and observe directly the results in terms of compliance.<sup>3</sup> Without the use of tax experiments, this would have been way more complex or impossible.

The present thesis is part of the behavioral public economics discipline. The discipline was first born to test the traditional economic model to account for tax evasion, inspired from the economics of crime models. However these models have rather failed to explain real life compliance. As a consequence, other sources of compliance—coming from behavioral economics and psychology—have been put forward to explain it. Two of these sources, individual personality of taxpayers and context in which taxpayers are inserted when filing, are studied here. It is done in the three following Chapters.

## 0.1 The traditional economic analysis of tax evasion

Since the 60s and the seminal contribution of Gary Becker, economics of crime is “*part of the standard portfolio that makes up the discipline*” (Machin and Marie, 2014 p. 7). Before the behavioral approach, the traditional economic analysis of tax evasion was born and flourished first within economics of crime. The traditional economic analysis of tax evasion, passing by standard economics of crime, are presented here.

### 0.1.1 Economic analysis of crime

For the first time, Becker (1968) has put in evidence that crime behavior was not an “*inevitable result of underlying social conditions*” but rather coming from “*individual choices influenced by perceived consequences*” (Machin and Marie, 2014, p. 8). In other words, the decision to commit a crime is influenced by a tradeoff between an expected cost and an expected benefit. In this view, “*the bad guys commit crime unless they are incapacitated, and the good guys are reliably law abiding*” (Machin and Marie, 2014, p. 7/8).

In his model, Becker described the supply of offenses as an aggregation of individual functions,  $O_j$ , which depends on  $p_j$ , the probability of conviction per offense,  $f_j$ , the probability of punishment per offense and  $u_j$ , all the other influences. This is represented as:

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<sup>3</sup>To define this term here once for all, compliance is the declared income divided by the earned income.

$$O_j = O_j(p_j, f_j, u_j) \quad (1)$$

Naturally, as the probability of detection or the size of punishment ( $p_j$  and  $f_j$ ) increase, the number of offenses ( $O$ ) decreases. But Becker went even deeper in its individual analysis and described the direct “*utility expected from committing an offense*” for  $j$  (Becker, 1974, p. 10) as:

$$EU_j = p_j U_j(Y_j - f_j) + (1 - p_j) U_j(Y_j) \quad (2)$$

$Y_j$  stands for the monetary and psychic income from committing an offense,  $U_j$ , for the utility function and  $f_j$  as the monetary equivalent of the punishment. Derivatives of  $EU_j$  according to  $p_j$  and  $f_j$  also revealed to be negative, i.e. that it is not interesting to commit a crime when the probability of detection or the size of punishment were higher, “*as long as the marginal utility of income was positive*” (Becker, 1974, p. 10). This first model is the milestone of the traditional economic analysis of tax evasion.

### 0.1.2 Economic analysis of tax evasion

Inspired by Becker’s approach, Allingham and Sandmo have transferred it to the tax evasion decision (Allingham and Sandmo, 1972). The model captures the moment where the taxpayer decides “*how much of his income should he report and how much should he evade*” (Sandmo, 2005, p. 646).<sup>4</sup>

Let us denote  $W$  the gross income,  $t$  the proportional income tax rate and the amount of income evaded,  $E$ . The declared income is thus  $W - E$ . In the case where the taxpayers evade a portion of his income and is not detected by the tax administration, the net income is:

$$Y = W - t(W - E) = (1 - t)W + tE \quad (3)$$

However if the tax administration discovers that he has evaded, the taxpayer has to pay a penalty,  $\theta$ . In the original Allingham and Sandmo (1972) model,  $\theta$  depends on the evaded

<sup>4</sup>This part and the following are inspired from Sandmo (2005) (including notations).

amount. In this case, his net income is:

$$Z = (1 - t)W + tE - \theta E = (1 - t)W - (\theta - t)E \quad (4)$$

A taxpayer's utility is defined over two states of the world, depending on whether or not an audit occurs with the probability  $p$  and  $(1 - p)$ . The amount of tax evaded is chosen so as to maximize his expected utility:

$$V = (1 - p)U(Y) + pU(Z) \quad (5)$$

$U$  is assumed to be increasing and concave. The taxpayer is thus risk-averse. The amount of money evaded optimally is obtained while derivating Equation 5 according to  $E$ , leading to the subsequent first-order condition:

$$\frac{U'(Z)}{U'(Y)} = \frac{(1 - p)t}{p(\theta - t)} \quad (6)$$

Standard interpretation is that the taxpayer is willing to evade one marginal unit of income if and only if, the expected gain  $((1 - p)t)$  is higher than the expected cost  $(p(\theta - t))$ .

If the parameters  $(\theta, p, W$  and  $t)$  change, the optimal amount of money evaded also changes. Signs of the derivatives according to  $\theta$  and  $p$  are both negatives: higher penalty and probability of detection rates unambiguously increase compliance. Concerning  $W$ , the gross income, authors made the common assumption that the measure of absolute risk aversion is decreasing. It leads to think that, as people get richer, they will engage in riskier activities. However  $t$  has an ambiguous effect because it is constituted of two sub effects: the negative income effect (when  $t$  increases, people are poorer and take less risks) and a positive substitution effect. This ambiguity has been deleted by the work of Yitzhaki (1974).

### 0.1.3 An addition of Yitzhaki

According to Yitzhaki (1974), the last result on the ambiguous effect of  $t$  depended on the "assumption that the penalty is imposed on the amount of income evaded" (Sandmo, 2005, p. 647). If

the penalty is rather imposed on the evaded tax (as e.g. in the American or Israeli system), the penalty would be  $\theta tE$  with  $\theta > 1$ . Under this assumption, equation 4 would become:

$$Z = (1 - t)W - (\theta - 1)tE \quad (7)$$

In this model, only the negative income effect remains. It would mean that increasing the tax rate induces people to comply more. Sandmo (2005) underlines that this addition, even though it deletes the ambiguity from the original model, concludes on a quite counter intuitive relationship between tax rate and compliance.

Works of Allingham and Sandmo (1972) and Yitzhaki (1974) (well often referred globally as the Allingham-Sandmo-Yitzhaki model) are the milestone in theoretical understanding of tax evasion decision. It has now been extended in a various number of ways (see e.g. Hashimzade, Myles, and Tran-Nam, 2013 for an application of behavioral approaches to tax evasion).

## 0.2 Methodological approach of conceiving a TEG

The experimental approach has been developed on tax evasion originally to test the previous cited models and observe if people reacted as models predicted. Tax evasion games were more and more numerous to be organized and they considerably expanded their scopes. Even though they started as a tool to test models, they finally became a way to produce scientific knowledge in itself.

Therefore, the open challenge was to find the way to relate behavior observed in the lab to the behavior observed in real life. It is the question of internal validity (*"how to build an experiment such that observed behavior can be related to the institutions under study"*, Jacquemet and L'Haridon, 2017, p. 35). TEG should be designed carefully to represent the tax decision of participants. The core game is usually as follow: participants get an income and are asked to declare it, knowing that declared income will be taxed according to a common knowledge tax rate.<sup>5</sup>

However there is always a tradeoff between improving the internal validity of TEG (i.e. copying real life parameters) and threatening the external validity (i.e. until what extent results

<sup>5</sup>This is a general description of a TEG. The description of the experimental designs of this thesis takes place in each of the Chapters.



obtained from TEG can be generalized). External validity teaches about “*what do decisions taken in the artificial framework of a laboratory tell us about real life*” (Jacquemet and L’Haridon, 2017, p. 35). The most prominent criticisms on external validity of economic experiments—and indirectly of TEG—are probably coming from Levitt and List (2007). Attention is focused here on answering each particular criticisms: scrutiny of participants’ behaviors, lack of anonymity, framing of lab decisions, size of stakes, selection into experiment (pool of subjects), temporal limitation and limited range of decisions of experiments. Critics and answers are organized in the original order from Levitt and List (2007). Main answers have already been provided in Torgler (2002); Bloomquist (2009), Alm, Bloomquist, and McKee (2015) and Muehlbacher and Kirchler (2016).

### 0.2.1 Scrutiny of behavior and anonymity of participants

Laboratory experiments involve a different relationship between participants and experimenter, compared to the field. Participants know that their behaviors will be under great scrutiny in the lab, and they also know that their anonymity is not totally insured.

To illustrate the latter, List (2006) has presented the very well-known baseball cards traders experiment. In a lab experiment, baseball cards traders rewarded, as in a gift exchange game, higher prices with higher quality cards. However in the field, when the baseball card sellers were not scrutinized, this relationship between quality and prices did not exist anymore. Pro-social behaviors would be exaggerated in the lab compared to the field. It would translate in producing less evasion in TEG, compared to the field. To answer this concern, Bloomquist (2009) first of all underlined that it is not sure “*that subjects perceive a heightened sense of scrutiny in the lab versus outside the lab*” (p. 118). It is especially true when the rather high compliance rates in the field are compared to the rather low lab compliance rates. Moreover in real life, unless cash transactions off the desk, taxpayers know that tax administration fights against tax evasion and audits some taxpayers each years. Real taxpayers, as participants from TEG, are already scrutinized, even though not as much.

The latter is illustrated using List, Berrens, Bohara, and Kerkvliet (2004) article: the less a public good game is anonymous (using a randomized response technique), the more participants contribute. Knowing that someone observes you should make you less willing to cheat in a

TEG. However first of all, “double blind” procedures—procedures that ensure full anonymity of participants—can be used to limit this effect. Secondly, Bloomquist (2009) also highlights that all TEG do not automatically possess a public good. Third, once again, no one remains anonymous towards tax administration.

To sum up, the problem of scrutiny of behavior is disputable when it comes to the TEG, especially because taxpayers are considered to be already scrutinized. Anonymity of taxpayers is also not ensured in real life. This problem could also be easily countered by using “double blind” procedures.

### 0.2.2 Context of the experiment

Context of the experiment can be varied in 3 ways: framing, earned vs windfall income and use of collected taxes. Each part—and its threat for the external validity of the TEG—is reviewed here.

The instructions given to participants in a TEG can possibly challenge the generalizability of the compliance rates found. It can be tax framed or neutral. A tax frame designates the use of such words: income, tax rate, audit instead of earnings, withholding rate, check. Ways of asking for compliance can be very directive or quite relaxed.

Income can be donated or earned by the participants themselves. Most of the time, earned income was implemented through a real effort task or, less commonly, using hypothetical effort (i.e. making participants believe that there was a strong selection and that they have been the very best). It was first assumed that effort invested to earn an income would make participants less willing to be taxed, thus decreased tax compliance (via sunk cost effect or simply feeling of property). However the reverse effect can also be hypothesized: effort invested can also increase risk averse decisions, participants could not wish to risk their hard earned income (reverse sunk cost effect), see Durham, Manly, and Ritsema (2014) to learn more about these effects. The nature of income, coming from a salaried job or from self-employment, implies a difference in the detection probability since income from self-employed workers are self-declared. This problem was also investigated experimentally below.

Tax rate applied to income results in an amount of collected taxes. These collected taxes can

be kept by the experimenter to reduce the cost of the experiment (thus considered as burned for the taxpayers, as in Fortin, Lacroix, and Villeval, 2007), redistributed to participants, with or without a social multiplier—as a public good game with a marginal per capita return—, or donated to finance a real life public good.

### 0.2.2.1 Neutral vs loaded frame

Some experiments showed that framing influences participants' behaviors. Among them, Baldry (1986) studied behaviors in two experiments where participants played a framed TEG and others played an equivalent game (a gamble) that was not framed. The results show that participants behaved differently, those from the framed experiment evading less. In Webley and Halstead (1986), authors made participants playing a TEG presented as an "economic game" and debriefed them afterward. The results show that most subjects saw the experiment as a game, and that they would not behave in the same way in real tax setting. Authors investigated this point and ran another session where participants were told to participate in an "economic problem". In this session, participants which instructions were framed as an economic problem have maximized their income more and under-declared more. Wartick, Madeo, and Vines (1999) also found that participants playing a TEG with framed instructions evaded less income and that older subjects (25 years old and more) complied even more than younger subjects (less than 25). It was concordant with what Mittone (2006) has found when comparing a TEG and an equivalent gamble: participants indeed evaded less under tax framing. Trivedi and Chung (2006) showed that there was also no difference between tax terminology and non-tax terminology in a TEG when income was low. However there was an effect of context when incomes were medium or high: participants evaded less under tax framing. Choo, Fonseca, and Myles (2015) also showed that tax frame could be of some importance, especially on non-students who evaded less when the experiment was framed. Two experiments that were not TEG can be also interesting. First, King and Sheffrin (2002) showed in a scenario-based survey, that subjects were reluctant to evade taxes even when using frames to stress the unfairness of the tax regimes. Second, in Jacobsen and Piovesan (2015), participants played a dice-under-cup experiment where they could earn money. When the instructions were tax framed, participants reported higher level of income compared to when it was not.

On the other hand, Alm, McClelland, and Schulze (1992) concluded that the use of neutral

wording did not change behavior in a TEG. Wartick, Madeo, and Vines (1999) and Durham, Manly, and Ritsema (2014) also made reference to an experiment ran by Swenson (1996) where *“experimental markets were created in the laboratory where buyers receive tax credit for purchasing a commodity”* (Wartick, Madeo, and Vines, 1999, p. 23). The results show that there was no difference using framing or not. Durham, Manly, and Ritsema (2014) also showed that overall context did not matter in tax evasion, however it could have a joint effect with income source and income level, or with income source and time.

There is no automatic effect of context/framing overall, but it can have an effect regarding socio and demographic variables, income source or income level. When an effect of context exists, it goes almost anytime in increasing compliance. This effect can be related to social norms, pushing towards more compliance: it is socially accepted to pay taxes.

#### 0.2.2.2 On the way to ask for compliance

Of importance is also the way to ask for compliance in the TEG. As quoted by Cadsby, Maynes, and Trivedi (2006), many experiments communicated to participants that they *“may report any amount of income from zero up to the amount they actually earned or received”* (p. 944). This sentence can be interpreted as a subtle invitation to gamble. To investigate this effect, Cadsby, Maynes, and Trivedi (2006) ran a non-framed experiment where they underlined the importance of declaring the full amount of income earned. In almost all of their treatments, a huge majority of subjects chose to report 100% of their income.

Framing of TEG also matters in the instructions given to the participants. The way to ask for compliance induces participants to over report or under report and the instructions should be carefully designed on this point.

#### 0.2.2.3 Origin of income: earned vs windfall income

Few experiments investigated the origin of income. Amongst them, there are first the experiments that compare earned vs endowed amount of money. A first framed TEG showed that people who earned money (through 1 hour of multiplication) were evading as much taxes as people endowed with money. However when the tax rate increased, participants with earned

income increased their compliance and participants with endowed income decreased their compliance (Boylan and Sprinkle, 2001). In Boylan (2010), participants of a neutral TEG were either endowed with income or earned an income (30 minutes of multiplication). The results show that compliance was higher for participants earning an income in the first rounds before an audit. Rounds after rounds, participants with earned money decreased their compliance while it was the reverse for those with endowed money. After an audit, these behaviors were even more polarized. In Durham, Manly, and Ritsema (2014), participants had to participate in a double auction market at the beginning of each round to earn an income. In the other condition, they were randomly given the same incomes. The results show that origin of income had no impact on tax evasion. It also had no impact coupled with context. However it had a negative impact within subjects across time, when coupled with the period on one hand, and when coupled with income level and context on the other hand. Peliova (2015) set a TEG with windfall vs earned income. Author observed less income declared in the first case (36.77%) compared to the second one (31.93%). An interesting result was that participants' gender was a visible factor. Men (women) declared 10.72% (47.50%) of their windfall income and 26.92% (37.25%) of their earned income.

Other studies featured different level of difficulty to earn an income and compared it to endowed income. In the framed TEG of Kirchler, Muehlbacher, Hoelzl, and Webley (2009), there were 3 hypothetical efforts levels (no effort, low effort and high effort). In their first and second experiments, participants in low effort condition in average evaded more income than the others. In Bühren and Kundt (2013), participants earned money through high effort (difficult and long counting of ones and zeros in boxes filled with digits), moderate effort (less difficult and long same task) or no effort (windfall endowment). Results proved that moderate effort income was least likely to be evaded as opposed to high effort or endowed income.

To conclude, there are no clear results of the origin of income on tax compliance decisions. There are interactions effects with audit, tax rate, context, income level or periods, gender and hypothetical vs real effort setting. More research is needed to understand how these parameters interact.

#### 0.2.2.4 Nature of income: self-employed vs salaried job

After deciding if subjects of a TEG earned or were endowed with an income, experimenters can also propose to subjects to choose between an income where they have the opportunity to cheat (self-employed) and one in which they cannot (salaried), so as to reveal participants' preferences.

In Gërkhani and Schram (2006), participants chose first between unregistered (self-employed) and registered (salaried) income. They then draw randomly within one of these sets, an income. Registered income have a high average and a low standard deviation and unregistered income have a lower average and a higher standard deviation. The registered income was audited for sure. The unregistered income was audited with the probabilities 0%, 16.67% or 50%. The results show that participants who chose a registered income declared truthfully their income. Participants chose more often an unregistered income when tax evasion was possible. However all participants who chose an unregistered income did not cheat. In Alm, Deskins, and McKee (2009), participants earned an income and this income was divided in a "matched" income and "non-matched" income. The probability of detecting matched income was 100%. The probability of detecting non-matched income varied across treatments between 25% to 75%. Thus, non-matched income came from self-employment. Overall subjects did not declare all of their non-matched income. No connection could be made between percent of income received as non-matched income and compliance. There was a slight downward trend but compliance was at the highest when participants received half of their income as non-matched income. Elaborating on the example of Gërkhani and Schram (2006), Lefebvre, Pestieau, Riedl, and Villevall (2015) decided to make participants chose between a registered and an unregistered income. A lottery drew the amount of gross income effectively perceived by the participant, across a set of possible incomes. Unregistered income had the highest standard deviation and registered income, the lowest. The registered income was automatically taxed. People with unregistered income had first to choose between reporting or not, and then decided of the amount to report. The results show that 60.64% of participants chose an unregistered income and among them, 40.65% chose to evade a portion of their income.

When income comes from a salaried job and has 100% chances of getting audited, participants declare their income more truthfully, in comparison to when they have an unregistered income. Unregistered income is rather successful: participants choose more often an unregistered in-

come when it is available. As unregistered income is expected to be lower when fully taxed, it reveals some intentions to cheat. However it does not lead automatically to more evasion. Therefore people like to keep an opportunity to cheat.

#### 0.2.2.5 Redistribution to participants

There is two ways to use collected taxes in a TEG. The first case studied is when collected taxes are redistributed to participants. In Becker, Büchner, and Slesking (1987), different rates of transfer share of taxes collected were implemented (0.60%, 1.20%, 1.80% in one condition and 1.70%, 3.40% and 5.10% in one other condition). The results show that the amount of public money received by participants impacted negatively their decision to evade taxes. However this relation was not significant with regard to the amount of taxes evaded. In Alm, Jackson, and McKee (1992a), the compliance rate raised from 26.20% to 55.70% when money was placed in a group fund, multiplied by two and shared equally among the taxpayers. With a similar treatment, Alm, Jackson, and McKee (1992b) observed a raise in compliance from 33.20% to 37.40%, but only in a weakly significant way. Alm, McClelland, and Schulze (1992) showed that the higher the multiplier of the fund, the higher the compliance rate. Compliance rates were: 43.50%, 53.70%, 59.20% with multipliers equal to, respectively, 0, 2 and 6. Increasing the social multiplier increased the compliance but at a decreasing rate. Alm, Sanchez, and De Juan (1995) have investigated the impact of redistribution of the tax fund, but also the composition of the group. In one condition, tax fund was redistributed for a certain number of rounds to a fixed group, in the second condition, tax fund was redistributed to a group whose members turned over. In these two conditions, the social multiplier was equal to 2. These conditions were compared to others without a tax fund. There were no differences between the status of the members of the group that was getting the tax fund (compliance with fixed members: 27.80%, compliance with variable members: 26.60%). The results also show that in this experiment, taxpayers in sessions with a tax fund only marginally increased their compliance (compliance in average of 25% in control condition). Bosco and Mittone (1997) implemented a TEG where taxes were partially redistributed. The results show that without redistribution, 80% of participants evaded. With redistribution, this rate decreased to 46.70%. The presence of redistribution decreased the decision to evade and the amount of money evaded. In Alm, McClelland, and Schulze (1999), when the social multiplier was  $1/2$ , compliance was 14%. When the social multiplier increased up to 2, compliance also increased to 44%. Park and Hyun (2003)

set a TEG where tax fund was redistributed to participants in one condition compared to when it was not. The results show that the presence of a public good had a significant negative impact on tax compliance. Torgler (2003) compared real taxpayers in two conditions: one with redistribution of taxes collected and one without. The social multiplier was set to 2. The results show that with redistribution, taxpayers increased their declaration from 57.50% to 85% of their income. In Gërzhani and Schram (2006), authors ran sessions with or without a redistribution of taxes collected for participants, with a social multiplier equal to 1. The results show that with a public good, participants chose more often a registered income, but it did not overall significantly decrease tax evasion.

To sum up, as proven by Blackwell (2007), redistribution has a strong positive impact on compliance, that increases with the size of the social multiplier. Papers showing this result are numerous, even though this effect is not automatic. However it is not the only use of collected tax that has been considered..

#### 0.2.2.6 Public good fund

The second case studied is when taxes fund a real life public good. Mittone (2006) has compared compliance rates under three conditions: money was burned in the baseline, or people got the amount of tax collected back via redistribution (without any social multiplier mentioned), or tax were used to invest in a real-world public good (a scholarship). Evasion rates (measured as the average percentage of acts of evasion) were: higher in the baseline (52.83%), lower with the investment in a public good (39.72%) and even lower in the redistribution condition (27.72%). However in Masclet, Montmarquette, and Viennot-Briot (2013), the results show that there were no differences across the two following conditions: when participants' taxes were invested in the purchase of carbon offset credit to counter greenhouse effect and when participants' taxes were burned.

The question of the choice of the real life public good is also important. The more participants supported the organization that would get the tax collected, the more participants complied (Alm, Jackson, and McKee, 1993). Indeed, when students have to comply for two organizations, the favorite one (about student support) and a least favorite one (university support), the favorite one got more tax funding than the other. The results also show that having the possibility to vote (or signal preference) on the preferred tax recipient increases compliance in Alm,



Jackson, and McKee (1993); Wahl, Muehlbacher, and Kirchler (2010); Lambertson, De Neve, and Norton (2014). Alm, McClelland, and Schulze (1999) also showed that participants vote according to their own interests with respect to the tax fund parameter. When the social multiplier was high, they voted in favor of a tax rate increase, and against when the social multiplier was low.

But what was the difference between redistribution to participants and donation on tax compliance? The only paper investigating this effect is from Doerrenberg (2015). Tax fund was either equally distributed between participants, invested in a research fund, donated to Red Cross or transferred to the German federal budget. The results show that compliance rates were respectively 30.22%, 42.52%, 40.87% and 34.94%. Even though tax compliance was higher when money was donated for research or charity purpose, these differences were not significant.

An alternative to redistribution is to donate the tax fund to real life public goods. It is interesting to underline that even in the case where no direct counterparts are given to the participants, e.g. when the social multiplier is 0 or when money is donated to a real life public good, the compliance is never 0. The results have not yet been set concerning the difference between donation and redistribution: which one performs better? Last but not least, when participants have the possibility to choose the destination of the donation, compliance increased (a phenomenon known as the direct democracy effect).

### 0.2.3 Size of stake

In experiments, the size of the stakes are most of the time rather low and constant. Participants are remunerated for their time often less than 20 € per hour. Some rare experiments, such as Andersen, Ertac, Gneezy, Hoffman, and List (2011) showed that raising the stake of the experiment (up to one year of income) induced very strong differences of proposals in a ultimatum game. It is obvious that TEG have nothing to do with real life earnings in terms of amounts. Bloomquist (2009) addressed this issue, using field data from the IRS, taxpayers were Schedule C filers subjected to IRS random audits, a subset of the Internal Revenue Service's National Research Program from 2001. Looking at the behavior of real taxpayers, the idea was to look for stake effects in the distribution of mean reporting rates across ranges of income. *"If self-interested behavior increases with the size of stakes, then we should expect to see less compliance*

*as income increases*” (Bloomquist, 2009, p. 119). The results show that compliance rates do not increase linearly with the income level (from 0 to more than 50,000 \$). Looking for stake size in TEG is thus pointless when real life data does not demonstrate such effects.

#### 0.2.4 Students are a valid pool of subjects

Another threat to the external validity of TEG and experiments in general, is that university students are well often invited as subjects. However it is the compliance behavior of taxpayers that researchers want to study. As introduced in Jacquemet and L’Haridon (2017), this threat is worrying only if “(i) *real-world economic agents are not university students, and (ii) there are reasons to believe that students behaviour is likely to be different from the [taxpayer] population*” (p. 380). There is to worry only if these two points are met.

The first point is indeed valid. Students are not representative of taxpayers. Their social and demographics characteristics are well often different from those of the taxpayers’ population (Alm, Bloomquist, and McKee, 2015). Students also have little to no experience of tax returns filing: e.g. in France they most of the time do not declare their own income and are on their parents’ tax return.<sup>6</sup>

The second point could also be valid. To address it, some experiments vary their pools of subjects. Gërkhani and Schram (2006) made different pools of participants play a TEG. They were high school students, university students, high school teachers, nonacademic university staff and academic staff. Authors did this experiment in Albania and in the Netherlands. The results show that tax evasion rates were higher for students compared to teachers. Alm, Bloomquist, and McKee (2015) proposed an experiment where participants were university students or university staff and faculty. Authors also varied different parameters in the TEG: audit, information, benefits etc. The results show that students complied differently from staff members. However across the different treatments, changes of compliance rates went in the same directions for both pools of subjects. In Choo, Fonseca, and Myles (2015), 520 individuals played a framed TEG in the first experiment, including 200 students with no prior experience of tax, 200 company employees who declared taxes directly through their company (declaration for salaried employees) and 120 self-employed taxpayers who declared themselves their incomes. Experimenters tested different set of fines and audit probabilities. The results show that there

<sup>6</sup>Article 194 from the french General Tax Code.

were indeed differences in compliance across groups: students were the least compliant participants compared to company employees and self-employed taxpayers. However students were more responsive to treatment changes compared to other groups, they complied less after an audit. Removing the tax frame of the experiment, i.e. making it a gamble, suppressed the difference across groups of participants. Norms of compliance from outside the lab were supposed to be at the origin of the enhanced compliance observed for non-students participants.

To conclude on the differences coming from the pools of subjects, student and non-student participants are different and they can behave differently (with students being less compliant). This difference could come from a norm from outside the lab and disappears outside the tax frame (Jacquemet and L'Haridon, 2017 already show the impact of experience on lab behavior). It could also come from the fact that real taxpayers benefit from a public good, in real life. This dimension is not taken into account when comparing taxpayers to students, and could explain differences of compliance. Another explanation could come from the difference between social and demographic variable: students can be poorer, younger etc. than real taxpayers. However tax evasion experiments are valuable because changes of students' behavior are the same, compared to non-students. Students sample may be like "*fruit flies to the geneticist*" (Ashton and Kramer, 1980, p. 13), the first step to generalize a lab experiment to other samples, or to a field experiment. Students are thus a valid pool of subjects for TEG.

### 0.2.5 Temporal limitation

Muehlbacher and Kirchler (2016) already underlined the temporal problem of compliance: in real life, Austrian taxpayers can know after up to 7 years if their tax declaration is being audited. It could lead to a discount of the future fine, or a major stress while waiting for a possible audit. Only three papers studied the impact of temporal distance between the tax declaration and the audit. Muehlbacher, Mittone, Kastlunger, and Kirchler (2012) made participants play a one-shot TEG in which audit results were announced immediately or after three weeks. The results show that immediate feedback provoked higher evasion. Kogler, Mittone, and Kirchler (2016) confirmed this result in a TEG with immediate/non-immediate feedback and repeated periods. However Cadsby, Maynes, and Trivedi (2006) let participants in a TEG think about their tax declarations for one week before filing and it led to the reverse, i.e. tax compliance rates were lower.

Time seems to have different impacts: when participants know that they will have to await a possible audit, they comply more. However when they have more time to declare, they tend to evade more. Even though more evidence should be needed on this point, temporal aspect seems indeed to be a limit on the external validity of TEG.

### 0.2.6 The decision task in a TEG is a valid measure of tax behavior

Another important criticism towards tax evasion games (as there are against experimental economics in general) is that one can wonder if the experiments are really revealing of behaviors in the field. In an experiment, choice set is reduced. To illustrate this, in Lazear, Malmendier, and Weber (2012), participants could opt out from a dictator game and it led to significant different sharing rates.

This question is addressed in an analysis done by Bloomquist (2009) and republished in Alm, Bloomquist, and McKee (2015). The aim of the study was to compare reporting behavior from a group of US taxpayers and participants from different tax evasion experiments. Again, taxpayers were Schedule C filers subjected to IRS random audits. The results show similarities in behaviors. In the field, the mean compliance rate was about 31.30% for an audit probability of 1.72%, compared to 28.80% (or 40.40%) compliance when the audit was 0% (or 5%) in the lab. The results show that the distributions of compliance were also similar: both adopted a bi-modal distribution, with the first mode being 0% of compliance and the second one being 100% compliance. Authors also noted that they observed approximately equal shares of fully compliant individuals in both settings. These similarities were being observed when scrutiny, anonymity, context, size of stakes, pool of participants, individual characteristics, time were significantly different.

To conclude on the criticisms of TEG, when compared to the appropriate data, compliance rates obtained in the lab are globally equivalent to those observed in the field, whatever the framing, size of stake and pool of subjects. Therefore Levitt and List (2007) criticisms are not fully righteous, when applied to the external validity of TEG.

### 0.3 The impact of traditional deterrent variables on lab tax compliance

It has been shown previously the elements to take into account to produce a valid tax evasion game, and what do these elements produce in terms of compliance. We have also seen previously that the Allingham and Sandmo model predicted that: audit probability, size of fine should increase tax compliance and tax rate should have an ambiguous impact on tax compliance. Yitzhaki's addition predicted that tax rate should have a negative impact on tax evasion. This Section puts theory to the test of experimental practice, it describes below the impact of the traditional deterrent variables—tax rate, audit probability, size of fine—in incentivized TEG.

#### 0.3.1 Tax rate

As in the Allingham and Sandmo (1972) model, only TEG using flat tax rate are mentioned here. Existing evidence is inconclusive. The effect of tax rate on lab tax compliance is rather ambiguous. The amount of papers collected here is separated in two paragraphs: first, the papers showing a negative effect of tax rate on compliance. Second, the papers having reversed, mixed or no effects.

Friedland, Maital, and Rutenberg (1978) considered two tax rates: 25% and 50%. When the tax rate was 25%, the proportion of income declared was 87%. When the tax rate was about 50%, the proportion of income declared was 66%. In Baldry (1987), an increase in the marginal tax rate increased also participants' evasion. In Collins and Plumlee (1991), tax rate was set to 30% or 60%. The results show that when tax rate was high, evasion was higher. In the experiment by Alm, Jackson, and McKee (1992b), the tax rates were 10%, 30% and 50%, leading to average compliance rate equal to 37.60%, 33.20% and 20%. Park and Hyun (2003) varied tax rates in their TEG from 10% to 40%. The results show that increasing tax rate had a significant negative impact on tax compliance. Alm, Deskins, and McKee (2009) also varied tax rate from 35 to 50% in their TEG and showed that it decreased compliance by 11.60 points. The most comprehensive study on tax rate is probably from Bernasconi, Corazzini, and Seri (2014) where authors compared two tax rates (27% vs 38%) across different treatments and showed that higher tax rate indeed reduced compliance. In Duch and Solaz (2015), there were different tax rates: 10%, 20% and 30%. In the baseline, the results show that high taxes really deterred compliance. Pe-

liova (2015) ran a TEG where tax rates varied from 10% to 40% with increments of 10%. With 20% audit rate, compliance decreased linearly from 62.83% till 45.83% at 30%, where it did not decrease anymore after. With a 5% audit rate, there was a U-shaped relationship between tax rates and evasion: compliance was decreasing from 45.86% at 10% tax rate to 22%, for a 20% and 30% tax rate, then increasing to 29% for a 40% tax rate. In an hypothetical TEG set by Murakami and Taguchi (2015), a tax rate of 30% corresponded to a compliance rate of 80.30%. A 10% increase in the tax rate marginally but significantly increased the compliance rate at 81.46%.

Second, the papers showing mixed or no effects of tax rate on compliance are mentioned here. In Becker, Büchner, and Slesking (1987), three tax rates were used on earned income: 33.33%, 50% and 66.66%. The results show that participants considering their tax burden as high, were less prone to decide to evade. The amount of income evaded was not correlated with the perceived tax burden. Beck, Davis, and Jung (1991) set a TEG with different tax rates: 25% and 50%. Increasing tax rate in this experiment did not lead to increased compliance. In Alm, Sanchez, and De Juan (1995), tax rates were varied across treatments in the following way: 10%, 30% and 50%. The results show that increasing tax rate increased compliance. Compliance rates were respectively of 14%, 24% and 31%. In the pre-vote rounds of Alm, McClelland, and Schulze (1999), the results show that the effects of tax rate on compliance were negligible, going from 28% compliance at 20% tax rate to 29% compliance at 50% tax rate. In Boylan and Sprinkle (2001), tax rate was either 20% or 40%. When incomes were endowed, doubling the tax rate decreased declaration from 61.50% to 55.30%. When incomes were earned, doubling the tax rate increased declaration from 48% to 68.70%. The results show that there were no effects of sole tax rate, but an interaction effects between nature of income and tax rates. In Fortin, Lacroix, and Villeval (2007), authors varied the tax rate from 5% to 70%. Their results show a U-shaped relationships with compliance: higher tax rates decreased compliance up to a 39% tax, but raised compliance afterward.

To sum up, the impact of the tax rate on tax evasion is not clear. Blackwell (2007) showed in a meta-analysis on 20 experimental articles that increasing the tax rate had a positive—but non-significant—impact on compliance. Andreoni, Erard, and Feinstein (1998) concluded on this topic that *"the effect of tax rates on evasion remains unclear"* and *"given the importance of this topic, it surely deserves further investigation"* (p. 839). In this literature review focusing on flat tax rate only, the tax rate seems to deter compliance when it increases. However a quite high number of

articles found no effects, reversed or mixed effects. It rather validates the result from Allingham and Sandmo (1972) on the effect of tax rate. There could exist a U-shaped relationship between taxation and compliance. Below 30%, an increase in the tax rate could decrease compliance. A tax rate between 30% to 40% could be a kind of psychological threshold after which the experiment would be no longer seen as a taxation environment. To preserve the perception of a taxation experiment, the flat tax rate should not exceed 40%.

### 0.3.2 Audit probability

As in the Allingham and Sandmo (1972) model, only experiments using random audits are mentioned here (endogenous audits are not mentioned). Audit has a strong positive impact on lab tax compliance. As in the previous Section, papers showing first a strong positive effect of audit are reviewed below.

In Friedland (1982), audit probability varied from 23% to 54% and lead to compliance rates that were respectively equal to 71.11% and 94.67%. In Spicer and Hero (1985), the number of random prior audits in the first 9 rounds of a TEG significantly reduced taxes evaded in the 10th round. Webley (1987) set a TEG where participants faced both audit probability: 16.67% and 50%. The results show that compliance rates were about 78.52% in the lowest audit probability, and 85.68% in the highest probability. Beck, Davis, and Jung (1991) implemented an experiment dealing with uncertainty. In this experiment, participants faced 40%, 50% or 90% chances of getting audited. The results show that when audit increased, participants declared more income. Alm, McClelland, and Schulze (1992) increased the probability of audit from 0% to 2%, then to 10%. The results show that the first increase more than double compliance rate (from 20% to 50.30%) and increasing it again to 10% made it increase again to 67.50%. These were the results from the TEG played with neutral instructions, but were almost the same for the TEG with non-neutral instructions. In Alm, Sanchez, and De Juan (1995), audit probabilities were varied in the following way: 5%, 30% and 60%, with the fines varying from 1, 2 to 4 the unpaid taxes. Except when the fine was equal to one, the results show that raising audit rates increased significantly compliance. Alm, McClelland, and Schulze (1999) set a TEG where, all else equal, the probability of audit increased from 2%, 10% to 50% and the compliance rates varied respectively from 23%, 39% and 73%. Park and Hyun (2003) set a TEG with the following different audit probabilities: 6%, 10%, 15%. The results show that audit probability significantly in-

creased tax compliance: when audit increased by 1%, compliance increased by almost 1.60%. Kirchler, Maciejovsky, and Schwarzenberger (2003) introduced two probabilities of audit: either 15% or 30% at each periods. The results show that increasing audit increased compliance. In Alm, Deskins, and McKee (2009), the audit probability can be of 10% or 30%. The results state a significant negative impact of audit probability on tax evasion. When audit raised by 20 points, compliance increased by 4.9% *ceteris paribus*. Cummings, Martinez-Vazquez, McKee, and Torgler (2009) made participants from South Africa and Botswana played a TEG varying the audit. When audit increased from 10% to 30% with a fine of 1.5 times the amount evaded, compliance increased from 49.40% to 56.90% for South Africans but decreased from 61.70% to 41.80% for Botswanans. When the fine was 3 times, and the audit rates increased by 10 points from 10% to 40%, authors observed a quasi linear increase for South Africans (from 48.50% to 69.74%) and an increase for Botswanans (from 62.20% to 74.99%). In Peliova (2015), when probability of audit increased from 5% to 20%, compliance increased too for any different level of tax rate (see Section 0.3.1).

A fewer number of papers have mixed or no effects of audit on compliance. Friedland, Maital, and Rutenberg (1978) studied in their seminal work the difference between large audit coupled with lower fines and few audits coupled with large fines. When probability of audit was equal to 6.67% and fine to 15 times the amount evaded, compliance amounted to 87.40% of income. When probability was 33% and fine 3 times, compliance was equal to 79.60%. Increasing audit here does not seem to have a strong impact, probably because it was accompanied with a decreasing fine. Alm, Jackson, and McKee (1992b) set a TEG all else equal with different audit rates: 2%, 4% and 6%. Compliance results were respectively of 32.10%, 33.20% and 36.50%. Compliance was indeed increasing with the audit but in a non-linear and non-significant way. Choo, Fonseca, and Myles (2015) showed that doubling the audit probability from 20% to 40% had no impact on any of the three subjects pools from their experiment. When audit probability increased, compliance also increased generally. However the sole impact of audit cannot be really identified as it was mixed with fines. This result only held for fines greater than 1.

To sum up, compliance is never 0, even when audit is set to 0% (Alm, McClelland, and Schulze, 1992). It is rarely over 80% too, unless with very high audit rate (Friedland, 1982). Nonetheless, in the lab, audit is probably the least ambiguous variable available to encourage compliance. The existing literature showed that increasing audit probability, all else equal, increased tax compliance. Few articles found no or mixed results of increasing audits. Two meta analysis are



also concordant on this result. For Blackwell (2007), an audit has a significant positive impact on tax compliance. Bloomquist (2009) regrouped data coming from different TEG, involving 1,072 participants (including only treatments) and 252 participants (considering only the baseline TEG). In the TEG including treatments, the mean reporting was strongly increasing when increasing the audit probability, from 28.80% at a 0% audit probability to 63.80% at a 40% one.

### 0.3.3 Fine size

As fine increases, lab tax compliance also increases. It is demonstrated in the following literature review classified in chronological way.

In Friedland, Maital, and Rutenberg (1978), reviewed in Section 0.3.2, frequent audits seem to be less deterrent than important fines. In Friedland (1982), when fine was increased from 3 to 7 times the taxes evaded, compliance also increased from 79.31% to 86.47% when the audit was precisely described and from 83.36% to 85.83% when the audit was vague. In Webley (1987), participants faced both fines: 2 and 6 times the taxes evaded. The results show that in the lowest audit probability, compliance rates were about 77.47%, and 86.72% in the highest probability. Beck, Davis, and Jung (1991) set a TEG where there were two different sizes of the fine: 1.2 and 2 times the unpaid taxes. The results show that increasing fine strongly decreased tax evasion. Collins and Plumlee (1991) chose two types of fines: 1.2 or 2 times the unpaid taxes. Even though the lowest penalty triggered more evasion than the highest, the difference was not significant. Alm, Jackson, and McKee (1992b) set a TEG all else equal with different fines: 1, 2 and 3 times the unpaid taxes. These fines led to compliance rates equal to respectively: 31.70%, 33.20% and 37.60%. The results show that increasing fines indeed increased compliance but in a non-significant way. When the penalty was equal to 5 times the evaded taxes, compliance was 39% in Alm, McClelland, and Schulze (1999). When the penalty was 25 times the evaded taxes, compliance jumped to 58%. In Alm, Sanchez, and De Juan (1995), fines were varied in the following way: 1, 2 and 4 times the unpaid taxes. Coupled with audit probability, there were no differences in the impact of fine when audit was 5%. However at higher audit rates, when fine size increased, compliance raised too. Park and Hyun (2003) set a TEG with the following different fines: 1, 3 and 5 times the unpaid taxes. The results show that size of fine was significant in reducing tax evasion. In Kirchler, Maciejovsky, and Schwarzenberger (2003), there were two fine size: 0.5 and 1 time the amounts evaded. Fine size tended

to increase compliance, but in a non-significant way. Cummings, Martinez-Vazquez, McKee, and Torgler (2009) made participants from South Africa and Botswana play a TEG with different parameters. With a probability of audit of 10%, when the fine doubled from 1.5 to 3 times, compliance was reduced from 49.40% to 48.50% for South Africans, and increased from 61.70% to 62.20% for Botswanans. However when the probability of audit was 30%, stakes were higher. In this case, compliance rates went from 56.90% to 61.80% for South Africans and from 41.80% to 75.10% for Botswanans. In Choo, Fonseca, and Myles (2015), the fine rates were varied between 1 and 2 time the unpaid taxes. Doubling the fine had a positive and significant impact on the pool of subjects but only a marginally significant one on workers.

In Blackwell (2007), the fine has a non-significant but positive impact on tax compliance. However in this literature review it is observed that increasing fines increases compliance. Rarely, it can have mixed or no result on compliance.

#### 0.3.4 From traditional deterrent variables to non-monetary incentives to comply

To conclude on the impact of the traditional economic deterrent variables on lab tax compliance, it concludes in favor of Allingham and Sandmo (1972) findings. They predicted that audit and fine had a positive impact on compliance while tax rate had an expected uncertain impact. It is exactly what is demonstrated when studying tax lab compliance. Traditional deterrent variables have exactly the expected impact foreseen by the classical Expected Utility model.

However even though these parameters globally explain well lab tax compliance, they rather fail to explain real life tax compliance. Indeed, these parameters have been found to be so low that they could not explain the full amount of compliance observed in real life. The research question changed in the early 90s from “*Why do people evade?*” to “*Why do people in fact comply so much?*”. For example, Alm, McClelland, and Schulze (1992) wrote about this tax evasion puzzle:

*“Although it is clear that detection and punishment affect compliance to a degree, it is equally clear that these factors cannot explain all, or even most, tax compliance behavior. The percentage of individual income tax returns that are subject to a thorough tax audit is quite small in the United States, less than 1 percent in recent years. In addition, the penalty on fraudulent evasion in the United States is only 75 percent of unpaid taxes, and the penalties on non-fraudulent evasion are even less. A purely*

*economic analysis of the evasion gamble implies that most individuals would evade if they are “rational”, because it is unlikely that cheaters will be caught and penalized. Yet compliance with the individual income tax remains relatively high; that is, individuals pay far more in taxes than suggested by the standard expected utility theory of compliance. It seems implausible that the low penalties and the low probability of detection that prevail in the United States, indeed in most countries, can by themselves act as an effective deterrent to evasion, unless individuals’ aversions to risk far exceed conventional assumptions. In fact, the Internal Revenue Service (1978) has found that there are numerous factors other than detection and punishment that affect the decision to pay taxes” (p. 21-22).*

In France, according to the *Cahier statistique 2015* of the *Direction Générale des Finances Publiques* (DGFIP, 2015), there were 17,081,041 French tax households in 2015. They paid 75,897,000 € of income tax in 2015. Light tax office interventions are numerous against private persons, there were 7,529,112 Letters of Recovery/Warnings to Pay and 5,815,371 Notices to third party holder. However serious tax office interventions are not so common: only 25 Recoveries of wealth, 326 Foreclosures and 98 Assignments in liquidation. This also led to (few) different Legal actions: 1,033 civil, 371 commercial and 304 administrative litigations. Focusing on fines and audits, a total of 16,121,000 € was detected to have been eluded overall, irrespective of the type of tax. This led to fines equal to 5,072,000 € (i.e. it leads to an effective fine size of 31.46% of evaded amount). Tax income represents 2,789,000 € and Solidarity tax on wealth, 1,016,000 €. Audits of private people led to 853,387 Income Tax Controls and to only 3,902 Reviews of personal tax situation.<sup>7</sup> Related to the number of tax households, it represents an audit rate of 4.99% for the Income Tax Controls and 0.0002% for the Reviews of personal tax situation. However these audits are not random but endogenous: they depend on previous information detained by the tax administration. Globally, French private people pay their required taxes (emphasizing the term “required”, as people could in the first place, conceal some income, and thus, not being required to pay taxes on these amounts). The Rate of individual users complying with their reporting obligations is 98.26% and the Rate of payment of personal taxes is 98.14%.<sup>8</sup> What could be the explanation for these high compliance rates?

<sup>7</sup>The former is a simple check where the tax administration compares the information it has with the provided information. In this case, tax collectors do not need to investigate outside their office. However the former is more serious and controls for the consistency between what is declared on one hand and “on the other hand, the cash position, the assets and liabilities of the taxpayer and the other members of his household” (as quoted in the Bulletin Officiel des Finances Publiques-Impôts, BOI-CF-DG-40-20-20120912, paragraph 250).

<sup>8</sup>According to the indicators of public performance (see *Public Performance Forum*), the rate of individual users complying with their reporting obligations measures “the part of private persons who respect their declarative obligation with respect to the income tax. It therefore reflects their propensity to show fiscal responsibility. To this end, it reports the population of individual users who filed their income tax returns and who have been taxed without penalizing the entire population known to the DGFIP and considered as having to file a declaration”. The rate of payment of personal taxes

## 0.4 Alternative sources of tax compliance

The purpose of this thesis is to highlight the alternative sources, used to explain the high compliance observed in real life. They are namely the individual personality traits of taxpayers and the contextual determinants in which taxpayers are, when filing taxes. They are presented in this Section, along with their impact on economic outcomes, inside and outside the lab. These alternative sources are then used in the different Chapters of this thesis to explain compliance.

### 0.4.1 Personality traits

The HighScope Perry Preschool Program is a good illustration of the importance of personality traits for economic outcomes. In the early 60s, a treatment targeted disadvantaged (economically and intellectually) 3 years old children from Perry Elementary School in Ypsilanti (Michigan). The treatment consisted of *“supporting children’s cognitive and socio-emotional development through active learning where both teachers and children had major roles in shaping children’s learning. Children were encouraged to plan, carry out, and reflect on their own activities through a plan-do-review process. Adults observed, supported, and extended children’s play as appropriate. They also encouraged children to make choices, problem solve, and engage in activities”* (Heckman, Moon, Pinto, Savelyev, and Yavitz, 2010). Children engaged in this treatment were compared to children from a control group at age 15, 19, 27 and 40. The intervention produced very strong effects on children, with a significant benefit for the society (Almlund, Duckworth, Heckman, and Kautz, 2011). These effects were not related to their cognition (i.e. these children did not become more intelligent than those from the control group), but in fact related to their personality.

#### 0.4.1.1 Definitions and examples

The first level of distinction, to isolate what are personality traits, is the one between cognitive and non-cognitive aspects of personality. Cognitive ability allows *“to understand complex ideas, to adapt effectively to the environment, to learn from experience, to engage in various forms of reasoning, to overcome obstacles by taking thought”* (Neisser, Boodoo, Bouchard Jr, Boykin, Brody, Ceci, Halpern, Loehlin, Perloff, Sternberg, and Urbina, 1996, p. 77, as quoted by Almlund, expresses *“the percentage of total revenue recovered [...] It takes into account initial, additional taxes and taxes following tax audits”*.

Duckworth, Heckman, and Kautz, 2011). It is in fact commonly known as intelligence. Non-cognitive ability is all the rest, the part of personality that is not related to intelligence. The second level of refinement is to understand precisely what is this non-cognitive part of personality. It can be quite difficult to apprehend as cognitive and non-cognitive parts of personality are not so easy to differentiate. According to Almlund, Duckworth, Heckman, and Kautz (2011), there are for example “quasi-cognitive” traits, such as creativity, emotional intelligence, cognitive style... A more precise definition, coming from Roberts (2009), is adopted here: personality traits are “*relatively enduring patterns of thoughts, feelings, and behaviors that reflect the tendency to respond in certain ways under certain circumstances*” (p. 140, as quoted by Almlund, Duckworth, Heckman, and Kautz, 2011).

Although some are difficult to isolate from cognitive traits, most personality traits are quite easy to grasp, as they are quite usually “*very weakly correlated with IQ*” (Almlund, Duckworth, Heckman, and Kautz, 2011, p. 67). Two different branches of psychology are necessary to measure personality traits. First, differential psychology globally studies differences across people. These differences are more or less evident: it is very easy to study differences of e.g. height or weight between people, it is less easy to measure personality traits. Second, personality psychology is dedicated to the measure and the interpretation of personality traits. Another whole field of study, psychometrics, is dedicated to study the ways to study differences across people (testing, questionnaires, etc.). In this Section, the impact of personality traits on economic outcomes is exemplified using the Big Five Traits inventory. The Big Five is a quite consensual—albeit not totally—taxonomy of personality traits. Historically, the first personality psychologists thought that all traits were present in the language. Therefore they logically copied all the adjectives from the (English) dictionary, eliminated the synonyms and regrouped them in categories, according to factorial analysis ran on big samples of subjects. It finally led to the Big Five inventory (see Table 1 for the description of each trait).

Many different behaviors have been identified on which the impact of personality traits is relevant. Almlund, Duckworth, Heckman, and Kautz (2011) showed that personality traits are significantly predictive of behaviors related to school achievements, labor market outcomes, health and crime. Attention is focused here on examples related to crime, which is the closest topic to tax evasion. Almlund, Duckworth, Heckman, and Kautz (2011) stated that Conscientiousness and Agreeableness are decisive factors involved in the decision to commit criminal acts. John, Caspi, Robins, Moffitt, and Stouthamer-Loeber (1994) showed that “*in a sample of*

Table 1: The Big Five Traits

Trait	Definition
Openness to Experience (Intellect)	The tendency to be open to new aesthetic, cultural, or intellectual experiences.
Conscientiousness	The tendency to be organized, responsible, and hard-working.
Extraversion	An orientation of one's interests and energies toward the outer world of people and things rather than the inner world of subjective experience; characterized by positive affect and sociability.
Agreeableness	The tendency to act in a cooperative, unselfish manner.
Neuroticism (Emotional Stability)	Neuroticism is a chronic level of emotional instability and proneness to psychological distress. Emotional stability is predictability and consistency in emotional reactions, with absence of rapid mood changes.

**Note.** From left to right is each traits' name in the Big Five and its definition, as it appears in the American Psychological Association Dictionary (Almlund, Duckworth, Heckman, and Kautz, 2011).

*at-risk youth, boys who had committed severe delinquent behaviors were more than three quarters of a standard deviation lower in Agreeableness and Conscientiousness, as measured by mother's reports at age 12 or 13, than boys who had committed minor or no delinquent behaviors up to that age"* (Almlund, Duckworth, Heckman, and Kautz, 2011, p. 167). Self-control—a trait associated in the Big Five to Conscientiousness—is also a particularly predictive variable when it comes to crime: it explains between 10% and 16% of variance of committing crimes such as: theft, assault, drug use, vandalism (Vazsonyi, Pickering, Junger, and Hessing, 2001). The tendency to Neuroticism is also a predictive variable of delinquency. There was a significant positive correlation between negative emotionality (tendency towards depression) and delinquency in different samples (Caspi, Moffitt, Silva, Stouthamer-Loeber, Krueger, and Schmutte, 1994; Agnew, Brezina, Wright, and Cullen, 2002). In a model, Cunha, Heckman, and Schennach (2010) showed that non-cognitive personality traits were more fit to account for the decision to commit crimes than cognitive factors. In the lab, few papers studied social dilemma and personality traits. Some already showed the impact of personality traits on giving in dictator games (Ben-Ner, Kong, and Puterman, 2004; Ben-Ner and Kramer, 2011; Edele, Dziobek, and Keller, 2013), on cooperation in prisoner's dilemma (Boone, De Brabander, and Van Witteloostuijn, 1999; Hirsh and Peterson, 2009; Kagel and McGee, 2014), investment in trust game (Becker, Deckers, Dohmen, Falk, and Kosse, 2012; Müller and Schwieren, 2012) and public good game (DeAngelo, Lang, and Mc-

Cannon, 2016). Few papers were dedicated to tax evasion analysis. They are presented in the Section 1.2 of Chapter 1.

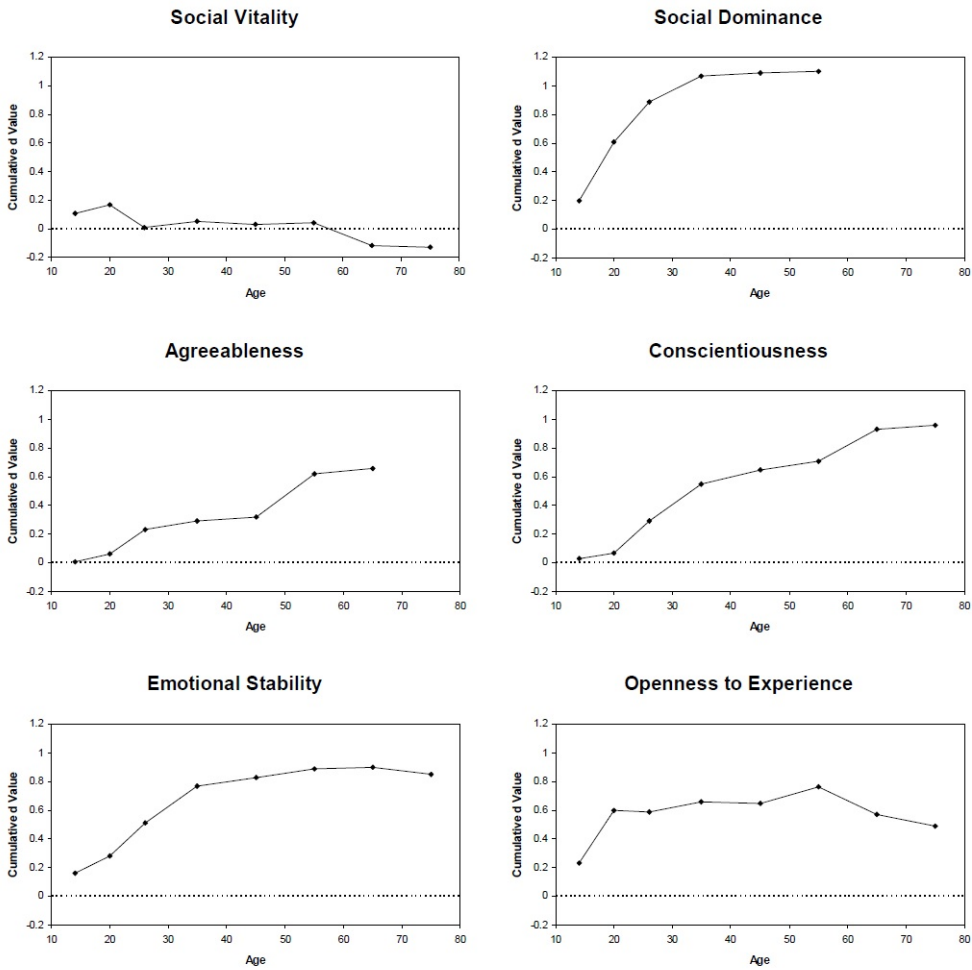
#### 0.4.1.2 When does personality vary?

Contrary to a popular belief, personality traits are not carved in stones after a certain age. They vary over life. Personality traits vary through ontogeny (normal development from child to adult, common to all persons), sociogeny (social development process), physical developments (how the brain develops), physical impairments (mostly brain lesions) and interventions (education, experience, lifecycle). Each particular case is illustrated with examples taken from Almlund, Duckworth, Heckman, and Kautz (2011).

Personality traits change throughout life. Figure 3 features all the different personality traits, measured in Roberts, Walton, and Viechtbauer (2006) and Roberts and Mroczek (2008), and shows the Big Five variations across life (Social Vitality and Social Dominance being parts of the Extraversion trait). The Cumulative d Value represents the change in units of standard deviations. Openness to Experience, for example, increases abruptly from 10 to 20, then linearly to 60 where it reaches a peak and decreases afterward.

Similarly, major shifts in social roles (i.e. getting a job, retiring, or having kids) can produce changes of personality. Social roles are not the only external force that can change someone: brain lesions can occur and have critical consequences. The most famous example is probably Phineas Gage, who went from being polite and trustworthy to rude and unreliable (Damasio, Grabowski, Frank, Galaburda, and Damasio, 1994). Interventions and experience are major sources of life-changing event that shape personality. The Perry School Program intervention, cited in the introduction of this Section, illustrates the importance of such interventions. Children coming from poor black families showed improvements of their personality, and it led to critical economic progresses. Later in life, treated children, for example, controlled better their personal behavior (as measured by elementary school teachers on criteria such as: absences, truancies, lying, cheating, stealing or swearing behaviors), leading them to commit less crimes, study better at school and finally get better jobs. Early life interventions are particularly effective, but it is never too late to intervene: Bloom, Gardenhire-Crooks, and Mandsager (2009) showed that the National Guard Youth Challenge program for the young people who dropped out school, increased the chances of participants to get a high school diploma by 12%, of work-

Figure 3: Cumulative Mean-Level Changes in Personality Across the Life Cycle (Almlund, Duckworth, Heckman, and Kautz, 2011)





ing full-time by 9% and decreased their chances to be arrested later. Personality is malleable throughout all of life, including at an advanced age.

#### 0.4.1.3 Does (stable) personality traits really exist?

As noticed by Almlund, Duckworth, Heckman, and Kautz (2011), many researchers are not convinced by the predictive validity, stability or causal status of personality traits. In other words, they believe that situations almost entirely define behavior, leaving no spaces for personality traits. Mischel (1968) is at the origins of this view of personality traits. In his theory, situational factors better explain behaviors, compared to personality traits. Concretely, if a broad trait is measured in one situation and is found to explain behavior in this situation, it will only explain this behavior in this type of situation. This personality trait cannot predict any other behavior in other settings. It is worth noting that a revision of this theory was proposed recently Mischel (2004), and it is now broadly consistent with actual theories of personality (Almlund, Duckworth, Heckman, and Kautz, 2011). This idea of absence of stable personality was also pushed forward by behaviorism approach. In the first half of the 20th century, behaviorism approach was also stating that all behaviors were the byproducts of conditioning, including also all mental processes (along with personality traits). Nowadays, many behavioral economists are influenced by Mischel and behaviorism outdated views of personality traits, and believe that there are *“no such thing as a stable personality trait”* (Thaler, 2008).

However there is a large amount of data proving that stable personality traits exist. Postulating that single items of behavior have a *“high component of error of measurement and a narrow range of generality”* (Epstein, 1979, p. 1097), Epstein (1979) averaged measures of behaviors across different events and showed that people acted in predictable manners ( $R^2$  varying from 0.6 to 0.8) and that different measures of personality (objective behavior, self-ratings, and ratings by others) were highly correlated with each other. As cited by Almlund, Duckworth, Heckman, and Kautz (2011), in some contexts *“personality may not play a particularly powerful role but averaging over many situations, stable patterns emerge”* (p. 92). Moskowitz (1982); Fleeson (2001); Borke-nau, Mauer, Riemann, Spinath, and Angleitner (2004); Wood and Roberts (2006) and Fleeson and Nofhle (2008) presented additional evidence of stability of personality traits across different tasks (see Roberts, 2009 for a summary of evidence on this question).

To sum up, postulates from situationists and behaviorists view of personality traits are really

challenged by the proofs of existing stable personality traits. A special issue of the *Journal of Research in Personality* [January 2009, Vol. 43] was dedicated to the person-situation debate. Inside this issue, editors stated that: *“All personality psychologists should be unified when it comes to asserting that personality differences are worthy of scientific study, that individual differences are more than just error variance and that not all behavior is simply a function of the situation”* (2009, p. 147, as quoted by Almlund, Duckworth, Heckman, and Kautz, 2011).

### 0.4.2 Context

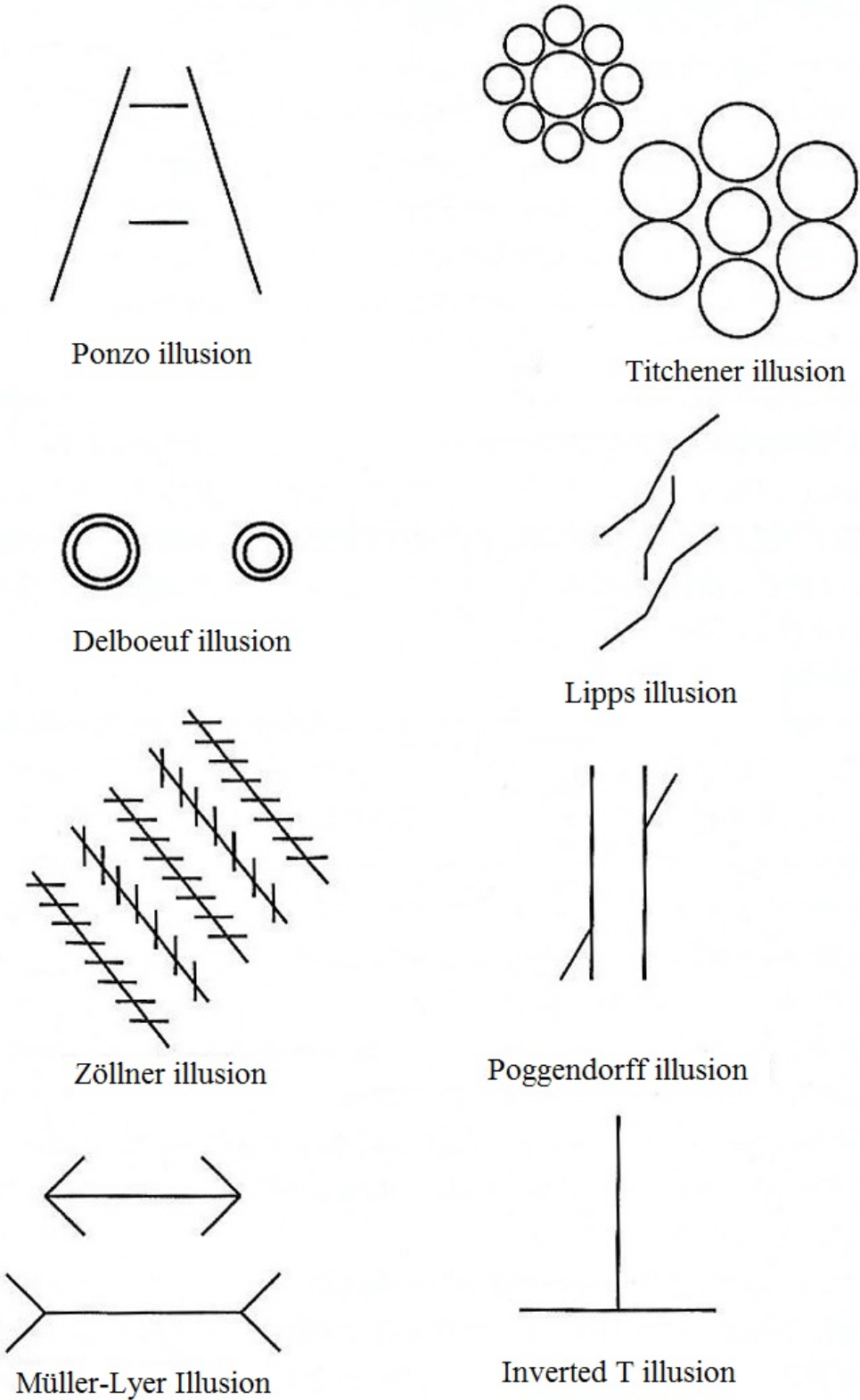
As seen previously, individual traits are not the only variable that can affect behavior. Context is also one of the main source of behavior variations. The most straightforward examples are cognitive biases, originated from cognitive psychology, the branch of psychology studying the human higher functions such as thinking, memorizing, perceiving, learning, etc. Humans process information using two broad strategies: either top-down or bottom-up. The top-down approach aims at reviewing very briefly a whole set of information. The bottom-up approach is examining each piece of information and assembling them together. Contextual influences occur using the top-down strategy. It is represented in Figure 4, that presents very well-known optical illusions. Taking e.g. the Ponzo illusion (upper left drawing), both horizontal lines are totally equal. Because perception is telling something else, it is hard for people to realize that the context is deceiving them. Indeed, the map is not the territory. Research in other branches of psychology and in behavioral economics demonstrated that optical illusions were not the only way to manipulate the context and influence human beings. Here are some evidence reviewed of other contextual effects.

#### 0.4.2.1 Framing

Framing is introducing a problem in a certain way, such as people cannot think out of that frame. A similar problem, with equivalent options introduced in two different ways (e.g. as a gain vs a loss), can lead to dramatically different decisions. The most known example is probably coming from Kahneman and Tversky (1984). In this article, a problem is first framed in the following way:

*“Problem 1: Imagine that the U.S. is preparing for the outbreak of an unusual Asian disease, which is*

Figure 4: Different optical illusions where context deceives (Nicolas, Gyselinck, Vergilino-Perez, and Doré-Mazars, 2009)



expected to kill 600 people. Two alternative programs to combat the disease have been proposed. Assume that the exact scientific estimates of the consequences of the programs are as follows:

- If Program A is adopted, 200 people will be saved.
- If Program B is adopted, there is a one-third probability that 600 people will be saved and a two-thirds probability that no people will be saved.

Which of the two programs would you favor?"

In the second problem, the same instructions are given to the participants, except that options changed:

"Problem 2: [Same as before.]

- If Program C is adopted, 400 people will die.
- If Program D is adopted, there is a one-third probability that nobody will die and a two-thirds probability that 600 people will die.

Which of the two programs would you favor?"

In the first problem (N=152), 72% of participants chose option A, while 28% chose option B. In the second problem (N = 155), C is adopted by 22% of participants, and D by 78% of participants. The way to frame the problem as a gain (problem 1) or as a loss (problem 2) leads to risk avoidance in the former case and risk seeking in the latter, while both problems hold in fact the same mathematical expectations. The laboratory experiments dealing with tax evasion also supported the result presented above: in Robben, Webley, Elffers, and Hessing (1990), when participants were recalled that they had to make an extra payment (loss frame) or were getting a refund (gain frame), those from the loss frame evaded more. This effect was replicated in Schepanski and Kelsey (1990) and could come from an excessive risk aversion from participants in the gain frame.

#### 0.4.2.2 Priming

Also coming from cognitive psychology, priming is a way of unconsciously influencing subjects (using images, subliminal stimuli, crossword, remembering a memory etc.). In the original pa-

per from Meyer and Schvaneveldt (1971), participants had to decide if two words, presented successively, were real words or not (answering Yes or No). The results show that when two words were associated (e.g. Nurse and Doctor), responses were faster, compared to unassociated ones (e.g. Nurse and Bread).

Priming is a treatment extensively used by psychologists and behavioral economists. Cohn and Maréchal (2016) reviewed the last priming economic experiments in different domains. They showed that priming is a useful tool to make research where *“large-scale field experimentation would be (i) prohibitively costly, (ii) ethically unacceptable, or (iii) simply impossible to administer or manipulate exogenously”* (p. 19). Priming produces strong effects on economic behavior. Activating cooperation (using term such as “partner”) or competition (“opponent”) in a trust game, led to more or less investment (Burnham, McCabe, and Smith, 2000). Priming prisoners or bankers with their identity, also led to an increase in dishonesty in coin tossing tasks (Cohn, Fehr, and Maréchal, 2014; Cohn, Maréchal, and Noll, 2015). Priming God concepts in a dictator game increased altruism (Shariff and Norenzayan, 2007). It also has strong effects on tax compliance: fairness priming in a TEG decreased evasion (Calvet and Alm, 2014) while Maciejovsky, Schwarzenberger, and Kirchler (2012) showed that affective priming (compared to cognitive priming) moderated the impact of fines and audit probabilities.

#### 0.4.2.3 Commitment

The main idea of commitment is that past actions affect actions to come (Jacquemet, Joule, Luchini, and Shogren, 2013). Theory of commitment is originated from social psychology (Joule and Beauvois, 1998). This theory was developed to make sense with the large amount of experiments using commitment techniques.

Experiments using commitment techniques share a same procedure. Let us imagine a situation in which experimenters want to see a target request adopted by some participants. They design a costless prior action, that should be implemented before the target request. A good prior action is one that binds participants to their behavioral acts. Prior action should be taken totally freely. It justifies why they are most of the time implemented in a private context, to avoid peer pressure. The mere fact of freely accepting prior action leads to a higher engagement of the participant to the target request. Experiments using commitment techniques also share a same aim. This aim is always to engage participants in an activity to which, at first, they

would not have committed. Social psychologists speak of self consented submission and it can remind economists of nudges and libertarian paternalism (Thaler and Sunstein, 2008). As social psychology of commitment is older than nudges concept, it results in a really extensive literature, either in techniques and field of application, that are introduced briefly below.

As described by Joule and Beauvois (1998), the most used technique is probably the foot-in-the-door where experimenter asks a costless request that have a lot of chances to get accepted, then asking the target request. In e.g. Harris (1972), experimenters asked money donations to bypassers in the streets. Asking a costless request (asking for the time) before proceeding to the target request multiplied by four times the acceptance rate of money donation (see Beaman, Cole, Preston, Klentz, and Steblay, 1983 or Burger, 1999 for a literature review). The second most used technique is exactly the opposite: asking a very costly request that have a lot of chances to get rejected, then asking the target request, also known as the door-in-the-face technique. In Cialdini, Vincent, Lewis, Catalan, Wheeler, and Darby (1975), participants in one condition were directly asked the target request (organizing a visit to the Zoo for 2 hours) and others were first asked a costly request (taking care of delinquents for 2 years) before proceeding to the target request. Acceptance rate jumped from 16.70% to 50% (see Pascual and Guéguen, 2005 for a literature review). Even very simple technique as laying a hand on someone for some seconds was found to be very effective. In e.g. Kleinke (1977), coins were left in a phone booth. When people walked out the phone booth, experimenter asked if they had found his change in one condition or touched their forearms for some seconds before asking in another condition. The restitution rate went from 63% to 93%.

The number of field of application concerning commitment techniques is really vast. Commitment techniques are used to promote pro-environmental behaviors, safe sexual conducts, to fight against risky practice at work in Joule and Beauvois (1998) or even to increase charity revenues (e.g. Reingen, 1982). Social psychology of commitment has been broadly used in economics settings these last years (see Jacquemet, Joule, Luchini, and Malézieux, 2016 for a literature review). A commitment technique (a truth telling oath) has been used to cuts half the hypothetical bias in preference elicitation for non-market-goods (Carlsson, Kataria, Krupnick, Lampi, Lofgren, Qin, Sterner, and Chung, 2013; Stevens, Tabatabaei, and Lass, 2013; Donfouet, Macha, and Mahieu, 2013; Jacquemet, Joule, Luchini, and Shogren, 2013; Jacquemet, James, Luchini, and Shogren, 2016), increase coordination (Jacquemet, Luchini, Shogren, and Zylbersztejn, 2011; Kataria and Winter, 2013), decrease lie telling (Weaver and Prelec, 2012; Jacquemet,

Luchini, Rosaz, and Shogren, 2014) and increase public good contributions (Dulleck, Koessler, and Page, 2014; Hergueux, Jacquemet, Luchini, and Shogren, 2016).

## **0.5 How are context and personality traits integrated into the analysis of tax evasion?**

This thesis is part of the recent trend of research trying to open the traditional economic analysis of tax evasion, to different themes. In this thesis, themes coming from psychology are considered: personality traits and contextual determinants. It is done in the following three Chapters.

In the first Chapter, insights from personality psychology are used to look for the individual personality traits pushing towards more compliance, also known as tax morale. In several models, the emphasis is put on the individual determinants that could take this role, mainly related to emotions, morality and conformity. For example, Cowell and Gordon (1988) integrated conformity, Gordon (1989), a parameter of honesty, Erard and Feinstein (1994) and Andreoni, Erard, and Feinstein (1998), a feeling of guilt and shame, Myles and Naylor (1996), group conformity and social customs, Traxler (2010), social norms and Thomas (2015) spoke about a psychic cost of evading. Based on these models' assumptions, different questionnaires related to non-monetary preferences are studied here. They deal with moral emotions (e.g. affective empathy, cognitive empathy, propensity to feel guilt and shame), moral judgments (e.g. ethics principles, integrity, and moralization of everyday life) and norm submission. Two lab experiments are used to correlate these questionnaires' answers with lab tax compliance. It is done in two different ways: first, using a Principal Component Analysis, i.e. letting the data regroup itself in the most meaningful components. Second, using the raw scores from the questionnaires. Both methods conclude that there are no significant and reliable results. This absence of correlation between individual personality traits and compliance leads to think that institutional context could probably do a better job to understand tax evasion behavior.

The second and third Chapters create a context while using the social psychology of commitment. In the second Chapter, a literature review summarizes 25 years of research on commitment to influence honesty related decisions. It concludes that the oath to tell the truth developed by Jacquemet, Joule, Luchini, and Shogren (2013), respects all the necessary features

advanced in the literature for a working commitment. Then, it applies this truth-telling oath to a tax evasion game. In a Baseline condition, participants play a classical tax evasion game without audits. In an Oath condition, the participants are first offered to sign voluntarily a truth-telling oath, before playing the same tax evasion game. The results show that in Experiment 1, compliance increases by one third under oath compared to the Baseline. Experiment 2 reproduces this result and highlights—for the first time in the literature—that the oath effect could be due to a change of taxpayers' preferences towards honest or dishonest fiscal declarations. Ex-nihilo created context influences well tax lab compliance.

The third Chapter tries to demonstrate the same commitment effect in a real life institution, direct democracy. Direct democracy is one of the most efficient tools to overcome free riding in experimental economics. When participants have the possibility to vote on one aspect of the social dilemma in which they will play (e.g. adopting a fine for evaders in a TEG), compliance in social dilemma is higher. This pattern is also present in field settings (e.g. direct democracy of Swiss cantons increases their taxpayers' compliance). But what can trigger this direct democracy effect? Most of the sources in the literature are either related to social effect between voters (voting would set a social norm, a signal, etc.) or commitment (voters would feel somehow engaged in the democratic process when they vote). The aim of this Chapter is to investigate these causes and disentangle each influence. It does so by using a tax evasion game where participants are asked to declare their income in favor of two different organizations. To determine which organization gets the tax payment, two different treatments are implemented: Vote and Choice. The Choice is the same as a Vote, except that it is implemented alone, without any social interaction. The results show that this setting does not replicate direct democracy effect, and social effects are not significant. However there is a significant commitment effect. Once again, tax lab compliance can be influenced by context.



# Chapter 1

## Does tax morale *really* exist? A psychometric investigation

*"We're not interested, frankly, in administering the tax system through fear of penalties."*

Roscoe L. Egger, Jr. (1920–1999), *Wall Street Journal* (Murray, 1984)

### 1.1 Introduction

Why do people pay taxes given the relatively small risk of an audit and low fines if they get caught? The answer provided by standard rational choice theory has proven to be inadequate—people who comply must be assumed to have an unrealistically high level of risk aversion (Allingham and Sandmo, 1972). In response, the “tax morale” literature provides an alternative explanation to the “tax evasion puzzle” (see Torgler, 2002). The tax morale literature specifies this intrinsic motivation to comply by adding non-monetary psychological factors to the traditional model of tax evasion. These new models globally integrate parameters related to a psychic cost of evading (e.g. emotions or morality) or to social customs (conformity, reputation effects, social norms). To exemplify what are those psychic costs: Gordon (1989) integrated a parameter of honesty, Erard and Feinstein (1994) and Andreoni, Erard, and Feinstein (1998), a feeling of guilt and shame, Eisenhauer (2008); Eisenhauer, Geide-Stevenson, and Ferro (2011),

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This Chapter is based on two different articles: *“Is tax evasion a personality trait? An empirical evaluation of psychological determinants of “tax morale”* (2016) and *“A psychometric investigation of the personality traits underlying individual tax morale”* (2016), co-authored with Nicolas Jacquemet, Stéphane Luchini & Jason Shogren.

a conscience parameter and Thomas (2015) spoke about a psychic cost of evading. Concerning the social customs aspect, Cowell and Gordon (1988) integrated conformity, Myles and Naylor (1996), group conformity and social customs, Kim (2003) and Fortin, Lacroix, and Villeval (2007), a loss of social prestige, and Traxler (2010), social norms (see Hashimzade, Myles, and Tran-Nam, 2013 for a literature review).

Therefore tax morale is a very protean and labile concept (Luttmer and Singhal, 2014). These models give some precious information but do not help understand what exactly the personality traits linked to tax morale are. Our research question is, as the former IRS Commissioner Roscoe L. Egger Jr. stated: what are those personality traits allowing us to manage the tax system without the "*fear of penalties*"?

Previous empirical research investigated the tax morale channels via three main axis: declarative, physiological and personality measures. Results from articles investigating individual declarative measures (see e.g. Scholz and Lubell, 1998; Alm and Torgler, 2006; Torgler and Schneider, 2007, 2009; Lago-Peñas and Lago-Peñas, 2010), based on survey data such as the World Value Survey, confirm the importance of declarative measures. But they concentrated only on attitudinal variables (e.g. levels of trust towards the others, propensity to behave in a generous way, sensibility to equity and equality) whose correlation with behaviors of taxation may not bring new information: if the income taxation is perceived as a redistribution mechanism, it seems logical that the equity feeling contributes to account for evasion behaviors. Such correlation does not explain how these behaviors are influenced by individual morality and personality. A new trend of experiments tried to capture the intensity of the emotions felt by the participants at the time of filing taxes. It can be measured using skin conductance or heart beats rates. It shows contrasting results: participants declare more when their skin were less conductant (Coricelli, Joffily, Montmarquette, and Villeval, 2010) and when their hearts were beating faster (Dulleck, Fooker, Newton, Ristl, Schaffner, and Torgler, 2016). Even though these papers give useful information about physiological reactions to a cheating situation, they do not allow to identify precisely which emotions and personality traits are at work. Another emerging trend of experiments precisely addressed this issue and study the correlations between personality traits, measured through self-reported questionnaires, and tax evasion. Calvet and Alm (2014) try to correlate thoroughly tax evasion and personality measures linked to moral emotions. The study focuses on the effect of levels of empathy and sympathy and finds few correlations with evasion behavior. Coricelli, Rusconi, and Villeval (2014) also correlate

moral emotions (shame and guilt) with tax evasion and find that only shame was correlated with the intensity of evasion. Even though these evidences contradict the idea of tax morale, these personality traits are only few examples in a large amount of characteristics of personality traits supposedly linked to tax morale.

In this Chapter, we explore whether tax morale is related to some individual characteristics. These individual characteristics are captured thanks to personality traits, i.e. psychometric measures of moral emotion, moral judgment and norm submission felt at the time of filling out. If tax evasion has something to do with morality or sociality, these measures are argued to be large enough to capture this relationship. We extend to tax evasion behavior a recent trend in applied microeconomics (Borghans, Duckworth, Heckman, and Ter Weel, 2008) that accounts for the psychological determinants, cognitive and non-cognitive, of economic decisions in the framework of e.g. a social dilemma (Swope, Cadigan, Schmitt, and Shupp, 2008; Edele, Dziobek, and Keller, 2013; DeAngelo, Lang, and McCannon, 2016) or education investment (Bowles, Gintis, and Osborne, 2001; Carneiro, Hansen, and Heckman, 2003).

To sum up, we expect some individual and idiosyncratic personality traits to be linked to tax morale, and to push towards more compliance than what the rational choice theory proposes. It is necessary to understand what are those traits and how do they combine to produce such fiscal behaviors. However, if these moral personality traits are not correlated with those behaviors, one must focus attention on the institutional environment (such as rules of taxes collection) that will either decrease evasion or make these moral traits salient.

We design two lab experiments that allow us to observe the tax evasion behavior in a controlled environment in which decisions have financial consequences. We add two distinct sets of psychological questionnaires to the decision of income declaration. In Experiment 1, we focus more on moral emotions and measure personality traits related to norm submission, cognitive and affective empathy, guilt and shame. In Experiment 2, we measure moral judgment based on three dimensions: ethics principles, integrity and moral judgments of acts of everyday life. Since these questionnaires are time-consuming and cognitively demanding for participants, we use a planned missing data design (Little and Rhemtulla, 2013) and split the questionnaires between two different experiments. Both experiments elicit compliance towards the same tax rate, in the same decision environment. In Experiment 2, however, we allow subjects to choose the use of the collected funds, a supposed way to strengthen the effect of tax morale on tax com-

pliance. This experimental design provides a conservative test of the personality traits related to tax morale.

Our results suggest that given significant rate of evasion (37% to 49% compliance rates across experiments), and high heterogeneity in individual scores to personality questionnaires, it exists little association between the compliance and morale. We find most correlations with moral emotions rather than with moral judgments or norm submission. Affective and cognitive empathy matter to reduce evasion rates; greater guilt and shame sub-scales, however, lead to a greater rate of evasion. Overall, we find at most weak correlations between tax compliance and personality traits related to morality, raising doubts about tax morale assumption. These weak correlations are obtained using two different methods, using the questionnaires' raw scores and combining them thanks to a Principal Component Analysis. Such results are in line with recent experimental and quasi experimental work on tax evasion. Field experiments such as Kleven, Knudsen, Kreiner, Pedersen, and Saez (2011), do not find any evidence of intrinsic motivation to pay taxes: those who can cheat (self-employed people) do evade taxes. Blumenthal, Christian, Slemrod, and Smith (2001); Torgler (2004, 2013); Fellner, Sausgruber, and Traxler (2013); Dwenger, Kleven, Rasul, and Rincke (2016) do not find any impact of letters sent to taxpayers appealing to their morale. Similarly, lab experiments do not find very conclusive results either (e.g. Calvet and Alm, 2014).

## 1.2 Foundations of tax morale from moral psychology

Moral psychology is a growing field within psychology, whose aim is to understand why people behave well and badly (Doris, 2010). Two different ways are explored to measure participants' morality: through moral emotions in the first experiment and through moral judgment in the second one. As in Calvet and Alm (2014), we choose to measure morality through moral emotions as a recent trend of papers shows its importance as a determinant of moral judgments (Haidt, 2001, 2008; Jourdeuil and Petit, 2015). Behaving morally requires to be able to make moral judgment, i.e. *"judgment that something has moral significance. In expressing moral judgments we use terms such as right and wrong, good and bad, just and unjust, virtuous and base"* (Prinz and Nichols, 2010, p. 113). Moral judgment drives what one ought to do. The second experiment focuses then on moral judgment directly, without focusing particularly on any of its different

components.

### 1.2.1 Morality and moral emotions

The psychology of moral emotions has emerged from the idea that moral emotions are developed through evolution, to help people choose the best strategy in human interactions. This gives rise to a strong relationship between emotions and morality, emotions being seen as either serving reason (Frank, 1988), or complementary to it (Damasio, 1994). Prinz and Nichols (2010) distinguishes three types of moral emotions: pro-social emotions that promote “morally good behavior” (empathy, sympathy, concern and compassion), self-blamed emotions that evoke negative self-directed feelings (guilt and shame) and other-blamed emotions, i.e. negative feelings directed towards others (contempt, anger, disgust). We choose to include only the first two, pro-social and self-blamed emotions, in our analysis as the third type seems harder to relate to tax evasion.

Regarding the effect of pro-social emotions on tax compliance, the empathy-altruism hypothesis (Batson, Dyck, Brandt, Batson, Powell, McMaster, and Griffitt, 1988) predicts that empathetic people are more altruistic and fair towards others. Calvet and Alm (2014) test this hypothesis in the framework of a laboratory tax evasion game combined with psychometric measures of empathy and sympathy. Only sympathy appears positively correlated with tax compliance. The components of self-blamed emotions, shame and guilt, also exhibit contrasted correlations with tax evasion. As regards shame, Coricelli, Joffily, Montmarquette, and Villeval (2010) show an increase in emotional arousal when evaders are informed that their pictures will be shown to other participants. Coricelli, Rusconi, and Villeval (2014) moreover find that the shame proneness scale from the TOSCA-3 test is negatively correlated with the intensity of the fraud after being caught. Experimental evidence on Guilt, the other self-blamed emotion, is rather mixed. Thurman, John, and Riggs (1984) observe a significant impact of anticipated guilt on tax evasion decisions, but also show that evaders can resort to neutralization strategies to avoid this feeling. This might explain the discrepancies observed in the literature, as Coricelli, Rusconi, and Villeval (2014) for instance fail to find any correlation of tax evasion with the guilt proneness sub-scale from the TOSCA-3. This is confirmed by Dunn, Farrar, and Hausserman (2016), who substantiate an effect of guilt on tax evasion but also show that the effect varies according to guilt cognition.

## 1.2.2 Morality and moral judgment

Recognizing a situation as morally problematic requires first the ability to formulate moral judgment. We collect moral judgments on critical themes: ethics principles, integrity and moralization of everyday life. These dimensions are in particular part of the Measuring Morality project, a “*nationally-representative survey of adults in the United States aimed at understanding the interrelations among moral constructs, and at exploring moral differences in the U.S. population*”.<sup>1</sup>

The tax literature on these themes is too scarce to be conclusive. Tax ethics and tax morale are often seen as overlapping notions (e.g. Wenzel, 2005; McGee, 2011; Maciejovsky, Schwarzenberger, and Kirchler, 2012; Noll, Schnell, and Zdravkovic, 2016), only a few experimental studies investigate tax ethics as a driving force of compliance. Henderson and Kaplan (2005) measure tax ethics using the Multidimensional Ethics Scale, and find a positive correlation with the likelihood of complying in hypothetical scenarios—a result that confirms the one obtained by Reckers, Sanders, and Roark (1994) on participants judging tax evasion as “ethically wrong”. Ghosh and Crain (1995) rely on a measure of Machiavellianism to control for tax ethics; they confirm a positive association with compliance. We complement this literature by adding two dimensions to ethics principles, which to the best of our knowledge have never been linked empirically to tax evasion. Integrity is defined as the attachment to ethical principles and is expected to foster the effect of one’s ethics on compliance. Ethics is a deep and abstract dimension of personality. The third dimension we consider aims to take into account ethics in daily behavior, based on a measure of moralization of everyday life.

## 1.3 Experiment 1

The first experiment aims to investigate whether morality, measured through personality traits linked to moral emotions, is related to tax compliance decisions. To that end, we combine a tax evasion game that delivers incentivized measures of tax compliance, to psychometric questionnaires.

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<sup>1</sup>More information can be found on *Measuring Morality* project’s website.

### 1.3.1 Design of the experiment

The standard game used to measure tax compliance behavior in the experimental literature is fairly straightforward: each participant is asked to report income, knowing that declared income will be taxed according to a common knowledge tax rate. The collected tax is deducted from experimental earnings. The target behavior is the share of income that is actually reported. Although the core decision task is standard, many variations in the design can be found in the literature—often associated with uncertain consequences on tax compliance. Our design balances three objectives: we ensure comparability with the existing literature, we generate enough variability in evasion decisions to correlate the outcome with individual covariates, and we enhance the ecological validity of the tax compliance observed in the laboratory.

In Experiment 1, subjects first earn an income through a real effort task.<sup>2</sup> We use a task first introduced by Alm, Cherry, Jones, and McKee (2012), in which the goal is to sort numbers in ascending order from a 3 \* 3 matrix filled with digits generated in random order. Earnings are computed based on the time taken to complete the task, as: 150 ECU - (subject's time \* 13). The task is repeated 5 times, earned income from this preliminary stage is the sum of earnings from all tasks. Participants then move to the declaration stage where they find out that their gross income will be taxed. They are asked to "*declare the amount of income they have earned at the previous stage*" (see Cadsby, Maynes, and Trivedi, 2006, on the importance of the way to ask for compliance). They do so using a cursor, which maximal value corresponds to the full income.<sup>3</sup> The tax rate is fixed, common to all participants, and this declaration task is not repeated. In France, the marginal tax rates on 2014 incomes are: 0%, 14%, 30%, 41% and 45%, applied progressively based on the level of income.<sup>4</sup> We use a tax rate equal to 35% that is announced to participants before the beginning of the declaration stage. Declared income determines the taxed, and effectively collected, amounts from each participants' experimental earnings. Collected taxes are used to finance a real life public good: all money is donated to the World Wide Fund for Nature (WWF). To ensure the credibility of the process, donations given to the WWF are officially certified by WWF-certificates that are emailed directly to the participants. It is important to emphasize that there is no audit in this experiment—this allows us to put the spotlight on compliance-based tax morale. Lastly the aim to correlate tax evasion

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<sup>2</sup>The evidence on the effect of windfall money, as compared to earned income, on tax evasion is mixed; see Section 0.2.2.3 of Introduction. We favor this choice to strengthen the external validity of our tax evasion measure.

<sup>3</sup>A screen-shot of the declaration stage is available in Figure 3.4 of Appendix.

<sup>4</sup>Finance law number 2014-1654, December 29th 2014.

and personality traits pleads for the framing of the task.<sup>5</sup> We describe the experiment as a fiscal simulation and the following words are used to describe the progress of the experiment: income, income declaration, tax and tax collected.

### 1.3.1.1 Psychometric measures of moral emotions

At the end of the experiment, subjects answer some questions related to their perception of their own level of honesty and happiness in this experiment, and of other participants' level of honesty, as well as a socio-demographic questionnaire (including their occupation, age, gender, nationality, language spoken at home, if they define themselves as believing in God or not, real income, if they receive financial help from their parents, if they were carrying money, credit card or checkbook during the experiment and finally, their attitude toward WWF).<sup>6</sup> They are then presented with the psychometric questionnaires designed to measure individual personality traits related to morality. We compensate the subjects for this last step by adding 5 Euro each to their experimental earnings.

We also include three dimensions to measure the psychological determinants of tax morale related to moral emotions: the propensity to norm submission, the level of empathy, and the propensity to feel shame and guilt. Social norms have been shown to be an important determinant of tax submission both in the field (Wenzel, 2005; Bobek, Roberts, and Sweeney, 2007) and the lab (Alm, McClelland, and Schulze, 1999; Bobek, Hageman, and Kelliher, 2013)—see Bobek, Hageman, and Kelliher (2013) for a survey. While norm submission is not strictly speaking an emotion, we include it to capture the internal pressure to follow the set of implicit rules defined by tax morale. For each of these three dimensions, we use a questionnaire validated in the psychometric literature which consists in collecting subjects' reactions toward a set of sentences. Answers are elicited on Likert's scales (ordinally graduated in an ascending order of intensity according to given labels).<sup>7</sup>

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<sup>5</sup>Contextualization of the tax evasion game has been found to have no impact in Alm, McClelland, and Schulze (1992); Swenson (1996); Durham, Manly, and Ritsema (2014) and to undermine tax evasion in Baldry (1986); Wartick, Madeo, and Vines (1999); King and Sheffrin (2002); Mittone (2006); Choo, Fonseca, and Myles (2015), see Section 0.2.2.1 of Introduction. In all cases, evasion rates remain substantial enough to allow an empirical analysis of tax evasion determinants (see e.g. Wahl, Muehlbacher, and Kirchler, 2010).

<sup>6</sup>These honesty, happiness and socio-demographic characteristics are only studied in the following Chapter.

<sup>7</sup>One of the most used criteria of reliability in this literature is the Cronbach's alpha, that measures the degree of consistence in answers, thanks to the individual variance of answers compared to the total variance (Cronbach, 1951). This measure ranges from 0 to 1, and is increasing with the internal consistency of the questionnaire. An alpha higher than 0.7 is considered as satisfying.



Norm submission is measured thanks to the Concern for Appropriateness Scale (CAS Lennox and Wolfe, 1984). Subjects are asked to express their degree of agreement, according to 6 possible levels of intensity, with 20 statements describing social behaviors, such as, for example, *“I tend to show different sides of myself to different people”* or *“If I am the least bit uncertain as to how to act in a social situation, I look to the behavior of others for cues”*. The degree of norm submission is stronger when the score to this questionnaire is high. This questionnaire is known to be correlated positively with religiosity and risky behavior (Wolfe, Lennox, and Cutler, 1986), as well as behavioral conformism (Johnson, 1984) and the propensity to feel embarrassed (Sabini, Siepmann, Stein, and Meyerowitz, 2000). This questionnaire is also correlated positively with perfectionism, public self-consciousness, social anxiety (Miller, Omens, and Delvadia, 1991) and with harm avoidance (Bachner-Melman, Bacon-Shnoor, Zohar, Elizur, and Ebstein, 2009). It is negatively correlated with self-esteem (Bachner-Melman, Bacon-Shnoor, Zohar, Elizur, and Ebstein, 2009) and emotional stability (Miller, Omens, and Delvadia, 1991). Following the tax morale presumption, people scoring higher on this scale are norm submissive and should be more scrupulous when declaring their income.

The feeling of empathy and its two components, affective and cognitive empathy, are measured thanks to the Questionnaire of Cognitive and Affective Empathy (QCAE Reniers, Corcoran, Drake, Shryane, and Völlm, 2011). It features 31 statements, such as *“I try to look at everybody’s side of a disagreement before I make a decision”* or *“I can easily tell if someone else is interested or bored with what I am saying”*, with which participants are asked to express their degree of agreement thanks to 4 possible levels. The global score is increasing with the individual level of empathy, and has been shown to be well correlated with the Interpersonal Reactivity Index, another measure of empathy (Michaels, Horan, Ginger, Martinovich, Pinkham, and Smith, 2014). The literature in psychology shows a positive association with pro-social tendencies (Lockwood, Seara-Cardoso, and Viding, 2014) and justice sensitivity (Yoder and Decety, 2014). QCAE scores are also negatively correlated with scales measuring impulsivity, aggression towards others, psychopathy, and Machiavellianism (Reniers, Corcoran, Drake, Shryane, and Völlm, 2011). The correlation with psychopathy is mainly driven by the affective empathy sub-scale (Seara-Cardoso, Dolberg, Neumann, Roiser, and Viding, 2013). Tax compliance may be linked to all these traits (pro social tendencies, justice sensitivity, lack of aggression toward others), giving rise to a negative relationship between empathy and tax evasion.

We measure feelings of guilt and shame by the Guilt and Shame Proneness scale (GASP Cohen,

Wolf, Panter, and Insko, 2011). These two feelings are distinguished by the context in which they occur—guilt refers to a feeling that arises in a private context, while shame is a reaction to events occurring in a public context. The GASP is made of 16 scenarios in which subjects have to describe the probability to feel one of these two feelings (according to 7 levels graduated from “*Very unlikely*” to “*Very likely*”). This questionnaire measures the sensitivity to feel these two feelings across scenarios of transgressions, such as “*Your home is messy and unexpected guests knock on your door and invite themselves in. What is the likelihood that you would avoid the guests until they leave?*” or “*You are privately informed that you are the only one in your group that did not make the honor society because you skipped too many days of school. What is the likelihood that this would lead you to become more responsible about attending school?*”. Cohen, Wolf, Panter, and Insko (2011) show a positive correlation of the guilt scale with psychometric measures of morality and pro social behaviors. People getting high score on this scale are less likely to behave in a non-ethical way, to have delinquent behaviors or to engage in counterproductive behaviors towards their companies (Cohen, 2010; Cohen, Panter, and Turan, 2012; Cohen, Panter, Turan, Morse, and Kim, 2013). Bracht and Regner (2013) show a positive correlation with generosity in a trust game. The shame scale has contrasted results. It is made of two sub-scales: the first, Negative Self-Evaluations, displays the same correlations as those of guilt scale. The second sub-scale (Shame-Withdrawal Responses), by contrast, is positively correlated with non-ethical behaviors, delinquency and pro-social attitudes. As a result, we refrain from aggregating the two components of the shame scale, and consider separately the scores obtained at NSE and SW as they refer to two different constructs. As regards tax compliance behavior, we expect guilt proneness to be negatively correlated with tax evasion, while the correlations within shame proneness should be contrasted: NSE should be negatively correlated with tax evasion while SW might be positively correlated with it.<sup>8</sup>

### 1.3.1.2 Experimental procedure

All experimental sessions took place at the laboratory of the Strasbourg University (LEES) between October 2014 and march 2015.<sup>9</sup> The empirical analysis relies on three experimental ses-

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<sup>8</sup>The French translation of CAS and QCAE are taken respectively from Myszkowski, Storme, Zenasni, and Lubart (2014) and Myszkowski, Brunet-Gouet, Roux, Robieux, Malézieux, Boujut, and Zenasni (2016). Translation of the GASP has been made by ourselves. For each of the three questionnaires, the sub-scales and their interpretation are presented in Section e of Appendix.

<sup>9</sup>The recruitment process of the participants makes use of ORSEE (Greiner, 2015). The experiment is computerized using Econplay ([www.econplay.fr](http://www.econplay.fr)).

Table 1.1: Summary statistics on compliance and psychometric measures in Experiment 1

Variable	Mean	Std. Dev.	Median	Q1	Q3	Minimum	Maximum	Alpha
CAS	2.52	.64	2.55	2.15	2.8	.9	4.55	.84
_CSV	2.69	.99	2.85	2	3.42	.28	4.42	.85
_ATSCI	2.43	.67	2.38	2.07	2.76	.84	4.61	.80
QCAE	2.87	.28	2.83	2.70	3.09	2.12	3.74	–
_COG. E.	2.97	.30	3	2.78	3.15	2.26	3.89	.74
_PT	3.02	.40	3	2.9	3.2	1.8	4	.78
_OS	2.92	.39	3	2.66	3.22	1.77	3.88	.68
_AFF. E.	2.70	.45	2.66	2.33	3.08	1.58	3.75	.77
_EC	2.55	.61	2.5	2	3	1	4	.66
_PROXR	2.88	.58	3	2.5	3.25	1.75	4	.68
_PERIR	2.66	.58	2.75	2.25	3	1	3.75	.62
GASP	4.50	.71	4.62	4	5.06	2.5	5.75	–
_GUILT	5.02	.96	5.12	4.37	5.62	2.75	6.75	–
_NBE	4.80	1.42	5	3.75	6	1.25	7	.74
_GR	5.25	.86	5.25	4.5	6	3.5	6.75	.37
_SHAME	3.99	.79	4	3.62	4.5	2.12	5.75	–
_NSE	5.29	1.07	5.5	4.5	6	2.75	7	.58
_SW	2.68	.83	2.75	2	3.25	1	5	.37
Income	356.714	87.308	362	305	416	23	496	–
Compliance	48.98%	37.94%	41.89%	16.57%	100%	0	100%	–

**Note.** Summary statistics on outcomes from Experiment 1 ( $N = 63$  individuals). CAS: Concern for Appropriateness Scale; CSV: Cross-Situational Variability of Behavior; ATSCI: Attention to Social Comparison Information; QCAE: Questionnaire for Cognitive and Affective Empathy; COG. E.: Cognitive Empathy; PT: Perspective Taking; OS: Online Simulation; AFF. E.: Affective Empathy; EC: Emotion Contagion; PERIR: Peripheral Responsivity; PROXR: Proximal Responsivity; GASP: Guilt And Shame Proneness; GUILT: guilt sub-scale from the GASP; NBE: Negative Behavior-Evaluations; GR: Guilt - Repair responses; SHAME: shame sub-scale from the GASP; NSE: Negative Self-Evaluations; SW: Shame - Withdrawal Responses.

sions, each having between 19 and 22 participants. Overall, the data is made of 63 participants, including 25 women and 38 men. 59 are students, among them 15 study economics (or a closely related field). The average participants' age is 23 years old. Each session lasts one hour and the average earnings are 20 Euro (among which 17 Euro are on average earned by participants, and 3 Euro donated to the WWF), including a 5 Euro show-up fee.

### 1.3.2 Results

Table 1.1 reports summary statistics on earned income, compliance behavior and psychometric measures elicited in the experiment. For all outcomes, we observe a high level of inter-

individual variance which allows to test the above hypotheses. The distribution of answers to the CAS is in line with the one observed by Myszkowski, Storme, Zenasni, and Lubart (2014) (on a sample of 634 undergraduates students); results for the QCAE are similar to those of Reniers, Corcoran, Völlm, Mashru, Howard, and Liddle (2012) (on a sample of 24 students) and answers to the GASP are similar to those obtained by Cohen, Wolf, Panter, and Insko (2011) on two different samples (862 representative American adults and 450 undergraduates students). The last column of the table provides a measure of the internal consistency of each sub-scale based on observed Cronbach's alphas. They are much higher than 0.70 for the CAS and each of its sub-scales (CSV and ATSCI), a level of consistency that is in line with what has been observed previously in the literature.<sup>10</sup> The consistency of the QCAE measures are a bit lower, and lower than what has been observed in previous implementations.<sup>11</sup> For the GASP, it is common use to study consistency for each sub-scale separately, and to apply a consistency threshold equal to .60 as these sub-scales are scenarios-based and constituted of 4 items each (see Cohen, Wolf, Panter, and Insko, 2011, for a detailed discussion). As compared to other studies using the GASP (Cohen, Wolf, Panter, and Insko, 2011; Howell, Turowski, and Buro, 2012; Schaumberg and Flynn, 2012; Cohen, Panter, Turan, Morse, and Kim, 2013), the NBE sub-scale exceeds most of the time what can be found in the literature (ranging from .67 to .82). Although NSE approaches the threshold of .60, it is just below what can be found in this literature (alphas between .63 and .70). Both GR and SW are well below the threshold, and lower than what can be found in the literature. Such lack of consistency for some of the GASP sub-scales has also been observed by Howell, Turowski, and Buro (2012); Cohen, Panter, Turan, Morse, and Kim (2013).<sup>12</sup>

### 1.3.2.1 Compliance behavior and morality

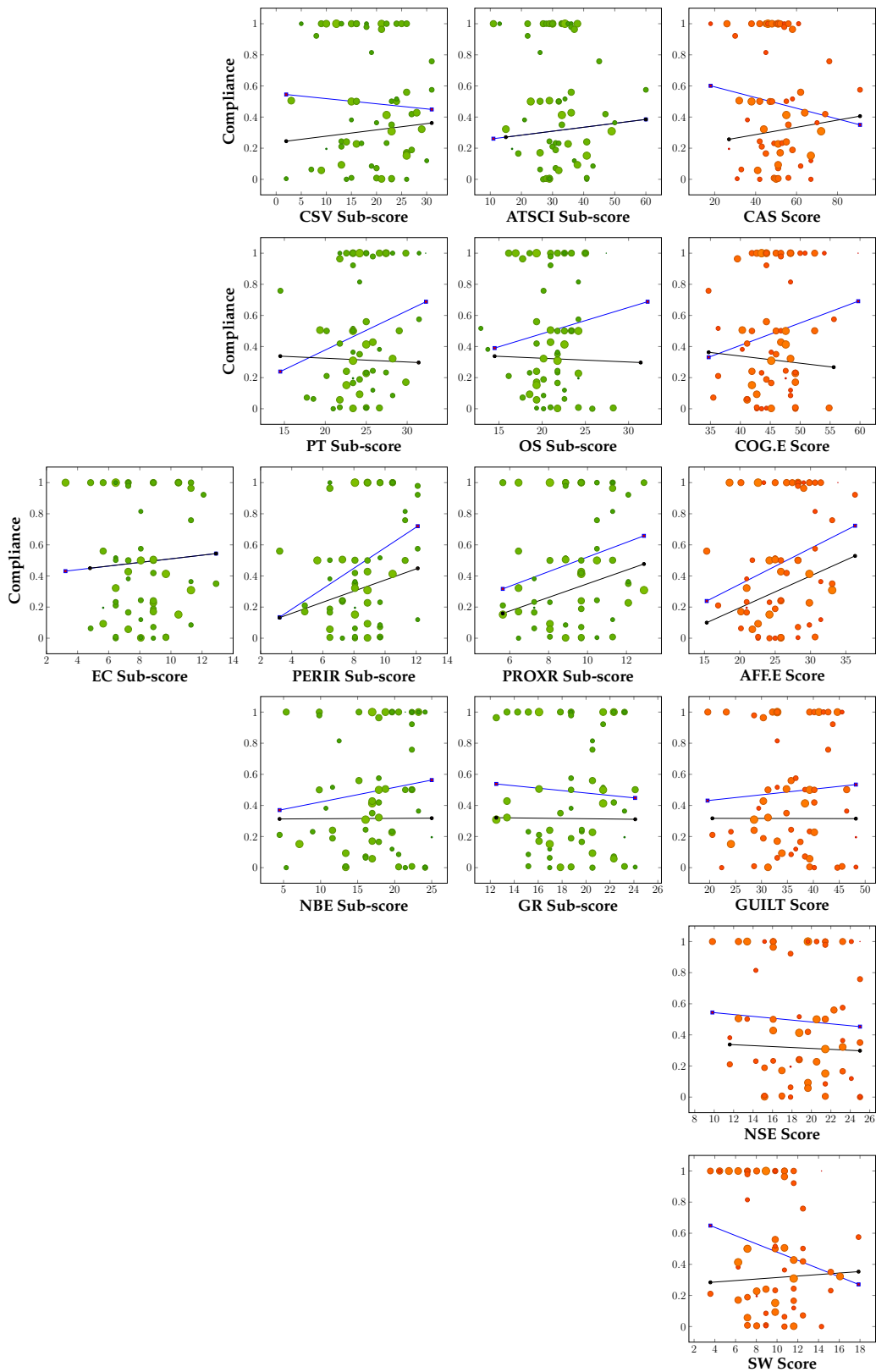
As reported at the bottom of Table 1.1, tax evasion in Experiment 1 is intense with an average declaration rate equal to 49%. It is also widespread, as only one fourth of all participants—16 subjects—declare 100% of their income. Evasion decisions are also much heterogeneous. 5% of the participants (3 subjects) declare zero income, while 25% declare less than 17% of income

<sup>10</sup>Cronbach's alpha range from .77 to .90 in Child and Agyeman-Budu (2010); Sabini, Siepmann, Stein, and Meyerowitz (2000); Ragsdale and Brandau-Brown (2005); this last study reports alpha equal to .83 and to .85 for the CSV and the ATSCI sub-scales

<sup>11</sup>Lockwood, Seara-Cardoso, and Viding (2014) finds alpha equal to .87 and .88 for the Cognitive and the Affective Empathy sub-scales; Reniers, Corcoran, Drake, Shryane, and Völlm (2011) reports alpha equal to .85 and .83 for the two COG. E. sub-scales (PT and OS), while they are similar to ours for the AFF. E. sub-scales.

<sup>12</sup>Table 3.10 from Section in g Appendix provides the 2×2 correlations observed between these measures.

Figure 1.1: Compliance and psychometric scores in Experiment 1 – Univariate analysis



and 50% less than 42%. It is interesting to note that the correlation between the amount of earned income and the declaration rate is low (equal to -0.023) and non-significant ( $p = .855$ ): there is no evidence of a wealth effect on compliance behavior.

Table 1.2: Information on the slopes of Figure 1.1

Variable	Full sample						Sample of compliance < 100%					
	Coef.	Conf. Inter.	p	R <sup>2</sup>	<i>r</i>	Coef.	Conf. Inter.	p	R <sup>2</sup>	<i>r</i>		
_CAS	-.003	-.010 .004	.362	.013	-.116	.002	-.003 .008	.443	.013	.114		
_CSV	-.003	-.017 .010	.635	.003	-.060	.004	-.007 .015	.475	.011	.106		
_ATSCI	-.005	-.016 .005	.337	.015	-.123	.002	-.006 .011	.576	.007	.083		
_COG. E.	.011	-.004 .027	.160	.032	.179	-.003	-.017 .010	.605	.006	-.077		
_PT	.020	-.003 .044	.089	.046	.215	-.001	.022 .019	.854	.000	-.027		
_OS	.005	-.021 .032	.686	.002	.052	-.007	-.030 .015	.524	.009	-.095		
_AFF. E.	.018	.001 .035	.033	.072	.269	.016	.002 .030	.018	.117	.343		
_EC	.009	-.029 .048	.634	.003	.061	.026	-.007 .060	.118	.053	.231		
_PROXR	.037	-.002 .078	.065	.054	.234	.035	.002 .068	.038	.092	.304		
_PERIR	.053	.014 .092	.008	.108	.329	.028	-.002 .059	.067	.072	.269		
_GUILT	.003	-.009 .015	.612	.004	.065	-.000	-.010 .010	.992	.000	-.001		
_NBE	.008	-.008 .025	.323	.016	.126	.000	-.014 .014	.978	.000	.004		
_GR	-.006	-.034 .020	.619	.004	-.063	-.000	-.024 .022	.946	.000	-.010		
_NSE	-.005	-.027 .017	.640	.003	-.060	-.002	-.022 .016	.785	.001	-.040		
_SW	-.023	-.052 .004	.101	.043	-.208	.004	-.021 .029	.732	.002	.051		

**Note.** Information on the slopes of Figure 1.1: variables, coefficients, confidence intervals, p-values,  $R^2$  and Pearson correlation coefficients  $r$ .

Figure 1.1 provides univariate descriptive evidence on the association between scores to the questionnaires and compliance decisions. Each scale is displayed on the right-hand side along with its sub-scales on the left-hand side. As explained in Section 1.3.1.1, NSE and SW are considered separately. On each graph, each dot represents one participant of our experiment. The size of the dot and the intensity of its color is proportional to earned income (the bigger and the darker the dot, the higher the income). Two regression lines are drawn: the blue one is based on all observations while the black one focuses only on evaders, i.e. compliance decisions that are not equal to 100% income reporting. Two main lessons emerge. First, for most measures, the blue and black lines show a weak association between compliance and psychometric scores. Coefficients, confidence intervals, p-values and  $R^2$  of these lines can be seen in Table 1.2. Concerning the whole sample, at the exception of PT, AFF. E., PROXR, PERIR and to a lesser extent COG. E. and SW, slopes' coefficients of the blue lines are between -.006 minimum and .009 maximum. None of these variables are significant ( $p$  between .323 and .686). The  $R^2$  is never higher than .016. Pearson correlation coefficients  $r$  (the square root of the  $R^2$  in the univariate case) between the scores and compliance are consequently weak (at most .126), indicating that psychometric scores do not explain much of the variance of compliance in this

sample. Concerning the sample of participants declaring less than their full incomes, at the exception of AFF. E., PROXR, PERIR and to a lesser extent EC, slopes' coefficient of the blue lines are between  $-.007$  and  $.004$ . None of these variables are significant ( $p$  is between  $.443$  and  $.992$ ). The  $R^2$  is not higher than  $0.013$ . Pearson correlation coefficients  $r$  are again weak (at most  $.114$ ), confirming that psychometric scores do not explain much of the variance of compliance in both sample. Most of the correlation between scales, sub-scales and mean compliance are extremely low and never significant. This holds when considering the whole sample and only evaders. Only AFF. E., PROXR and PERIR are significant in both settings. Second, there is a strong discrepancy in the observed univariate association between scores and compliance depending whether the decision to evade is treated separately from its intensity: in most cases, the slope of black lines is drastically different from the one of blue lines. As an example, compliance is positively related to PT sub-scale when all subjects are considered (blue line), but is totally flat once full compliers are excluded (black line). This difference points to different determinants of behavior depending on whether the intensive or the extensive margin of compliance behavior is considered.

### 1.3.2.2 Multivariate analysis

We now turn to parametric models aimed at controlling the correlations between psychometric scores. We distinguish the extensive margin of tax compliance (the decision to evade taxes) from its intensive margin (the intensity of evasion when there is evasion). The first outcome is specified as a 0/1 variable, on which we adjust a Probit model estimated on all individuals. The second outcome is measured as the ratio between the declared income and the earned income; the effect of psychometric scores is measured through a linear model estimated on evaders.<sup>13</sup> For each of the two dimensions, we estimate two specifications of the models: one based on the general scales—except for NSE and SW that are not aggregated—and one based on the specific sub-scales of each scale. The results are reported in Table 1.3.

The estimation results, for both the extensive and the intensive margin as well as both the general scales and their sub-scales, confirm the general lesson drawn from univariate analysis: the personality traits related to moral emotions measured by the psychometric questionnaires are weakly associated to the decision to evade taxes. We do observe a few correlations, though,

<sup>13</sup>We specify an OLS model that does not account for the fact that the subsample is selected, because we aim to identify the parameters that are specific to the sub-population that decide to evade taxes.

Table 1.3: Experiment 1: Multivariate regressions of compliance decisions on psychometric scores

Variable	Extensive margin				Intensive margin			
	Scales		Sub-scales		Scales		Sub-scales	
	Coef.	(St. E.)	Coef.	(St. E.)	Coef.	(St. E.)	Coef.	(St. E.)
_CAS	-0.018	(0.020)	-	-	0.001	(0.004)	-	-
_CSV	-	-	-0.005	(0.034)	-	-	0.008	(0.007)
_ATSCI	-	-	-0.022	(0.031)	-	-	-0.003	(0.006)
_COG. E.	0.066*	(0.038)	.	.	-0.005	(0.007)	-	-
_PT	-	-	0.058	(0.063)	-	-	-0.002	(0.011)
_OS	-	-	0.022	(0.068)	-	-	-0.019	(0.014)
_AFF. E.	0.038	(0.040)	-	-	0.019**	(0.008)	-	-
_EC	-	-	-0.144	(0.113)	-	-	0.003	(0.023)
_PROXR	-	-	0.151	(0.149)	-	-	0.044	(0.028)
_PERIR	-	-	0.165	(0.107)	-	-	0.021	(0.019)
_GUILT	-0.011	(0.030)	-	-	0.000	(0.007)	-	-
_NBE	-	-	0.092	(0.058)	-	-	0.001	(0.010)
_GR	-	-	-0.143*	(0.077)	-	-	-0.003	(0.015)
_NSE	0.010	(0.063)	-0.016	(0.069)	-0.011	(0.012)	-0.010	(0.013)
_SW	-0.134*	(0.074)	-0.198**	(0.088)	-0.001	(0.014)	-0.004	(0.016)
Intercept	-3.191	(2.369)	-0.809	(3.113)	0.150	(0.444)	0.375	(0.572)
(Pseudo) R <sup>2</sup>	0.1796		0.2952		0.159		0.215	
$\chi^2_{(6)}$	12.821		$\chi^2_{(11)}$ 21.074		$F_{(6,40)}$ 1.263		$F_{(11,35)}$ .873	

**Note.** Left-hand side: Probit model on the decision to fully comply or not. The dependent variable equals 1 if declared income is equal to earned income, to 0 otherwise ( $N = 63$ ). Right-hand side: OLS regression on the compliance rate (declared income divided by earned income) estimated on the subsample of evaders ( $N = 47$ ). CAS: Concern for Appropriateness Scale; CSV: Cross-Situational Variability of Behavior; ATSCI: Attention to Social Comparison Information; QCAE: Questionnaire for Cognitive and Affective Empathy; COG. E.: Cognitive Empathy; PT: Perspective Taking; OS: Online Simulation; AFF. E.: Affective Empathy; EC: Emotion Contagion; PERIR: Peripheral Responsivity; PROXR: Proximal Responsivity; GASP: Guilt And Shame Proneness; GUILT: guilt sub-scale from the GASP; NBE: Negative Behavior-Evaluations; GR: Guilt - Repair responses; SHAME: shame sub-scale from the GASP; NSE: Negative Self-Evaluations; SW: Shame - Withdrawal Responses.

**Legend.** Significance levels: \* : 10% \*\* : 5% \*\*\* : 1%

that are moreover different depending on whether the decision to evade or its intensity is considered. Regarding the extensive margin, the Cognitive Empathy scale is significantly (at 10%) and positively linked with the decision to fully comply or evade. This indicates that being more able to figure out and understand the emotional states of others increases the probability to be a full complier. The Shame-Withdrawal sub-scale is also significant, but with a negative sign. Once Guilt is disaggregated into its sub-scales, in column 2, Guilt-Repair appears significant (at the 5% level) with the same sign. This negative correlation is expected for SW as people scoring high on this sub-scale tend to have inappropriate behavior following a transgression (see literature review concerning SW where there is a negative correlation between SW and ethical behaviors). However, the negative correlation is not expected for GR and contradicts



Table 1.4: Weights of each component in Experiment 1 (varimax rotation)

	Guilt	Public Morality	Affective Empathy	Cognitive Empathy	Unexp.
_CSV	–	0.5803	–	–	.3657
_ATSCI	–	0.4314	–	–	.4772
_PT	–	–	–	0.7920	.2093
_OS	0.4019	–	–	0.3273	.4492
_EC	–	–	0.5578	–	.3544
_PROXR	–	–	0.5667	–	.1914
_PERIR	–	–	0.5720	–	.4180
_NBE	0.5701	–	–	–	.2792
_GR	0.5198	–	–	–	.3805
_NSE	0.4034	0.3960	–	–	.2817
_SW	–	0.5286	–	–	.4284

**Note.** The table presents the eigenvector of each of the 4 components (>.30), after an orthogonal rotation (varimax).

the existing literature, as it measures the will to correct or compensate a transgression.<sup>14</sup>

Turning to the intensive margin, only the affective empathy scale of the QCAE is significant (at 5% level). Its sign is positive, meaning that those who score higher on this affective empathy scale are declaring more honestly their income.<sup>15</sup>

### 1.3.2.3 Using Principal Component Analysis to combine sub-scales

To better grasp the meaning of these psychological questionnaires, we run a standard method in psychometrics: a Principal Component Analysis (PCA). Running a PCA on a set of possibly correlated variables allows to extract linearly uncorrelated components and to reduce the dimension of these variables. Using PCA in an economic experiment with personality questionnaires is not new (e.g. Calvet and Alm, 2014). In this experiment, there are 13 variables of personality measuring different traits.<sup>16</sup> The PCA leads to identify four principal components that explain 65.14% of the overall original questions variance ( $Rho=0.6514$ ).<sup>17</sup> To simplify the

<sup>14</sup>Considering GR and SW have a low Cronbach's alpha, we are not confident about these conclusions. Dropping them from the analysis does not change anything to the outputs. We can provide the results of these regressions on request.

<sup>15</sup>Table 3.8 from Section g in Appendix shows that the Heckman selection model gives comparable results.

<sup>16</sup>Normalized raw scores are presented in Figure 3.8 in Appendix. The PCA is conducted on reduced centered variable to ease their interpretation.

<sup>17</sup>To select the components, we retain those that possess a eigenvalue higher than 1. The eigenvalue from the PCA is higher when the component explains an important part of the variance observed of the answers to the 13 variables. This criterion corresponds to the traditional threshold retained in data analysis (Hair Jr, Wolfinbarger, Money, Samouel, and Page, 2015).

eigenvector matrix of these four principal components, we apply an orthogonal rotation (varimax) that conserves the independence of the components rotated.<sup>18</sup> The Kaiser-Meyer-Olkin (KMO) measure of sampling adequacy is equal to 0.6458. When the KMO value is too small, the variables have too little in common to run a PCA. Here, the actual value is judged as acceptable (Kaiser, 1974).

Table 1.4 presents the eigenvector after orthogonal rotation of the four retained components. These components are latent factors that synthetically sum up the available information in the questionnaires. Their content can be interpreted according to their degree of correlation with the original psychological questionnaires. Component 1 is principally linked (with a correlation superior to 0.3) to the subscales NBE, GR and NSE from the GASP questionnaire and to the OS subscale from the QCAE questionnaire. The subscales NBE and GR correspond to the Guilt part of the GASP and the first represents more precisely the propensity to feel guilty while the second measures the willingness to repair transgressions. The subscale NSE represents the propensity to feel ashamed, and the OS subscale measures the voluntary attempt to put oneself in another person's position. Component 1 can be understood as a personality variable that associates propensity to feel shame, guilt and cognitive empathy. It is a component that can recall the definition of guilt proposed in the economical literature (Charness and Dufwenberg, 2006): subjects feel guiltiness if they deceive others' expectations. Shame and guilt measured in the GASP correspond indeed to a negative emotion felt in a social or private context. The first component of PCA indicates that to feel guilt and/or shame (measured by NBE and NSE), one has to be able to understand what the expectations of the aggrieved person are (measured by OS). The subscale GR informs on the actions following this negative emotion, i.e. the willingness to repair the transgressions at the origin of this emotion. It is named "Guilt". Component 2 is principally correlated with questionnaires measuring norm submission (CAS) and the propensity to feel guilt and shame (GASP). More precisely, if this component is linked positively to two subscales of the CAS (CSV and ATSCI), it is only linked to the Shame part of the GASP (NSE and SW). It seems logical that norm submission would be linked to shame propensity, a negative emotion felt in public. Norm is an implicit rule coming from a social group—susceptible to

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<sup>18</sup>See respectively in Table 3.5 and in Table 3.6 in Appendix, the principal components ordered by their eigenvalues and the matrix of eigenvectors before rotation. Rotation of PCA consists in modifying the projection space in a way to simplify the structure such as the weight of each variable is as different as possible between components. The orthogonal rotation is an alternative to oblique rotation (e.g. promax). These oblique rotations authorize correlations between rotated components. In our case, the conservation of the orthogonality is a desired property because it allows putting in evidence personality traits that can be interpreted independently from each other. However, oblique promax rotation does not change the results (the detailed results are presented in Table 3.7).

prescribe “*a margin of behavior*” to adopt (Drozda-Senkowska, 2004, p. 40). This norm depends on the social context and is reinforced by the presence of observers. This component could capture the public dimension of morality, through which shame feeling propensity and norm submission would go pairwise. It is named “Public Morality”. Another explanation could be that a shared factor explains the association inside this component. Indeed, we observe that CAS is negatively correlated with self-esteem repeatedly in the literature. Using Rosenberg (1965) scale to measure self-esteem, Bachner-Melman, Bacon-Shnoor, Zohar, Elizur, and Eibstein (2009) and Myszkowski, Storme, Zenasni, and Lubart (2014) find a negative correlation between CAS and self-esteem. It is the same for Miller, Omens, and Delvadia (1991) who are using Helmreich and Stapp (1974) scale to measure self-esteem. Cohen, Wolf, Panter, and Insko (2011) show that subscales NSE and SW are also correlated negatively to self-esteem as measured by Rosenberg (1965). Thus, the factor shared by these two scales could be self-esteem, meaning that the individuals with low self-esteem would have a higher propensity to evade. The two last components are both linked to the QCAE. Component 3 is linked to subscales EC, PROXR and PERIR, that are parts of the Affective Empathy scale. This component is thus a direct measure of affective empathy, which corresponds to the ability to be sensitive and to feel vicariously others’ feelings. Component 4 covers the PT and OS subscales which constitutes the Cognitive Empathy scale. Cognitive empathy is the ability to represent a functional model of other people’s emotional states, i.e. to recognize and attribute emotions to others. These results are coming from a PCA in which the varimax rotation is preserving the orthogonality of principal components, therefore it confirms that cognitive and affective empathy can be seen as two independent personality traits (Reniers, Corcoran, Drake, Shryane, and Völlm, 2011). They are named respectively “Affective Empathy” and “Cognitive Empathy”.

Table 1.5 presents, as before, a Probit model on the extensive margin and an OLS model on the intensive margin. Regressors are the components combined thanks to the PCA. Guilt (Component 1) is the only one that does not account for the decision to evade or for the evasion intensity. The two last components, capturing the individual propensity to feel empathy, respectively Affective (Component 3) and Cognitive Empathy (Component 4), make the declarations levels varying positively, each in a different dimension. Cognitive Empathy affects precisely the decision to evade, while Affective Empathy explains its intensity among the individuals who decide to evade. Globally, these results indicate that the higher the ability of a person to project oneself in others’ position and to represent their feelings, the higher the reluctance to

Table 1.5: Experiment 1: Multivariate regressions of compliance decisions on principal components

	Extensive margin		Intensive margin	
Variable	Coef.	(St. E.)	Coef.	(St. E.)
Guilt	0.034	(0.143)	-0.035	(0.030)
Public Morality	-0.354**	(0.160)	-0.011	(0.030)
Affective Empathy	0.189	(0.167)	0.078**	(0.032)
Cognitive Empathy	0.555***	(0.214)	-0.002	(0.038)
Intercept	-0.825***	(0.205)	0.323***	(0.040)
(Pseudo) R <sup>2</sup>	0.210		0.135	
$\chi^2_{(4)}$	15.047		F <sub>(4,42)</sub> 1.644	

**Note.** Left-hand side: Probit model on the decision to fully comply or not. The dependent variable equals 1 if declared income is equal to earned income, to 0 otherwise ( $N = 63$ ). Right-hand side: OLS regression on the compliance rate (declared income divided by earned income) estimated on the subsample of evaders ( $N = 47$ ).

**Legend.** Significance levels: \*: 10% \*\*: 5% \*\*\*: 1%

evade. Public Morality (Component 2) has a contrasted effect as it impacts only the decision to evade, and in a negative direction. This component is constituted of the CAS (CSV and ATSCI) and the Shame part of the GASP (NSE and SW). This negative effect is entirely due to the score observed on Shame-Withdrawal Responses (SW) sub-scale (as seen in Table 1.3).<sup>19</sup>

## 1.4 Experiment 2

Observed behavior from Experiment 1 shows that (i) moral emotions weakly explain the decision to evade taxes, using raw scores or components and (ii) when a correlation does show up, the sign are sometimes highly counter intuitive. In Experiment 2, we assess the robustness of these observations to two variations in the design. First, we consider alternative dimensions of tax morale by focusing on moral judgment rather than moral emotions. Second, the design of the compliance elicitation task aims to foster the effect of tax morale on tax compliance, by letting participants choose the use of the tax collected.

<sup>19</sup>Table 3.9 from Section g in Appendix shows that the Heckman selection model gives comparable results.

### 1.4.1 Design of the experiment

The design of Experiment 2 closely follows Experiment 1—income is first earned through a 9 digit ordering task and taxed at a 35% rate with no penalty on tax evasion. The only exception is the declaration stage. Participants are allowed to choose between two organizations to which the tax collected will be donated: the World Wide Fund for Nature (WWF) or a French organization for the protection of the wildlife, ASPAS (*Association pour la protection des animaux sauvages*). Such feature has been shown in the literature to foster compliance, as it reinforces the personal identification towards the taxation mechanism (see e.g. Alm, Jackson, and McKee, 1993; Alm, McClelland, and Schulze, 1999; Wahl, Muehlbacher, and Kirchler, 2010; Lamberton, De Neve, and Norton, 2014). In order to control the variation in compliance induced by this choice, we need to observe compliance in both states of the world: whether the selected association or the other one actually receives the tax collected. To that end, participants are asked to choose between two possible options: in option 1, the WWF is selected with probability 2/3, while ASPAS will receive the funds with a 1/3 probability; option 2 maintains the same probability distribution but favors ASPAS (selected with 2/3 probability) rather than WWF (1/3). Once an option has been chosen, participants are asked to make two declarations: one if ASPAS is selected, one if is WWF.<sup>20</sup> Participants are then individually informed of the association actually selected to receive their taxes. To ensure the credibility of the donations made in the experiment, the funds given to the WWF and ASPAS are certified thanks to certificates directly issued by the organizations and sent directly to the participants through email.

#### 1.4.1.1 Psychometric measures of moral judgments

As in Experiment 1, subjects are asked to fill out a socio demographic questionnaire at the end of the experiment, followed by psychometric questionnaires (subjects receive a 5 Euro fixed fee as compensation for this step). Three dimensions of moral judgments are included: ethics principles, integrity and the moralization of daily acts.

Attachment to ethics principles is measured thanks to the Ethics Position Questionnaire (EPQ Forsyth, 1980). The scale is made of two sub-scales, relativism and idealism, both having 10 items, such as “*People should make certain that their actions never intentionally harm another even*

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<sup>20</sup>Section c of Appendix provides screen-shots of the choice phase (Figure 3.5) and the declaration phase (Figure 3.6).

*to a small degree*" or *"No rule concerning lying can be formulated; whether a lie is permissible or not permissible totally depends upon the situation"*. Respondents are asked to report their level of agreement with each statement on a 9 point scale—the higher the score on the relativism sub-scale the higher the rejection of absolute rules; the higher the score on the idealism sub-scale the higher the endorsement of ethical rules. This questionnaire has been extensively used in the last decades, resulting in a large amount of literature (see Davis, Andersen, and Curtis, 2001; Craft, 2013; Meng, Othman, D'Silva, and Omar, 2014, for surveys of its application to business, ethics and academic (dis)honesty). Idealism and relativism are generally correlated with the same outcome behavior, but with reverse signs. For instance, the propensity to use an aggressive business negotiation strategy is related negatively to idealism but positively to relativism (Al-Khatib, Rawwas, Swaidan, and Rexeisen, 2005; Low, Al-Khatib, Vollmers, and Liu, 2007), as is the propensity to morally disengage on a broad range of unethical organizational behaviors (Moore, Detert, Klebe Treviño, Baker, and Mayer, 2012). Idealistic people tend to see things as being more ethical than less idealistic persons (Singhapakdi, Vitell, and Franke, 1999) and recognize more easily an ethical problem (Dorantes, Hewitt, and Goles, 2006). The reverse relationships are observed for relativistic persons. These personality differences have consequences on the behavior. Idealism is negatively correlated with cheating behavior (Sierra and Hyman, 2008), and positively correlated with the likelihood of reporting those who cheated (Smith and Shen, 2013), the rating of academic unethical behaviors as being serious (Etter, Cramer, and Finn, 2006), and stating that reporting peer's cheating is ethical (Barnett, Bass, and Brown, 1996). Again, relativism is related to these same behaviors, but with a reverse sign. As a result, we hypothesize a positive correlation between tax compliance and idealism and a negative correlation with relativism.

Integrity, defined as the commitment to ethical principles, is measured by the Integrity Scale (IS Schlenker, 2008). Participant's agreement with 18 statements, such as *"It is foolish to tell the truth when big profits can be made by lying"* or *"One's principles should not be compromised regardless of the possible gain"*, is elicited on a 5 levels scale. The higher the score, the higher the endorsement of ethics. The score at IS is correlated with a wide range of behaviors and traits. It is positively related with helping others, the frequency of volunteering, the preference for respect, the preference for consistency, role satisfaction and religiosity in Schlenker (2008), with conservatism and life satisfaction in Schlenker, Chambers, and Le (2012), and with religiousness, moral compass (i.e. knowing what is right and wrong), considering lying as unacceptable in Shepperd,

Miller, Smith, and Algina (2014). It is also negatively correlated with unethical behavior like plagiarism (Lewis and Zhong, 2011) or cheating (Wowra, 2007). We hypothesize that a negative association exists between score at IS and tax evasion.

People's assignment of moral weight to common behavior is measured by the Moralization of Everyday Life Scale (MELS Lovett, Jordan, and Wiltermuth, 2012). This scale is made of 30 situations, such as *"Elizabeth fakes an injury after an automobile accident in order to collect on insurance"* or *"Alexis, a 16-year-old, does not offer her seat on the bus to a disabled old woman"*. Participants make moral statements on these situations using a 7 levels scale ranging from *"Not wrong at all; has nothing to do with morality"* to *"Very wrong; an extremely immoral action"*. The general scale is organized in 6 sub-scales labeled as Factors: Deception (F1, related to the moral weight on the use of deception), Norm violation (F2), Laziness (F3), Failures to behave the right way (F4), Body violations (F5) and Disgust (F6, related to disgusting behaviors). The higher the score, the higher the moralization of everyday life. The existing literature mainly investigates the attitudinal content of the score. The scores to this test significantly explain the variability of the scores to the Crissman (1942) test on everyday moral judgments. Stoeber and Yang (2016) shows that moral perfectionism and general perfectionism explains a part of the variance of the MELS sub-scales. Seeing life thanks to a *"dramaturgical perspective"* (society is a game where individuals enacts roles) decreases the moralization of everyday behavior (Sullivan, Landau, Young, and Stewart, 2014). We hypothesize a negative correlation between scores to the MELS test and tax evasion.<sup>21</sup>

#### 1.4.1.2 Experimental procedure

All the experimental sessions took place at the laboratory of the Strasbourg University (LEES) in January 2016.<sup>22</sup> The empirical analysis relies on two experimental sessions, with 25 participants each. Overall, the data is made of 50 participants, including 25 women and 25 men. All subjects are students, among them 17 study economics (or a closely related field). The average participants' age is 21 years old. Each session lasts one hour and the average earnings are 20 Euro (18 Euro earned on average by participants and 2 Euro donated to one of two organizations), including a 5 Euro show-up fee.

<sup>21</sup>French translations of the EPQ, IS and the MELS have been made by ourselves. The sub-scales and their interpretation are presented in Section f in the Appendix.

<sup>22</sup>The recruitment process of the participants uses ORSEE Greiner (2015). The experiment is computerized, thanks to a program from the internet platform Econplay ([www.econplay.fr](http://www.econplay.fr)).

Table 1.6: Summary statistics on compliance and psychometric measures in Experiment 2

Variable	Mean	Std. Dev.	Median	Q1	Q3	Minimum	Maximum	Alpha
_Idealism (EPQ)	6.61	1.21	6.7	5.9	7.3	2.5	8.9	.83
_Relativism (EPQ)	5.35	1.23	5.3	4.7	6.1	1.8	7.6	.74
_Integrity Scale	3.38	.46	3.36	3.11	3.72	2.27	4.5	.75
MELS	3.79	.88	3.73	3.3	4.16	2.2	6.33	.90
_F1-Deception	4.28	1.30	4.4	3.6	5.4	1.6	7	.77
_F2-Norm violation	5.58	1.28	5.8	5.2	6.6	1	7	.81
_F3-Laziness	1.72	.96	1.4	1.2	2	1	5.2	.78
_F4-Failure	4.88	1.35	5	4	6	1	7	.88
_F5-Body violations	2.23	1.25	1.8	1.4	2.8	1	7	.78
_F6-Disgust	4.08	1.37	4.1	3	4.8	1.4	6.8	.75
Income	347.70	79.810	360	314	405	107	483	–
Compliance (for WWF)	36.58%	31.13%	24.42%	16.7%	54.14%	0	1	–
Compliance (for ASPAS)	34.42%	30%	22.21%	14%	50.72%	0	1	–

**Note.** Summary statistics on outcomes from Experiment 2 ( $N = 50$ ). EPQ: Ethics Position Questionnaire; MELS: Moralization of Everyday Life Scale.

### 1.4.2 Results

The top part of Table 1.6 reports summary statistics on the answers elicited to the EPQ, IS and MELS scales. The observed distributions of psychometric scores are similar to those obtained in seminal studies—Barnett, Bass, and Brown (1996) for the EPQ on a sample of 267 students, Johnson and Schlenker (2007) for the IS on a sample of 1341 participants, Stoeber and Yang (2016) for the MELS on a sample of 243 students. Our participants however scored higher on two sub-scales: F2-Norm violation and F4-Failure, meaning that our participants are judging these domains as being more morale. The last column of the Table provides Cronbach measures of internal consistency. For all scales and sub-scales, alpha is higher than a 0.7 threshold. For the EPQ, our alphas are similar to the ones observed in the original Forsyth (1980) study (.80 for idealism and .73 for relativism). For IS, our consistency measure is in the middle of the range observed in the studies reviewed in the previous section.<sup>23</sup> Lastly, for the MELS, the alphas are globally a bit lower than in the original Lovett, Jordan, and Wiltermuth (2012) study, but similar to those reported by the follow-up studies reviewed in the previous section, in which alphas range between .78 and .88.

<sup>23</sup>The IS alphas are ranging from .84 to maximum .90 across five different samples in the original research from Schlenker (2008), is equal to .83 in Hill, Burrow, Brandenberger, Lapsley, and Quaranto (2010) and to .67 in Shepperd, Miller, Smith, and Algina (2014).



### 1.4.2.1 Compliance behavior and morality

The bottom part of Table 1.6 describes the distribution of earned income and compliance for both the WWF and ASPAS. The two declarations are highly correlated ( $r = .94$ ) and exhibit similar distributions. To ease the comparison with the results from Experiment 1, we focus on compliance decisions directed towards the WWF.<sup>24</sup> As in Experiment 1, tax evasion is intense (the average declaration rate is 36.58%) and widespread—only one eighth of participants, 6 subjects, declare 100% for their income.<sup>25</sup> Evasion decisions are slightly less heterogeneous than in the first experiment. 6% of the participants (3 subjects) declare zero income, while 25% declare less than 16.70% of their income and 50% less than 24.42%. Lastly we again can rule out wealth effects in compliance decisions as the correlation with the level of income is both low (equal to 0.0007), and non-significant ( $p = .201$ ).

In Figure 1.2, we provide the univariate association between the moral judgments questionnaires and compliance using the same patterns as in Figure 1.1. Despite a wide inter-individual heterogeneity in both scores and compliance, the regression lines clearly show a lack of association with any of the personality traits included in the experiment. Coefficients, confidence intervals, p-values and  $R^2$  of these lines can be seen in Table 1.7. Concerning the whole sample, slopes' coefficients of the blue lines are between -.005 minimum and .005 maximum. None of the variables are significant ( $p$  between .329 and .850). The  $R^2$  is never higher than .019, leading to a Pearson correlation coefficients  $r$  weak (at most -.140). Concerning the sample of participants declaring less than their full incomes, slopes' coefficients of the black lines are between -.005 and .003. None of the variables are again significant ( $p$  between .273 and .973). The  $R^2$  is never higher than .027,  $r$  is never higher than -.166 and once again, we can conclude that psychometric scores do not explain much of the variance of compliance in this sample. The correlations between scales, sub-scales, and mean compliance are extremely low and never significant. This holds when considering the whole sample and only evaders. All regression lines are flat. In contrast with Experiment 1, we do not find any difference depending on whether we pool all subjects, or focus only on evaders. For all sub-scales, the blue regression lines (computed by pooling all subjects) and the black ones (excluding full compliers) are now parallel.

<sup>24</sup>All figures, tables and results are the same when using declaration to the ASPAS rather than WWF. The results are available upon request.

<sup>25</sup>Figure 3.9 in Appendix, provides the distribution of individual compliance decisions in the experiment.

Figure 1.2: Compliance and psychometric scores in Experiment 2 – Univariate analysis

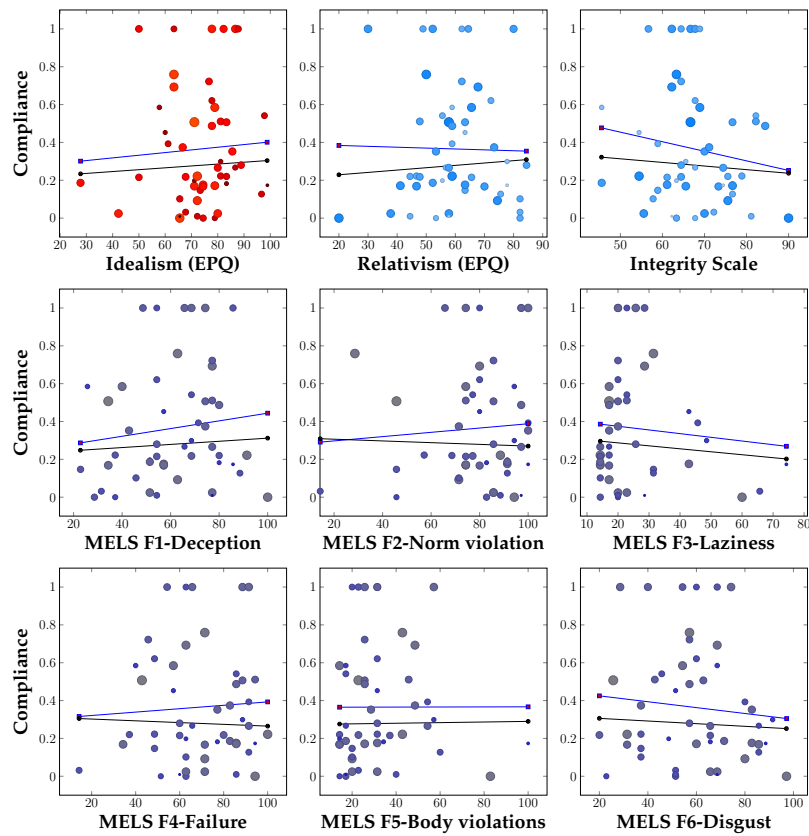


Table 1.7: Information on the slopes of Figure 1.2

Variable	Full sample						Sample of compliance < 100%					
	Coef.	Conf. Inter.	p	R <sup>2</sup>	r	Coef.	Conf. Inter.	p	R <sup>2</sup>	r		
__Idealism (EPQ)	.000	-.006 .007	.850	.000	.027	.001	-.004 .006	.613	.006	.077		
__Relativism (EPQ)	-.001	-.008 .005	.750	.002	-.046	-.000	-.005 .005	.973	.000	-.005		
__Integrity Scale	-.005	-.015 .005	.329	.019	-.140	-.001	-.009 .006	.651	.004	-.069		
__F1-Deception	.005	-.007 .019	.388	.015	.124	.003	-.006 .013	.518	.009	.098		
__F2-Norm violation	.003	-.009 .017	.575	.006	.081	-.001	-.011 .008	.788	.001	-.041		
__F3-Laziness	-.005	-.023 .012	.545	.007	-.087	-.005	-.018 .007	.417	.015	-.123		
__F4-Failure	.003	-.009 .016	.594	.006	.077	.001	-.007 .011	.688	.003	.061		
__F5-Body violations	.000	-.013 .014	.919	.000	.014	.000	-.010 .010	.957	.000	.008		
__F6-Disgust	-.004	-.017 .008	.493	.009	-.099	-.005	-.014 .004	.273	.027	-.166		

Note. Information on the slopes of Figure 1.2: variables, coefficients, confidence intervals, p-values,  $R^2$  and Pearson correlation coefficients  $r$ .

### 1.4.2.2 Multivariate analysis

Given the similar patterns of univariate associations between the whole sample and the sub-sample of evaders, we focus our multivariate analysis on pooled regressions on all subjects. The results are provided in Table 1.8. We estimate two specifications of the model, with varying definitions of the compliance variable. The benchmark model, on the left-hand side, uses the

Table 1.8: Experiment 2: Multivariate regressions of compliance decisions on psychometric scores

Variable	WWF		Chosen organization	
	Coef.	(St. e.)	Coef.	(St. e.)
_Idealism (EPQ)	0.007	(0.005)	0.006	(0.005)
_Relativism (EPQ)	-0.002	(0.004)	-0.002	(0.004)
_Integrity Scale	-0.015*	(0.008)	-0.012	(0.008)
_F1-Deception	0.012	(0.011)	0.010	(0.011)
_F2-Norm violation	-0.003	(0.012)	0.000	(0.012)
_F3-Laziness	-0.007	(0.015)	-0.010	(0.015)
_F4-Failure	-0.003	(0.011)	-0.003	(0.011)
_F5-Body violations	0.004	(0.013)	0.006	(0.012)
_F6-Disgust	-0.005	(0.010)	-0.005	(0.009)
Intercept	0.953*	(0.516)	0.800	(0.507)
R <sup>2</sup>	0.122		R <sup>2</sup> 0.109	
F <sub>(9,40)</sub>	.619		F <sub>(9,40)</sub> .545	

**Note.** OLS regressions of compliance rate (income declared divided by earned income) on scores to moral judgment questionnaires. Left-hand side: compliance directed towards the WWF. Right-hand side: compliance directed towards the chosen organization—WWF if the option with higher probability favoring WWF has been chosen, ASPAS otherwise. All models are estimated on the whole sample of subjects ( $N = 50$ ). EPQ: Ethics Position Questionnaire; MELs: Moralization of Everyday Life Scale. **Legend.** Significance levels: \* : 10% \*\* : 5% \*\*\* : 1%

compliance directed towards the WWF. On the right-hand side, we make use of the individual choice of the organization who benefits from collected taxes: we use compliance towards the WWF when the option with higher probability favoring WWF has been chosen and compliance for ASPAS otherwise.

The estimation results confirm the conclusions drawn from univariate analysis: compliance is weakly related to psychometric measures of personality traits related to moral emotions. When compliance directed towards the WWF is considered, only the score on the integrity scale is significant. It shows up with a negative sign, which is highly counterintuitive: more upright people should be less willing to evade. This correlation does not survive the conditioning on the choice of the organization who benefits from collected taxes: in the second model, no subscale is significantly correlated with the compliance for the organization selected.<sup>26</sup>

Table 1.9: Weights of each component in Experiment 2 (varimax rotation)

	Morality towards Others	Morality towards Self	Idealism	Relativism	Unexp.
_Idealism (EPQ)	–	–	0.6558	0.3124	.1568
_Relativism (EPQ)	–	–	–	0.8673	.1135
_Integrity Scale	–	–	0.6478	–	.1831
_F1-Deception	0.3534	–	–	–	.2821
_F2-Norm violation	0.6967	–	–	–	.1088
_F3-Laziness	–	0.7215	–	–	.0992
_F4-Failure	0.4595	–	–	–	.2664
_F5-Body violations	–	0.5507	–	–	.1843
_F6-Disgust	0.3312	0.3610	–	–	.3799

**Note.** The table presents the eigenvector of each of the 4 components (>.30), after an orthogonal rotation (varimax).

### 1.4.2.3 Using Principal Component Analysis to combine sub-scales

Once again, we use a PCA to synthesize the information obtained in our questionnaires. There are overall 9 variables measuring different traits.<sup>27</sup> The PCA leads to identify four principal components that explain 80.29% of the overall original questions variance (Rho=0.8029). The KMO is equal to 0.6132 and is judged as acceptable. Table 1.9 presents the eigenvector after orthogonal rotations of the four retained components.<sup>28</sup> Their content can be interpreted according to their degree of correlation with the original psychological questionnaires.

Component 1 and Component 2 are based on the MELS and have one variable in common (F6-Disgust). More precisely, Component 1 is based on F1-Deception, F2-Norm violation, F4-Failure and F6-Disgust. Component 2 is based on F3-Laziness, F5-Body violations and F6-Disgust. Component 1 is constituted of variables involving mainly others while the second is rather involving the one who commits these behaviors. Thus, Component 1 captures morally reprehensible behaviors committed against others and the second, those committed against oneself. They are respectively renamed “Morality towards Others” and “Morality towards Self”. Component 3 is made of the idealism subscale from the EPQ and the unique integrity scale. Integrity measures the attachment to the sense of ethics that one feels. Idealism is the optimistic belief that ethical behavior will provide the best outcome possible. This third component represents an idealistic integrity. It is simply renamed “Idealism”. Component 4 is

<sup>26</sup>Table 3.16 from Section h in Appendix shows that the Heckman selection model gives comparable results.

<sup>27</sup>Normalized raw scores are presented in Figure 3.10.

<sup>28</sup>See Table 3.11 and Table 3.12, respectively the principal components ordered by their eigenvalues and the matrix of eigenvectors before rotation.

Table 1.10: Experiment 2: Multivariate regressions of compliance decisions on principal components

	WWF		Chosen organization	
Variable	Coef.	(St. E.)	Coef.	(St. E.)
Morality towards Others	0.003	(0.026)	0.005	(0.025)
Morality towards Self	0.003	(0.037)	0.011	(0.036)
Idealism	-0.030	(0.038)	-0.037	(0.037)
Relativism	0.024	(0.046)	0.027	(0.044)
Intercept	0.366***	(0.045)	0.371***	(0.044)
R <sup>2</sup>	0.02		0.032	
F <sub>(4,45)</sub>	.227		F <sub>(4,45)</sub> .37	

**Note.** OLS regressions of compliance rate (income declared divided by earned income) on principal components. Left-hand side: compliance directed towards the WWF. Right-hand side: compliance directed towards the chosen organization—WWF if the option with higher probability favoring WWF has been chosen, ASPAS otherwise. All models are estimated on the whole sample of subjects ( $N = 50$ ).

**Legend.** Significance levels: \*: 10% \*\*: 5% \*\*\*: 1%

simply based on the EPQ subscales: relativism and idealism. Relativism is the extent to which one rejects universal rules. It is not rare in the literature to see the idealism subscale positively correlated to the relativism subscale (e.g. Barnett, Bass, and Brown, 1996). However, it tends to invalidate that idealism and relativism can be seen as two independent personality traits, as supposed by Forsyth (1980). This component could represent the ability to idealize and to put in perspective moral concerns. It is just renamed “Relativism”.

Table 1.10 reports two OLS models, when WWF or the chosen organization is the tax destination. Regressors are the components combined thanks to the PCA. None of the four components based on the moral questionnaires accounts for any part in the explanation of the intensity of the compliance, when WWF or when the selected organization is considered.<sup>29</sup>

## 1.5 Conclusion

Tax morale—the socio-psychological determinants of an intrinsic willingness to report income truthfully to the tax authority—is one of the main building blocks on how to better design a tax system (OECD, 2013). In this Chapter, we combine incentivized measures of tax compliance in the laboratory with psychometric measures of personality traits to investigate their empirical

<sup>29</sup>Table 3.17 from Section h in Appendix shows that the Heckman selection model gives comparable results.

association. While the existing theoretical literature has hypothesized a link between tax compliance and a wide set of individual personality traits related to morality and/or conformity, we include measures related to norm submission, moral emotions (cognitive and affective empathy, guilt, shame), and the ability to make moral judgments (ethics principles, integrity and moral judgment of acts of everyday life). We elicit tax compliance in a tax evasion game that favors the influence of tax morale—thanks e.g. to the absence of penalty on evaders, and the use of tax collected to fund a real-world public good—while trying to strengthen the external validity of compliance behavior observed in the laboratory—through e.g. the taxation of a previously earned income.<sup>30</sup>

We find that both tax compliance and scores at the psychometric questionnaires exhibit high inter-individual variability. But we observe minimal relationships between the variability of income reporting decisions and the distribution of personality traits, both using univariate analysis and multivariate regression models, including raw scores and Principal Component Analysis. A few personality traits turn out significant: the propensity to feel affective and cognitive empathy increases tax compliance. This result underlines the social dimension of behavior related to tax morale: the psychological ability to foresee the effect of one's own actions on the situation and the feelings of others plays an important role in this type of situation. In line with the existing literature, we also find a positive correlation between withdrawing after committing a transgression and tax evasion. While statistically significant, the economic significance of these correlations is low—over 80% of the observed variability of compliance remains unexplained when accounting for either moral emotions or moral judgments.

There are however different limitations to this study. First, non-significant results can always be interpreted as a lack of statistical power. The sample size is indeed quite reduced but in psychology, it is not uncommon to find such sample sizes (e.g. Edele, Dziobek, and Keller, 2013 with 35 participants). Moreover the same experiment has been run with other treatments and do not show much difference (see Annex k.1). These results should nevertheless be interpreted with caution. Second, the design can also be discussed on different point. Placing the questionnaires after the tax evasion game is a rather standard implementation, but it could also lead to some priming effect. One could only wonder what would have happened if the order was re-

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<sup>30</sup>Laboratory experiments trade the ability to control behavior and collect precise information on a wide set of measures against a lower external validity. See e.g. Torgler (2002) for a discussion of the external validity of laboratory tax evasion games. Since the aim of our experiment is to measure the correlation between tax evasion behavior and personality traits, our results do not rely on the external validity of the quantitative measures of tax evasion, but rather to its covariation with personality traits.

versed. In addition, the tax evasion game is presented as a “fiscal simulation”. This term could be associated to something fictional, leading to participants not taking the TEG seriously. We also did not introduce the tax rate at the beginning of the instructions (i.e. the participants do not know in the first stage that their income will be taxed in the second stage). We thought that using the term “fiscal simulation” was rather transparent on the fact of expecting a declaration afterward. Moreover participants can still opt out from the taxation by declaring 0 income. This lack of precision could have made participants feel deceived and modify their declaration behavior. However, the obtained compliance rates (49% and 37%) are quite typical, when we consider the framing effects and the quite directive way to ask for compliance. Results do not really differ from what is obtained in the literature. Shame—the negative emotion that appears in a social context—does not seem to be correlated with the tax compliance. It is contrary to what is found by Coricelli, Rusconi, and Villeval (2014), where they used TOSCA-3 questionnaire and a combination of audit/fine. On the contrary, in our experiment, declarations remain private and anonymous and there are no audits or fines. If tax evasion were detected, results could be different. It is another matter for the Guilt scale, as Coricelli, Rusconi, and Villeval (2014) already did not find any correlation and it is a private feeling.

Some other aspects could be implemented as extensions or robustness treatments. For example, an audit treatment could be implemented as not having an audit could lead to a wrong interpretation of evasion in this experiment: participants could think that it is fine to evade as they are not punished for doing it. However, the way to frame the instructions (unambiguously asking for compliance and using a tax frame) and the quite high rates of compliance obtained lead to think that it is not the case. Moreover, a treatment where taxes are withheld could also be interesting. In this experiment, participants are in the loss domain, and it could push them to cheat. We could only wonder what could happen in terms of correlation with our questionnaires if taxes were withheld.

The current results of this Chapter echo the evidence collected in the field by Kleven, Knudsen, Kreiner, Pedersen, and Saez (2011) showing that personal and socioeconomic characteristics only marginally affect tax compliance. One explanation for such a lack of individual determinism of compliance could be that while personality traits toward a behavior are determinants of the intention to adopt a given behavior, they do not necessarily determine behavior itself (Ajzen, 1985). The open question is to understand what features of the income reporting process is better able to link intentions to actions, and to administer the tax system without the fear

of penalties. This question is next on our agenda.



## Chapter 2

# Tax evasion under Oath

*“When a man makes an oath, Meg, he’s holding his own self in his own hands. Like water.*

*And if he opens his fingers then—he need not hope to find himself again.”*

Robert Bolt (1924-1995), quoted from Rutgers (2013)

### 2.1 Introduction

In the previous Chapter, we investigated whether personality traits shaped tax morale, through studying correlation between personality questionnaires and tax compliance. Tax morale was rather independent from individual characteristics determinants. In this Chapter, we now focus on the contextual determinants that could influence decision-making. Getting interested in the context of decisions echoes previous research in psychology or in economics. Cronbach (1957) already described the opposition of the two main disciplines of scientific psychology: differential and experimental psychology. The first one preferably uses correlation to analyze individual differences. The second one focuses on understanding human behavior across different situations. Cronbach pleaded for the reunion of experimental and correlational psychology, in a discipline that could analyze people’s individualities in different contexts. According to him, a precise behavior is always taken in a precise context, by a participant with a certain set of salient personality traits. In economics, Tversky and Kahneman (1981) also recognized the influence of context on decision-making.

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Section 2.2 of this Chapter is partly based on “*Commitment and incentives: Economic behaviors under oath*” (2016), co-authored with Nicolas Jacquemet, Stéphane Luchini & Robert-Vincent Joule.

As stated in Section 0.2.2 from Introduction, there are different methods to create a context: framing, priming and using commitment. We focus here on the commitment method. More precisely, this Chapter assesses the ability of an institutional mechanism, based on the social psychology of commitment, to foster compliance with the tax system. This institutional mechanism is a truth-telling oath (as an Hippocratic oath). An oath is a solution proposed to reduce dishonesty and promote moral behavior, as in the workplace for bankers (Boatright, 2013; Cohn, Fehr, and Maréchal, 2014), for managers (Khurana and Nohria, 2008) or even in academia (DeMartino, 2010). We have strong evidence that commitment is a valid method to fight against dishonesty, in various situations (McCabe and Trevino, 1993, 1997; McCabe, Trevino, and Butterfield, 2002; Mazar, Amir, and Ariely, 2008; Shu, Gino, and Bazerman, 2011; Shu, Mazar, Gino, Ariely, and Bazerman, 2012; Jacquemet, Luchini, Rosaz, and Shogren, 2014; Leal, Vrij, Nahari, and Mann, 2016). However, even though commitment is effective, we still do not know much about the precise changes of behavior created thanks to this method.

Until now the changes in the context of decisions passed much by priming. Commitment is implemented in this Chapter as long term effects of priming remain quite questionable (e.g. from 1 to 4 days in Lowery, Eisenberger, Hardin, and Sinclair, 2007, 20 minutes in Rodd, Cutrin, Kirsch, Millar, and Davis, 2013 etc.). As a comparison, commitment effects—and especially written commitments—can last for weeks, even for months (e.g. Geller, Kalsher, Rudd, and Lehman, 1989; Boyce and Geller, 2000; Girandola and Roussiau, 2003). As a reminder, priming is a way of unconsciously influencing subjects. Calvet and Alm (2014) made participants write the Golden Rule (i.e. the moral rule of treating others as we would like to be treated) before giving them the opportunity to cheat in a tax evasion game. The mere fact of exposing participants to such fairness clues—priming them—made them less willing to cheat. Commitment and priming are two methods that overlap, as commitment rather have loaded than neutral instructions. But commitment designates a precise process coming from social psychology (Joule and Beauvois, 1998). Let us consider a target behavior that social psychologists want to see adopted by participants (e.g. an ethical behavior). They will first design a costless prior action, to which participants will freely commit (e.g. a sentence in which participants commit themselves to adopt an ethical behavior). This free acceptance of the prior act will lead to higher acceptance of the target behavior. In order to be internalized in the long term, prior action is not public and is taken freely. Commitment is really about the intrinsic motivation to adopt a behavior, not about any extrinsic motivation (e.g. some social pressure) that could result in reactance ef-

fects (Jacquemet, Joule, Luchini, and Shogren, 2013). An oath to tell the truth has been applied in many different settings (see Introduction, Section 0.4.2.3). Armed with this knowledge, we expect the truth-telling oath to limit tax evasion.

We design two lab experiments that allow us to observe tax evasion behavior in a controlled environment in which decisions have financial consequences. The first experiment is designed to assess if the truth-telling oath increases declarations—as expected according to our literature review—and the second one, to look for the origin of such effect. There are two comparable conditions in both experiments: an Oath condition, in which before entering the lab participants are proposed to commit themselves to tell the truth, and a Baseline, where there is no commitment. In Experiment 1, participants play a one-shot tax evasion game with no audit. The aim of Experiment 2 is to have an objective measure of the strength of preferences as defined as how consistently subjects comply (Rustichini, 2008). In Experiment 2, we chose to repeat five times the declaration task and only one has monetary consequences. It allows to assess the degree of participants' confidence levels of their own preferences: some participants are very certain of their preferences (5 identical declarations) and others are much less so.

Results show that evasion occurs in Experiment 1: the compliance rate is about 48.98% in the Baseline. Under oath, this rate increases to 63.17%. As the literature let it presupposed, a commitment to tell the truth (an oath) significantly reduces tax evasion. In Experiment 2, similar results are found. However, participants' declarations are polarized towards both extremes under oath, and it is a novelty. This translates also in a global increase of their certainty about their declarations (through different measures). This enhanced certainty under oath, as if preferences were polarized towards honest and dishonest extremes, could be the factor leading the commitment effect. Participants under oath could be surer of their preferences. We conclude on policy recommendation triggered by this novel feature put in light.

## 2.2 Fighting dishonesty with commitment

Monetary incentives and self-regulation of ethical behavior are well often conflicting. In the example of tax evasion (one amongst others), there is an interest in not declaring one's full gross income. Taxes not levied on the concealed part can thus be spent other way by taxpayers. As demonstrated in Chapter 1, individual morality traits do not seem to explain why people

comply or not. Here we are interested in studying how context can influence honest and dishonest decision-making. In the case of fiscal declaration, taxpayers' environment is supposed to be able to pre-commit them to pay their taxes, as e.g. in France where income declarations are pre-filled out thanks to third-party information since 2006 (see e.g. *Le Monde* from 17/12/2005). Literature in behavioral ethics often modify people's environment by making them sign a general promise, that can be named honor code, code of conduct, honesty pledge, written commitment, vow or oath. In our framework, these terms are equivalent and are used to try to order the future, and back up honest behavior even when monetary incentives are at stake.<sup>1</sup>

An empirical literature in psychology already showed the impact of honor code on academic dishonesty (i.e. plagiarism and cheating that occur in the academia context). In a series of article McCabe and Trevino (1993, 1997) showed that students coming from a university with an honor code were less likely to self-report having cheated and perceived less fraud from other fellow students. Another type of code (named "modified" honor codes by the authors, that was less strict and targeting than honor codes) was also integrated in a study from McCabe, Trevino, and Butterfield (2002). Results show that there was the maximum fraud in universities with no codes (modified or not), average fraud in universities with modified honor codes and the least fraud in universities with traditional honor codes. In a more controlled environment, Mazar, Amir, and Ariely (2008) used honor codes to decrease dishonesty propensity of students. Authors used paper/pencil task such as counting the number of one in a matrix. In the control condition, participants gave their answers to a corrector who graded their work and paid them accordingly. In another condition, participants self-corrected their tests and were paid in accord with their self report. The third condition was the same as the one before, people self-corrected their answers but before starting the task, they had to sign their name below the following declaration: "*I understand that this short survey falls under MIT's [Yale's] honor system*". Results confirmed the impact of such declaration on cheating behavior: in the condition that allowed cheating, the declared scored was 5, while it was significantly lower in the control condition (equal to 3.2) and in the treatment (equal to 3). When the monetary incentives to cheat decreased from 2\$ (as previously) to 50 cents, results were again confirmed (average score was 3.4 in the control, 6.1 when cheating was tolerated and 3.1 with the honor code). Performance was decreased from 40% (high stake) to 49% (low stake) in this experiment. Honor

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<sup>1</sup>Although this assumption is questionable, these terms may cover different realities as studied in the analytic philosophy (Austin, 1975).

codes thus indeed commit participants to honesty in and outside the lab.

Shu, Mazar, Gino, Ariely, and Bazerman (2012) studied the fact of signing at the beginning, rather than at the end, a pledge to tell the truth. They did so in two different experiments: in the equivalent of a tax evasion game and in a real-life insurance contract. In the first experiment, there were two conditions. In the signature-after condition, participants had to earn an income, declare it to the experimenters and sign a declaration that they *"carefully examined the return and that to the best of their knowledge and belief it was correct and complete"* (p. 1599). In the signature-before condition, participants first earned an income, signed the declaration, then declared it. Results show that 79% of participants declared an income that was not equal to their real one in the signature-after condition, but only 37% did so in the signature-before condition (less than a half). It also reduced in average by 46% the amount of expenses claimed (from 9.62 in the signature-after to 5.27 in the signature-before). Experimenters also tested the equivalent protocol in a naturalistic setting: an automobile insurance company. Insured people were asked to sign a policy form for their car and to declare the current odometer mileage. Two conditions were implemented: one in which insured people were asked to sign an honesty statement at the end of the form (after-form) and one in which they were asked to sign it at the beginning (before-form). The honesty statement was as follow: *"I promise that the information I am providing is true"* (p. 1598). Number of miles declared increased by 10.25% in the before-form condition (26,098), compared to the after-form (23,670). Signing an honesty pledge indeed increases honesty in the lab and in the field. However, the interpretation of Shu, Mazar, Gino, Ariely, and Bazerman (2012) is that signing an honesty pledge makes ethics salient and act only as a priming. It is quite close to the explanation developed by Mazar, Amir, and Ariely (2008) where participants would only be interested in maintaining a positive self concept (i.e. signing would prime the idea of self). Therefore we can wonder what is the difference between self-priming and ethics-priming and from what a commitment should be constituted of. It seems that a signature to a neutral pledge is not enough in itself to influence dishonest behavior. Cagala, Glogowsky, and Rincke (2016) did not find evidence of the signature of the following pledge: *"I hereby declare that I will not use unauthorized materials during the exam. Furthermore, I declare neither to use unauthorized aid from other participants nor to give unauthorized aid to other participants"* (p. 29) on cheating behavior in an exam, even though it did change the participants' attitude towards cheating. An honesty pledge should thus be non-neutral and should make appear clearly that the behavior to eliminate is dishonest behavior.

What is the difference between committing to an honor code and a priming of the same honor code? Shu, Gino, and Bazerman (2011) answered this question in a comparable task to Mazar, Amir, and Ariely (2008) (i.e. self-correcting task that allowed cheating). In a first condition, participants were asked to add their name and signature to a statement at the bottom of an academic honor code that they had to read. In a second condition, they just had to read the honor code without signing it. It was compared to a third condition in which there was no honor code. Results show that reading an honor code reduced cheating, without eliminating it: the performance reported was reduced by 23% compared to the control condition. Signing an honor code eliminated cheating: the performance reported was reduced by 39%. 57% (13/23) of participants cheated in the control condition, 32% (7/22) in the read-only, and only 4.5% (1/22) in the signature. Commitment can be qualified as more powerful than just priming. A commitment to tell the truth can also be written or oral. Leal, Vrij, Nahari, and Mann (2016) made participants read aloud the following sentence *"Hello my name is [...] and I state that the information I will give regarding this claim will be totally truthful to the best of my knowledge"* (p. 770) and observed that they were more honest when claiming insurance for stolen items. In average, participants told 4.19 lies in the baseline compared to 2.40 in the treatment. It represents a drop of 42% of lies told. Moreover, the dishonest behavior (e.g. a lie) have to be easily identified as such. Jacquemet, Luchini, Rosaz, and Shogren (2014) used a truth-telling oath in a sender-receiver game where the sender have to communicate the result of a dice drawing to the receiver. According to this information, the receiver chooses a number that determines the payment of both subjects. Therefore the sender can lie or tell the truth to the receiver to improve his own or both payoffs. In one condition, experimenters kept a neutral environment. In another one, they created a loaded environment, where they underlined what was a lie and what was telling the truth. In the neutral environment, the truth-telling oath had no impact. In the loaded environment, the truth-telling oath was effective and really decreased all the different lies, from 25.4% to 17.1%.

To sum up, commitments to honesty are effective tools to overcome dishonesty, in the lab and in the field. However in order to be effective, a solemn commitment needs: to ask for an explicit commitment, to be non-neutral, to be written or oral and to apply in a situation where lies and truth can be easily recognized. The oath to tell the truth, as developed by Jacquemet, Joule, Luchini, and Shogren (2013), are in compliance with all these precise requirements and we choose to apply it in the tax evasion context.

## 2.3 Experiment 1

Experiment 1 aims to investigate whether an oath to tell the truth can change tax compliance decisions, by making them more truthful.

### 2.3.1 Design of the experiment

The design of the experiment is exactly the same as presented in Chapter 1, Section 1.3.1. As a reminder, participants have to earn an income by sorting 9 digits as quickly as possible (stage 1). Then they proceed to the tax simulation, where they have to declare their income earned at the previous stage, knowing that it will be taxed at a 35% tax rate (stage 2). Therefore, they are proposed to fill out different questionnaires (stage 3).


### 2.3.2 Experimental treatment

In the Baseline condition, participants are going through the different stages of the experiment (income earning, declaration, questionnaires) without any additional modification. This is our control group.<sup>2</sup> The Oath condition uses an identical experimental environment as in the Baseline, except that participants are proposed to sign an explicit commitment to tell the truth beforehand in this experiment. The oath procedure is implemented as follow: after filling out the contract of approval to participate in the experiment, participants have to give it back to the monitor who is waiting in a separate room next to the lab. In this room, subjects are coming one by one. The monitor offers each subject a form to sign as presented in Figure 2.1. The Université de Strasbourg logo on the top of the form and the address at the bottom indicate that it is an official paper; the topic designation and the research number were added so to ensure credibility. Before he reads the form the monitor explicitly points out to the subject that he is free to sign the oath or not and that participation and earnings in the experiment are not conditional on signing the oath. Subjects are not informed about the topic of the experiment when asked to take the oath. The subject reads the form, which asks whether he agrees “*to swear upon [his] honor that, during the whole experiment, [he] will **tell the truth and provide honest answers***” (in bold in the original form). Regardless of whether the subject signs the oath, he is

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<sup>2</sup>The Baseline condition of this Chapter is the same as in the previous Chapter.

Figure 2.1: Oath to tell the truth



**SOLEMN OATH**

I undersigned \_\_\_\_\_ swear

upon my honor that, during the whole experiment I will:

**Tell the truth and provide sincere answers**

STRASBOURG..... Signature...

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Pôle Européen de Gestion et d'Economie, 61 avenue de la Forêt Noire, 67085 Strasbourg – France.

thanked and invited to enter the lab. The exact wording used by the monitors to offer the oath to respondents was scripted to standardize the procedure. The monitor did not leave the room at any time. Another monitor remained in the lab until all subjects had been presented with the oath, to avoid communication prior to the experiment. Subjects that were waiting for their turn could neither see nor hear what was happening at the oath-desk.

### 2.3.3 Experimental procedure

Our analysis relies on six experimental sessions (three for each condition), each of them has between 19 and 24 subjects. Although signing the oath is not mandatory, a large majority of subjects do so. All the subject except one accepted to sign the oath, leading to a 98% acceptance rate. This subject is thus excluded from our analysis. This percentage is in line with previous



experiments involving the oath.<sup>3</sup> All sessions take place in the lab of Strasbourg University (LEES) between October 2014 and March 2015. The recruitment of subjects has been carried out by LEES database amongst individuals who had successfully completed their registration on the laboratory's website.<sup>4</sup> The experiment overall involved 129 subjects, 75 males and 54 females. The mean age of participants is almost 23. Each session lasted about 1 hour, with an average payoff of 20 euros (17 euros directly given to the participants and 3 euros given to WWF), including a 5 euro show-up fee.

## 2.4 Results

To be comparable, data coming from both conditions in Experiment 1 need to be as similar as possible. To be sure that any change in compliance behavior is really coming from our context manipulation, we look first for differences in both conditions, their impact on compliance and then study the differences induced by our treatment.

### 2.4.1 Descriptive statistics

Table 2.1 reports summary statistics on the different covariates measured in the socio-demographic questionnaire or during the experiment. Few variables were not correctly randomized across conditions. There is a significant difference between subjects from both conditions concerning French nationality ( $p = .042$ ).

Table 2.3 reports compliance measures, percentages of full compliers and evaders, and the amount of tax collected. Tax evasion in the Baseline of Experiment 1 is intense with an average declaration rate equal to 49%. It is also widespread, as only one fourth of all participants—16 subjects—declare 100% of their income. Evasion decisions are also very heterogeneous. 5% of the participants (3 subjects) declare zero income, while 25% declare less than 17% of income and 50% less than 42%. In comparison, tax evasion in the Oath condition is less intense with an average declaration rate of 63%. Half of the participants—33 subjects—are full compliers. Evasion decisions are even more heterogeneous: 12% of participants (8 subjects) declare now zero

<sup>3</sup>See Jacquemet, Joule, Luchini, and Malézieux (2016) for a literature review.

<sup>4</sup>The recruitment process of the participants makes use of ORSEE (Greiner, 2015). The experiment is computerized using Econplay ([www.econplay.fr](http://www.econplay.fr)).

Table 2.1: Summary statistics on individual covariates in Experiment 1

	Baseline					Oath					Sign.
	Avg.	Med.	SD	Q1	Q3	Avg.	Med.	SD	Q1	Q3	Diff.
Monthly income	571.42	250	436.32	250	750	496.21	250	430.76	250	750	NS
Age	23.07	22	4.72	19	25	22.33	21	5.49	20	23	NS
Men	60.31%	–	–	–	–	56.06%	–	–	–	–	NS
French nationality	79.36%	–	–	–	–	92.42%	–	–	–	–	**
Not speaking French at home	49.20%	–	–	–	–	33.33%	–	–	–	–	*
Economic studies	23.80%	–	–	–	–	36.36%	–	–	–	–	NS
Believing in God	49.20%	–	–	–	–	40.90%	–	–	–	–	NS
Parents' financial help	58.73%	–	–	–	–	74.24%	–	–	–	–	*
Self-honesty	5.52	7	1.99	4	7	5.81	7	2.05	5	7	NS
Happiness	5.09	5	1.21	4	6	5	5	1.21	4	6	NS
Perception of WWF's actions	5.68	6	.77	5	6	5.70	6	1.19	5	7	NS
N	63					66					

**Note.** Summary statistics on individual covariates in Experiment 1. From left to right are the variables' names, their corresponding values in the Baseline (average, median, standard deviation, first and third quartiles) and in the Oath conditions. Due to a technical problem, question on perception of WWF's actions has been included only in 2 out of 6 sessions. On the last right column, statistical tests of differences on individual covariates are also featured (Wilcoxon rank-sum test in order to test mean differences for continuous variables and Fisher's exact test for binary variables).

**Legend.** Significance levels: \*: 10% \*\*: 5% \*\*\*: 1%

income, 25% of subjects declare less than 16% of income and 50% less than 97%. Concerning the Baseline condition, these data are exactly the same as the one used in the previous Chapter. However, we study here the impact of other demographic and perceptive variables on compliance, as well as the impact of a truth-telling oath.

#### 2.4.2 Income declaration: the impact of individual variables

As we did in Chapter 1 for participants' morality, we want to know now if socio-demographic variables or variables that were measured during the experiment, are explaining compliance.<sup>5</sup>

Table 2.2 shows an OLS regression on socio-demographic variables (such as age, being a man etc.), as well as experimental measures (such as declared level of honesty, happiness etc.), in the Baseline condition, Oath condition and when data are Pooled. Few of these regressors turn out to be significant. Considering the pooled data, socio and demographic variables have little influence on compliance: only the fact of not speaking French at home have a marginally significant ( $p = .056$ ) impact on compliance, but a negative one. Another experimental measure seems to better explain compliance. There is a significant ( $< 1\%$ ) positive correlation between

<sup>5</sup>Study of the moral emotions questionnaires, after participants signed an oath, is presented in Section k.1 of Appendix. It globally confirms conclusions from previous Chapter.

Table 2.2: Experiment 1: Multiple regressions of compliance on socio-demographic variables and experimental measures

	(1)	(2)	(3)
	Baseline	Oath	Pooled
Monthly income	-0.000189 (-1.58)	0.0000221 (0.17)	-0.0000950 (-1.09)
Age	0.0357*** (2.93)	-0.00525 (-0.45)	0.0140* (1.71)
Men	-0.0271 (-0.29)	0.0116 (0.13)	0.00229 (0.04)
French nationality	-0.0301 (-0.22)	0.0442 (0.24)	0.0211 (0.20)
Not speaking French at home	-0.0861 (-0.79)	-0.154 (-1.42)	-0.147* (-1.93)
Economic studies	-0.0878 (-0.72)	-0.0208 (-0.21)	0.000799 (0.01)
Believing in God	-0.186* (-1.89)	-0.127 (-1.36)	-0.138** (-2.05)
Parents' financial help	0.0634 (0.63)	0.0818 (0.71)	0.0802 (1.08)
Self-honesty	0.0567** (2.53)	0.111*** (4.83)	0.0901*** (5.66)
Happiness	-0.00836 (-0.22)	-0.0380 (-0.98)	-0.00660 (-0.25)
Intercept	-0.348 (-0.89)	0.287 (0.76)	-0.138 (-0.52)
<i>N</i>	63	66	129
adj. $R^2$	0.323	0.444	0.331

**Note.** OLS regression of the compliance rate (income declared divided by income earned) on different socio-demographics variables and experimental measures in Baseline, Oath and Pooled conditions. Standard errors in parentheses.

**Legend.** Significance levels: \*: 10% \*\*: 5% \*\*\*: 1%

compliance and the self-level of honesty. It is quite straightforward as people who behave honestly perceived themselves as more honest. This result is present in both conditions.<sup>6</sup>

To conclude, once again compliance is rather not to look inside participants' characteristics. As hypothesized, context is probably more apt to explain compliance.

### 2.4.3 Income declaration: the oath impact

Table 2.3 allows to compare compliance measures in both treatments. Compliance rate in the Oath condition is significantly higher than in the Baseline ( $p = .0472$ ): signing a truth-telling oath increases income declaration by almost a third.<sup>7</sup> The median is also significantly higher in the Oath condition ( $p = .043$ ). The median is multiplied by more than two: 50% of participants declare more than 41.89% in the Baseline versus 96.40% in the Oath. The number of full compliers is also significantly higher in the Oath ( $p = .0038$ ), it doubles from 25.39% in the Baseline to 50% in the Oath.

This significant difference is not only average: the Oath distribution stochastically dominates the Baseline distribution ( $p = .040$ ), i.e. people under oath declare more income (even though both distribution are the same until about 20% to 25% compliance rate). A graph representing both empirical distribution functions is available in Figure 2.2a. We observe that an oath is especially effective on people declaring between 40% to 60% of their income. Most of these people are declaring all of their income under oath.

A possible explanation would be that people who are unsure of their preferences are declaring a medium amount (e.g. around 50% of their income). Taking an oath could generate a polarization of their preferences towards both extreme.<sup>8</sup>

<sup>6</sup>Table 3.18 from Section k in Appendix, shows a significant interaction effect between Oath and Self-honesty: for the participants under oath, each point of self-honesty increases compliance by 12.05%.

<sup>7</sup>Table 3.19 from Section k in Appendix provides a Probit model on the extensive margin and an OLS regression on the intensive margin. Explanatory variables are again the same socio-demographic and experimental variables, augmented with an oath dummy (1 for the oath treatment, 0 otherwise). The oath effect is still significant—at  $p = .035$ —on the extensive margin, even with the numerous different individual variables, meaning that this effect is quite robust.

<sup>8</sup>This is observed in Figure 3.11 where middle declarations are pushed towards 0% and 100% declaration rates.

Table 2.3: Summary statistics on compliance in Experiment 1

	Baseline	Oath
Compliance:		
- Average	48.98%	63.17%
- Median	41.89%	96.40%
- SD	37.94%	42.24%
% Full compliers	25.39%	50%
(N)	(16)	(33)
% Full evaders	4.76%	12.12%
(N)	(3)	(6)
Tax collected	154€	214€

**Note.** Summary statistics on outcome behavior in Experiment 1. Compliance measures are presented in the Baseline (middle) and Oath (right) conditions.

## 2.5 Experiment 2

Observed behavior from Experiment 1 shows that (i) oath has, as predicted, a significant impact on compliance in a one-shot experiment and (ii) it could be due to a polarization of participants' preferences towards (dis)honesty. In Experiment 2, we assess the pertinence of this explanation to two variations in the design. First we consider a repetition of the declaration task, to know if it varies more with time. Second we ask explicitly to participants to rate their declarations' certainty.

### 2.5.1 Design of the experiment

The experiment is the same as presented in Chapter 1, Section 1.3.1 except for the declaration stage. In the second stage, it is asked to participants to declare their amount of income in a succession of five rounds.<sup>9</sup> The gross income is the same at each round. They are told that one declaration will be picked randomly and will determine their net income (thus their experimental earnings) and their donation to WWF.<sup>10</sup> One other question is added to the first questionnaire to be fill out by the participants after the 5 declarations. In this question, participants have to rate the income declaration decisions' certainty from 1 to 10 (1 being "Totally

<sup>9</sup>The declaration task is repeated five times so as to measure if 5 repeated observations of the same income would give the same declaration rate. We were not interested in repeating five times the real effort task and the declaration task. The aim here is to obtain a behavioral measure of participants' certainty. This repetition of the sole declaration task was also preferred as it was closer to the one shot TEG from Experiment 1.

<sup>10</sup>Screen-shots of the Experiment 2, including the declaration stage are available in Appendix 1.2.

*uncertain*" and 10, "*Totally certain*"). No other changes are implemented. Our pool of subjects is again divided between two conditions: one Baseline and one Oath.

### 2.5.2 Experimental procedure

Our analysis relies on four experimental sessions (two for each condition), each of them has between 20 and 22 subjects. Although signing the oath is not mandatory, a large majority of subjects do so. All the subject except four accepted to sign the oath, leading to a 91.11% acceptance rate. These subjects are thus excluded from our analysis. All sessions take place in the lab of Strasbourg University (LEES) in June 2015. The recruitment of subjects has been carried out by LEES database amongst individuals who have successfully completed their registration on the laboratory's website.<sup>11</sup> The experiment overall involved 87 subjects, 38 males and 49 females. The mean age of participants is 22. Each session lasted about 1 hour, with an average payoff of 20 euros (17 euros directly given to the participants and 3 euros given to WWF), including a 5 euro show-up fee.

### 2.5.3 Descriptive statistics

Once again, Table 2.4 reports summary statistics on the different covariates measured in the socio-demographic questionnaire or during the experiment. The only variable that is different across conditions is the declared self-honesty ( $p = .0098$ ). It means that in the Oath condition, participants perceived themselves as significantly more honest.

As before, Table 2.5 reports compliance measures in Experiment 2 on the second last column, in average on the 5 rounds. Tax evasion in the Baseline of Experiment 2 is still intense with an average declaration rate equal to 43%. It is also widespread, as only 6 subjects declare 100% of their income in their five declarations. Evasion decisions are also very heterogeneous. 4.44% of the participants (2 subjects) declare zero income, and 50% less than 32%. In comparison, tax evasion in the Oath condition is less intense with an average declaration rate of 60%. Almost half of the participants—17 subjects—are full compliers. Evasion decisions are even more heterogeneous: almost 12% of participants (5 subjects) declare now zero income and 50% less than 73%.

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<sup>11</sup>The recruitment process of the participants makes use of ORSEE (Greiner, 2015). The experiment is computerized using Econplay ([www.econplay.fr](http://www.econplay.fr)).

Table 2.4: Summary statistics on individual covariates in Experiment 2

	Baseline					Oath					Sign.
	Avg.	Med.	SD	Q1	Q3	Avg.	Med.	SD	Q1	Q3	Diff.
Monthly income	461.11	250	336.91	250	750	500	250	344.82	250	750	NS
Age	21.64	21	2.56	20	23	22.40	22	2.73	20	24	NS
Men	46.66%	-	-	-	-	40.47%	-	-	-	-	NS
French nationality	88.88%	-	-	-	-	88.09%	-	-	-	-	NS
Not speaking French at home	33.33%	-	-	-	-	33.33%	-	-	-	-	NS
Economic studies	33.33%	-	-	-	-	19.04%	-	-	-	-	NS
Believing in God	44.44%	-	-	-	-	40.47%	-	-	-	-	NS
Parents' financial help	62.22%	-	-	-	-	59.52%	-	-	-	-	NS
Self-honesty	4.66	5	2.35	2	7	5.88	7	1.95	5	7	***
Happiness	4.71	4	1.39	4	6	4.88	5	1.40	4	6	NS
Perception of WWF's actions	5.60	6	1.23	5	7	5.54	6	1.32	5	7	NS
Certainty	7.15	8	2.67	5	10	7.83	9	2.74	5	10	NS
N	45					42					

**Note.** Summary statistics on individual covariates in Experiment 2. From left to right are the variables' names, their corresponding values in the Baseline (average, median, standard deviation, first and third quartiles) and in the Oath conditions. On the last right column, statistical tests of differences on individual covariates are also featured (Wilcoxon rank-sum test in order to test mean differences for continuous variables and Fisher's exact test for binary variables).

**Legend.** Significance levels: \*: 10% \*\*: 5% \*\*\*: 1%

#### 2.5.4 Income declaration: the oath impact

Table 2.5 again provides compliance measures from Experiment 1 on the last column, along with those from Experiment 2. Average compliance rates are strictly similar in both experiments. We confirm that average compliance rates in the Oath condition are significantly higher than in the Baseline ( $p = .0501$ ): signing a truth-telling oath increases income declaration by almost a half, and it does not seem to decrease with time. The median is again two times higher in the Oath condition, even though it is not significant this time ( $p = .069$ ). The number of full compliers is also significantly higher in the Oath ( $p = .0038$ ), it triples from 13.33% to 40.47%.

A graph representing both empirical distribution functions is available in Figure 2.2b. We replicate once again the same result as in Experiment 1: the Oath distribution stochastically dominates the Baseline distribution ( $p = .042$ ), i.e. people under oath declare more income. However, the empirical distribution functions are not the same compared to the one-shot experiment: the difference between Oath and Baseline appears sooner and there is no big inflexion point around 50% as there was. There are now many different local inflexion point.

Figure 2.2: Empirical distribution functions of compliance from Oath and Baseline conditions

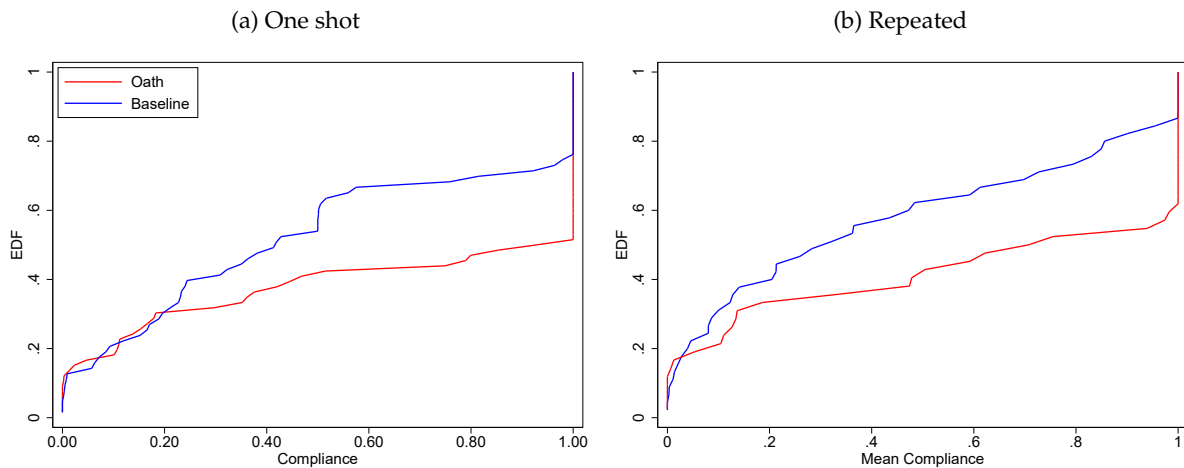


Table 2.5: Summary statistics on compliance in Experiment 2

Baseline							
Rounds	1	2	3	4	5	Mean Compliance	Reminder Expe. 1
Compliance:							
- Average	46.59%	40.60%	40.33%	43.85%	43.44%	42.96%	48.98%
- Median	36.49%	25.88%	22.83%	36.49%	36.49%	32.41%	41.89%
- SD	40.22%	40.78%	38.68%	39.84%	40.63%	37.88%	37.94%
% Full compliers	24.44%	17.77%	17.77%	20%	22.22%	13.33%	25.39%
(N)	(11)	(8)	(8)	(9)	(10)	(6)	(16)
% Full evaders	6.66%	11.11%	8.88%	6.66%	6.66%	4.44%	4.76%
(N)	(3)	(5)	(4)	(3)	(3)	(2)	(3)
Tax collected	92€						154€
Oath							
Rounds	1	2	3	4	5	Mean Compliance	Reminder Expe. 1
Compliance:							
- Average	64.76%	56.61%	57.83%	60.43%	60.75%	60.07%	63.17%
- Median	100%	69.65%	71.57%	89.41%	95.45%	73.07%	96.40%
- SD	44.53%	43.16%	44.16%	44.45%	44.29%	42.41%	42.24%
% Full compliers	54.76%	40.47%	47.61%	50%	50%	40.47%	50%
(N)	(23)	(17)	(20)	(21)	(21)	(17)	(33)
% Full evaders	11.90%	14.28%	11.90%	11.90%	14.28%	11.90%	12.12%
(N)	(5)	(6)	(5)	(5)	(6)	(5)	(6)
Tax collected	132€						214€

**Note.** Summary statistics on outcome behavior in Experiment 2. Compliance measures are presented in the Baseline (above) and Oath (below) conditions. To ease comparison, compliance measures are also provided from Experiment 1 (last right-hand column).



### 2.5.5 Compliance under oath: light on the polarization effect

In the previous experiment, we already bring to light that oath polarized compliance towards both extremes. In an unknown situation, people would declare a medium amount because they would be unsure of their preferences. Opting for a medium response when unsure is a well-documented effect in psychology (called central tendency bias) and in economics (called pull-to-center effect). We want to know whether signing an oath exacerbates participants' preferences, making them surer about their behavioral answer, in their thoughts and in their acts.

Table 2.4 also features the level of self declared level of certainty regarding their declarations on the bottom. In this Table, participants' mean is not significantly higher in the Oath as compared to the Baseline. In their minds, participants do not seem to be significantly surer of their answers. Table 2.6 reports the percentage of people declaring exactly five times the same income. It is categorized according to the type of compliance: either 0%, 100% or somewhere between 0% and 100%. It represents a behavioral measure of participants' certainty. The number of certain participants more than doubles in the Oath compared to the Baseline (from 22.22% to 54.76%), and this difference is highly significant ( $p = .0015$ ). It is especially effective in the full fraud and in the full compliance declarations where it triples. In their acts, participants behave as if they were surer of their declarations under oath.

The declaration task is about moving a slider and it can be quite difficult to position it at a precise point. We consider another behavioral measure of certainty, computed as the difference between highest and lowest declaration. The lower this spread, the higher the certainty of declaration. There is a strong negative correlation between spread and certainty scale ( $p = .002$ ), i.e. the surer subjects are of their declarations, the less they vary in their declarations. People are rather congruent between their behavior and self-declared certainty. Again, under oath, participants are more certain of their answers: around 65% of participants under oath vary their five declarations by less than 5% versus 45% in the Baseline ( $p = .010$ ).<sup>12</sup>

To conclude, in a new situation one does not know how to behave and opt for a medium response. It is what happens for people who are uncertain of their preferences for honesty in the baselines of these two experiments. For the first time our design allows to observe distribution of compliance behavior, rather than average behavior. Signing an oath polarizes their

<sup>12</sup>A graph representing both empirical distribution functions is available in Figure 3.15 in Appendix.

Table 2.6: Distribution of 5 identical declarations across type of declaration

	Full fraud	Fraud	Full compliance	Sum
Baseline	4.44% (2)	4.44% (2)	13.33% (6)	22.22% (10)
Oath	11.90% (5)	2.38% (1)	40.47% (17)	54.76% (23)

**Note.** This table presents the percentage of 5 identical declarations across type of declaration (full fraud, fraud, full compliance) and conditions.

preferences towards both extremes. It polarizes their preferences and makes them surer of their behavioral answer.

## 2.6 Conclusion

There is well often a dilemma between truth-telling and immediate gains, such as one has to choose between the first or the latter. Tax evasion is one of the situation illustrating this trade-off. In binding people's words to their behavioral acts, there is a way to ensure that a person could resist the sirens of dishonesty. This Chapter investigates first if a truth-telling oath, as developed by Jacquemet, Joule, Luchini, and Shogren (2013), respects all the features of a written commitment. It investigates also if this oath to tell the truth can foster compliance with the tax law, in the situation in which there is no control. Finally, it looks for the channel of such commitment effect. We commit participants by proposing them to sign a truth-telling oath before entering the lab and playing a tax evasion game.

According to our literature review, the truth-telling oath is a valid commitment. Our results confirm this assumption: the mere fact of signing an oath to tell the truth significantly increases income declaration by one third to half of the incomes declared in an equivalent Baseline. We bring further information on the channel through which the commitment is passing. Our working hypothesis is that the oath transforms participants' unsure preferences to sure ones. In the Baseline, many participants do not know what behavior to adopt. This proceeds in an amount of centered declarations. Under oath, their declarations are polarized towards both extremes (full fraud and full compliance). Part of the compliance observed between 0% and 100% would be due to subjects' uncertainty about their answers rather than their unwillingness to comply.

The present Chapter documents the behavioral mechanism behind the observed change in compliance. However it does not study the psychological reasons that explain this observed

mechanism. Different hypothesis reviewed below could explain it. Asking participants to take an oath has a demand effect. It informs on the appropriate behavior that the experimenter would like to see implemented. However it has probably the same demand effect as an oath sworn in front of a judge and jury in a court. Moreover Jacquemet, Joule, Luchini, and Shogren (2013) already studied if the oath was different than an explicit exhortation to tell the truth. The results show that the commitment was more effective than the exhortation in improving truth telling, so the oath effect is not only a demand effect. Self-deception theory states that participants who lie by a little can still perceive themselves as not lying. The oath effect could come from impossibility for participants to deceive themselves. However two arguments counter this hypothesis. First, we do not observe a little evasion in the Baseline, but a quite massive one (more than 50% evade): there are few people (9/63) complying between 51% of their income and 99%. Second, Jacquemet, Luchini, Rosaz, and Shogren (2014) studied response times and already showed that participants probably knew that they were cheating when they were cheating. It demonstrates that the oath was affecting only conscious lying. Another interpretation could also simply be partial lying driven from the lies-in-disguise theory, as explained by Fischbacher and Föllmi-Heusi (2013). However the oath effect is still very effective on the polarization of compliance, whether there is hesitation on real preferences or lies-in-disguise theory driven. It is as effective on compliance as monetary incentives (Kajackaite and Gneezy, 2015). All these different hypothesis that explain the observed mechanism could be disentangled by running further treatments.

To conclude, this Chapter demonstrated that commitment is efficient to significantly reduce tax evasion, in a situation created *ex nihilo*. It pleads for creating a committing context for taxpayers. It could be done e.g. by simply moving the pledge for honesty signature from the end to the beginning of the fiscal declaration. A secondary finding from this experiment is that uncertainty on the “good” way to behave is confirmed to trigger dishonesty. This pleads for the hypothesis that ambiguity deters compliance. People unsure about what to do in a situation cheat, but by a little. People do not cheat by the maximum of what they could achieve (Mazar, Amir, and Ariely, 2008). A straightforward public policy would be also to always disambiguate and publicize the “good” way to behave in a situation that could give rise to uncertainty (e.g. always describing clearly the precise conditions under which some categories of taxpayers have the right to a certain tax deduction). In the following Chapter, a real-life equivalent of the oath is studied and a new compliance inviting context is used to try to bring the same phenomena

to light.

## Chapter 3

# Disentangling commitment from social effect in a voting experiment on tax funds

*“It is not always feasible to consult the whole people, either directly or indirectly, in the formation of the law; but it cannot be denied that, when such a measure is possible, the authority of the law is much augmented. This popular origin, which impairs the excellence and wisdom of legislation, contributes prodigiously to increase its power.”*

Alexis de Tocqueville (1805-1859), quoted from Dal Bó (2014)

### 3.1 Introduction

When people participate in the formation of the rules that will govern them, they are subsequently more respectful of these rules. This result has been observed in various situations, among which: when people are taking part in setting goals for themselves (Locke and Latham, 2002), when farmers are deciding on irrigation rules (Bardhan, 2000), when workers have a voice in organizing their own work (Ichniowski, Shaw, and Prennushi, 1997) and when taxpayers shape their own tax system, the subject that interests me here (Pommerehne and Weck-Hannemann, 1996; Torgler, 2002, 2005; Alm and Torgler, 2006). Switzerland illustrates perfectly

this direct democracy effect, as it is one of the rare direct democracy country and in parallel, probably the most tax dutiful nation in the world (Wahl, Muehlbacher, and Kirchler, 2010).

However, there have always been an ambiguity on the direct democracy effect's origins. Does the fact of voting really creates incentives that modify subsequent behavior? Or is it only coming from a selection effect, as people can sort themselves through voting? Authors answered this research question by producing innovative treatments allowing to isolate only the direct democracy effect. Dal Bó, Foster, and Putterman (2010) showed the persistence of this effect when participants voted in a prisoner's dilemma. Accounting for selection bias, the results show that participants really changed their subsequent behavior and it was only due to the fact of voting. This result was confirmed in public good games (Rauchdobler, Sausgruber, and Tyran, 2010; Kamei, 2014) and in a TEG with a vote on a fine (Feld and Tyran, 2002). However, accounting for the selection bias has never been implemented in a TEG where participants have the possibility to vote on the destination of the tax fund. Voting on tax fund has repeatedly proved to increase compliance in TEG (Alm, Jackson, and McKee, 1993; Wahl, Muehlbacher, and Kirchler, 2010; Lambertson, De Neve, and Norton, 2014).

The more general question of knowing whether the State should let its taxpayers decide on the destination of their tax funds is particularly relevant nowadays. Recent debates on tax incentives for charitable giving and its impacts, show that letting taxpayers give money to an organization is not automatically efficient (Fack and Landais, 2010) and can even be counter-productive and give rise to tax evasion when not correctly controlled (Fack and Landais, 2016). This question is even more important in the current participatory democratization movement. To illustrate this movement, the City of Paris let Parisians decide on how 5% of their total budget will be spent. It represents half a billion Euro till 2020.<sup>1</sup> The present experiment addresses this question, both at the micro-level and in the lab, by demonstrating the impact of direct democracy, using voting on tax fund.

The first aim of this Chapter is to take into account this selection bias in a TEG where participants have the possibility to decide on the use of the tax collected (i.e. donation of tax collected to one of two organizations). The present design must allow to capture participant's decision in each possible state of the world from the vote result. It is implemented thanks to the strategy method, where participants are asked to comply when the two organizations are elected to get

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<sup>1</sup>See *City of Paris website*.

the tax. The second aim of this Chapter is to disentangle the origins of the direct democracy effect: most of the sources in the literature are either related to social effect (voting would set a social norm, a signal, etc. and voting in group could enhance a sense of social coordination between voters) or commitment effect (participants would feel somehow engaged in the democratic process when they vote). The design also contributes to the literature in terms of identification of the possible source of direct democracy effect. To do so, two treatments are implemented: a Vote treatment, where participants are grouped by 3 and cast a vote on one of two organizations, and a Choice treatment where participants are alone deciding on a couple of probabilities. The Choice treatment eliminates the social dimension of the vote while keeping as constant as possible the decision behavior. In addition to the traditional social and demographics variables, important dimensions of the experiment are also rated by participants such as perception of fairness, legitimacy and the importance of the stake in each treatments. Lastly these treatments are compared to a Baseline where participants do not vote or make a choice on the use of tax collected.

The results show that, compared to the Baseline, no treatments improve compliance, when voting/choosing was allowed on the tax fund and selection bias was accounted for. However, there is a significant commitment effect in both treatments while the social effect is not significant. This finding does not confirm social effect as the main driver for the direct democracy effect. Results also show that a vote is perceived as more legitimate and fair than a simple choice, but it did not trigger higher compliance rates.

## 3.2 Why should voting increase compliance?

Table 3.23 in Appendix reviews 26 experiments featuring a vote in at least one treatment and compared it to other conditions, so as to isolate its effect. It also sums up different important characteristics of these experiments: what is the game that is being implemented, the number of voters grouped together, the number and the definitions of options offered, whether voting is repeated and how many times, what are voters voting on and the sources mentioned of the direct democracy effect. The first result that is worth mentioning when observing this Table is that 11 papers did not explain at all why should voting increase compliance. The other 15 papers put forward social, commitment or other explanations that are developed below.

The most cited channel of compliance in the literature is what can be called social effect, because a social dimension is shared by all the following explanations: voting could work as a coordination device, a signal to others, a way to communicate or to influence other voters (i.e. as a peer/social norm influence). This is illustrated in Feld and Tyran (2002) where participants had the possibility to vote for a fine for evaders, in groups of 3. Using the strategy method, participants complied in each conditional situation: if 0, 1 and 2 subjects approved the fine. The results show that the more subjects approved the fines (from 1 to 2), the higher the compliance rate (from 66% to 72%). A similar pattern is found, e.g. in Rauchdobler, Sausgruber, and Tyran (2010): the more subjects are expected to vote for a threshold in a public good game, the higher the global expected compliance. This increase in compliance confirms the importance of social effect between voters.

The second channel of compliance is commitment. Voting for a law would make participants feel committed to this law. For example, in Rauchdobler, Sausgruber, and Tyran (2010), participants are offered the opportunity to vote for a threshold of contribution in a public good game. Participants voting to set the threshold increased significantly their compliance compared to those who voted against. Through this vote in favor of the threshold, they commit to increase their compliance subsequently. This channel is also called consistency effect in the literature, as in Cialdini (1989). Its definition is very similar to the commitment definition: *“people generally tend to behave in ways that are consistent with their words and their action”* (Alm, Jackson, and McKee 1993, p. 288). In light of the social psychology of commitment, voting could be considered as another commitment technique (as described in Section 0.4.2.3 of Introduction). A vote could work as a prior action, that would engage participants in the process and commit them to the social dilemma. The prospect of casting a vote working as a prior action is appealing as it is less ad hoc to participants than any other existing prior action. This first real life commitment technique could have substantial political and economical consequences.<sup>2</sup>

At a third position comes all the different other sources, marginally cited in the literature. These marginal channels encompass mainly a sense of fairness and legitimacy procured by a vote (Feld and Tyran, 2002; Grossman and Baldassarri, 2012; Wahl, Muehlbacher, and Kirchner, 2010). A political decision taken through a democratic vote is considered as more fair and legitimate for citizens, than one imposed in a dictatorial way. Voting could also increase sub-

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<sup>2</sup>If forcing people to vote definitely engage them in the concerned process, it would suggest e.g. to reinforce employees' voice in their companies, make voting compulsory in elections as in Belgium or Luxemburg, consult taxpayers on every major public spending etc.



jective responsibility for one's community and improves the relationship between citizens and authorities (Wahl, Muehlbacher, and Kirchler, 2010). Grossman and Baldassarri (2012) underlined the ritualistic and symbolic value of the vote that could inflate its effect.

### 3.3 Design of the experiment

Most of the social dilemmas featuring a vote are public good games (16 occurrences out of 26). However, in the present experiment, a tax evasion game is implemented (with only 4 occurrences out of 26). The first reason is that a significant direct democracy effect of voting on tax fund has already been demonstrated in Alm, Jackson, and McKee (1993); Wahl, Muehlbacher, and Kirchler (2010); Lamberton, De Neve, and Norton (2014). Yet, none of these articles took into account selection effect. Second, a TEG is the only game that can be played with participants being alone and in group. Therefore in this experiment, selection effect is taken into account in a TEG with voting on tax fund.

#### 3.3.1 Experimental protocol

As in the previous Chapters, a TEG is implemented here. The experimental protocol is thus still the same, as described in Chapter 1, Section 1.3.1, at the exception of the declaration and the questionnaire stages. As a reminder, in the Baseline, participants have to earn an income by sorting 9 digits as fast as possible (stage 1). Then they proceed to the tax simulation, where they have to declare their income earned at the previous stage, knowing that it will be taxed at a 35% tax rate (stage 2). They are subsequently proposed to fill out different questionnaires (stage 3). Between the income earning stage and the declaration stage, participants will be asked to express themselves, alone and in group, on one aspect of the TEG. Attention is focused here on a vote on the destination of the tax fund, as it demonstrated previously significant direct democracy effect. Participants are thus asked to select between two organizations, the organization that will get their taxes. Organizations are described in Section 3.3.3. Different questions are also asked to participants, especially to measure participants' perception of fairness and legitimacy of the selection process.<sup>3</sup>

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<sup>3</sup>Other questions asked to participants are about the importance of the selection process, if they thought that at least one participants would vote as they did (in the Vote treatment only), and some questions focusing on the two organizations: if they knew them, what was their opinion on them and on their actions.

### 3.3.2 Avoiding selection effect

According to Dal Bó (2014), there are identification issues in experiments featuring a vote. Three issues arise: endogenous democracy (groups with democratic institutions “*may differ from [...] groups without those institutions*”, p. 279), policy choice (those groups do not make similar choices as those who did not adopt it), and selection into policies (democratic groups with different characteristics choose different policies). The randomization of experimental pools of subjects allows to avoid the first problem: participants are supposedly the same in each treatments. Standardization of the experiment paradigm allows to avoid the second problem: participants face a set of predetermined options. The third problem requires specific design choices.

This issue has been solved by making possible to capture behavior in two different states of the world, i.e. when the participants have voted for their preferred option and the preferred option has been elected and when another option has been elected. This can be done by using conditional behavior, such as in the strategy method (Selten, 1967). Feld and Tyran (2002) and Rauchdobler, Sausgruber, and Tyran (2010) used the strategy method and asked participants to comply in each conditional situation of the experiment. However, it can also be implemented by measuring participants’ real behaviors: as in Dal Bó, Foster, and Putterman (2010), where participants voted on an issue and afterward, a computer randomly decided to take into account votes or not, or in Kamei (2014), where participants played two equivalent simultaneous public good games. Recent evidences confirmed that the strategy method is a rather valid measure of behavior (Brandts and Charness, 2011; Fischbacher, Gächter, and Quercia, 2012), along with being easier to implement. For these reasons, the strategy method is adopted in this experiment. Participants are thus asked to declare their amount of income for both organizations no matter which organization they choose.

### 3.3.3 Experimental treatments

Before proceeding to the declaration stage, participants are randomly sorted to one of the two experimental treatments: Vote or Choice. The Choice is made to be as close as possible to the Vote, without the social component. These treatments are compared to a Baseline coming from Chapter 1.

The Choice and the Baseline treatments have already been presented respectively in Chapter 1, Section 1.3.1 and Section 1.4.1. As a reminder to the readers, in the Baseline participants do not choose nor cast a vote on the destination of the tax fund. Tax fund is directly donated to WWF only. In the Choice treatment, participants make a probabilistic choice on the organization that will get their individual tax. Participants are allowed to choose between two organizations to which the tax collected will be donated: the World Wide Fund for Nature (WWF) or a French organization for the protection of the wildlife, ASPAS (*Association pour la protection des animaux sauvages*). These two organizations have been chosen as they were as similar as possible and both emitted donations certificates.<sup>4</sup> Participants are asked to choose between two possible options: in option 1, the WWF is selected with probability  $2/3$ , while ASPAS will receive the funds with a  $1/3$  probability; option 2 maintains the same probability distribution but favors ASPAS (selected with  $2/3$  probability) rather than WWF ( $1/3$ ). The precise probability  $2/3$  (or 66.67%) has been chosen so as to counterbalance the number of individuals in the Vote treatment.<sup>5</sup> In the Vote treatment, participants are grouped by 3 randomly in the lab. They do not know which participants they are teamed with. They can vote for one organization: WWF or ASPAS. The elected organization in each trio will perceive the taxes collected from each trio. Using the majority rule, the organization that have at least 2 out of 3 votes get the taxes collected. After choosing or voting, each participant goes to the income declaration phase.<sup>6</sup> Entering the income declaration phase, people from both treatments still do not know which organization will get the taxes collected and only learn it at the end of the second stage, after complying and answering the first block of questions. Even though there are no immediate feedback on the voting issue in the Vote treatment, social effect is still believe to arise using the strategy method, as participants know that the elected organization would have a majority of support (at least 2 votes out of 3). This aspect is specifically underlined in the instructions.

<sup>4</sup>Both organizations have been deliberately chosen to be as identical as possible, so as to measure only the direct democracy effect. Alm, Jackson, and McKee (1993) already showed that when an option was really preferred over another one (and this was known by participants), compliance increased significantly. If organizations would have been too different, difference of compliance could have come from preferences, rather than from selection process.

<sup>5</sup>Reflecting back, 66.67% is not equal to the supposed probability to see their vote implemented that can be computed. The probability  $P$  to win the vote for a subject is equal to  $1 - P(\text{subject 1 did not vote for the same organization}) * P(\text{subject 2 did not vote for the same organization})$ . If we assume that votes from subjects 1 and 2 are independent and follow uniform laws, it is thus not different from  $\frac{1}{2}$ . The probability to win the vote is thus equal to:  $1 - [\frac{1}{2} * \frac{1}{2}] = 0.75$ . In the Vote treatment, when an individual vote for an organization, he can suppose having 75% chances to see his vote implemented. However, choosing 66.67% is corroborated by the following question asked to participants: "Do you think at least one participant will vote for the same organization as you did?", where 66.67% of the participants answered "Yes", meaning that they were sure to see their vote implemented (with 4% answering "No" and 29.33% did not know). An interesting robustness check could be to implement a Choice treatment with modified probabilities.

<sup>6</sup>Screen-shots of the declaration phase in the Baseline is available in Figure 3.4 in Appendix. Screen-shots of the choice and vote phase are available in Figure 3.5 and Figure 3.16. The declaration phase after the choice/vote is in Figure 3.6.

### 3.3.4 Experimental procedure

The analysis relies on five experimental sessions (three for Voting, two for Choice), each including between 24 and 27 subjects. Baseline sessions are not described here, as they have been presented in Chapter 1, Section 1.3.1.2. All sessions took place in the lab of Strasbourg University (LEES) in January 2016. The recruitment of subjects has been carried out by LEES database among individuals who have successfully completed their registration on the laboratory's website.<sup>7</sup> The experiment overall involves 125 subjects, 59 males and 66 females. The mean age of participants is almost 21 years old. Each session lasted about 1 hour, with an average payoff of 19 Euro (17 Euro directly given to the participants and 2 Euro given to one organization), including a 5 Euro show-up fee.

## 3.4 Comparison of treatments and participants

Before proceeding to the results' analysis, participants and behaviors of participants inside each treatments need to be proven as alike as possible.

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<sup>7</sup>The recruitment process uses ORSEE (Greiner, 2015). The program of this experiment has been designed by Kene Boun My with the web platform EconPlay ([www.econplay.fr](http://www.econplay.fr)).

Table 3.1: Summary statistics on individual covariates and compliance measures

	Baseline				Vote				Choice						
	Avg.	Med.	SD	Q1	Q3	Avg.	Med.	SD	Q1	Q3	Avg.	Med.	SD	Q1	Q3
	Monthly income	571.42	250	436.32	250	750	300.82	250	436.32	250	750	410	250	266.11	250
Age	23.07	22	4.72	19	25	21.06	21	1.54	20	22	20.8	21	1.30	20	22
Men	60.31%	-	-	-	-	45.33%	-	-	-	-	50%	-	-	-	-
French nationality	79.36%	-	-	-	-	82.67%	-	-	-	-	78%	-	-	-	-
Not speaking French at home	49.20%	-	-	-	-	33.33%	-	-	-	-	30%	-	-	-	-
Economic studies	23.80%	-	-	-	-	66.67%	-	-	-	-	34%	-	-	-	-
Believing in God	49.20%	-	-	-	-	33.33%	-	-	-	-	30%	-	-	-	-
Parents' financial help	58.73%	-	-	-	-	73.33%	-	-	-	-	78%	-	-	-	-
Self honesty	5.52	7	1.99	4	7	4.92	6	2.07	3	7	5	6	2.08	4	7
Others' honesty	4.61	5	1.51	4	6	4.41	4	1.58	3	5	4.4	4	1.56	3	6
Happiness	5.09	5	1.21	4	6	4.93	5	1.15	4	6	5.12	5	1.23	4	6
Knew WWF	-	-	-	-	-	81.33%	-	-	-	-	82%	-	-	-	-
Knew ASPAS	-	-	-	-	-	5.33%	-	-	-	-	14%	-	-	-	-
Perception of WWF's actions	5.68	6	.77	5	6	5.52	6	1.13	5	6	5.72	6	1.01	5	6
Perception of ASPAS's actions	-	-	-	-	-	5.37	6	1.17	4	6	5.54	6	1.14	4	7
Opinion on WWF	-	-	-	-	-	5.50	6	1.15	5	6	5.64	6	1	5	6
Opinion on ASPAS	-	-	-	-	-	5.24	5	1.22	4	6	5.54	6	1.09	5	6
Importance of the stake	-	-	-	-	-	2.70	3	.99	2	3	2.76	3	1.11	2	4
Legitimacy of selection process	-	-	-	-	-	3.24	3	.76	3	4	2.76	3	.91	2	3
Fairness of selection process	-	-	-	-	-	3.18	3	.78	3	4	2.76	3	.93	2	3
Experimental Income	356.71	362	87.50	305	416	342.80	354	79.16	296	396	347.70	360	79.80	314	405
Compliance (for WWF) when WWF is selected	48.9%	41.89%	37.94%	16.57%	100%	35.02%	17.09%	34.44%	10.31%	54.64%	39.38%	28.01%	31.39%	17.36%	58.46%
Compliance (for WWF)	-	-	-	-	-	31.52%	17.12%	32.36%	5.72%	49.28%	36.58%	24.42%	31.13%	16.70%	54.14%
Compliance (for ASPAS)	-	-	-	-	-	30.80%	17.12%	31.59%	4.92%	44.91%	34.42%	22.21%	29.96%	14%	50.72%
N	63				75				50						

**Note.** Above (first, second and third blocks): Summary statistics on individual covariates. Below (fourth block): Summary statistics on outcome behavior. From left to right are the variables' names; their corresponding values (average, median, standard deviation, first and third quartiles) in the Baseline, Vote and Choice treatments.

### 3.4.1 Participants are globally comparable between treatment

Summarized statistics of subject pool are presented in Table 3.1. It features, from left to right, the variable's name, and its value in Baseline, Vote and Choice treatments. The significance of these different variables across treatments is directly tested in Table 3.2. It allows to observe directly the significant differences across treatments. What matters the most is the significant differences across Vote and Choice treatments. It is observed from Table 3.2 that the randomization of pool of subjects is well performed, as there is only a higher number of Econ students in the Vote compared to the Choice ( $p = .000$ ). There are more differences across Baseline and Vote, and Baseline and Choice. In the Baseline, participants are older ( $p = .048$ ), more numerous to be Econ students ( $p = .000$ ), and perceived themselves as more honest ( $p = .043$ ) compared to the Vote. They are also older ( $p = .025$ ) and more numerous to receive help from their parents ( $p = .054$ ) compared the Choice. Differences of compliance, legitimacy and fairness are studied in Section 3.5.4 while differences of compliance are studied in Section 3.5. There are no statistically significant differences between other comparisons. It is important to note that participants in both treatments know and perceive both organizations and their actions in the same manner. It means that there are no differences in perception of these organizations across treatments.

### 3.4.2 Participants make the same decisions in each treatment

Here are studied the selection behavior of organizations by participants. There should be no treatment effects on selection of organizations. As both organizations has been chosen to be as similar as possible for participants, they should choose in average not differently than a probability  $\frac{1}{2}$  between both organizations.

Overall, 56% of participants select WWF (70/125) and 44% select ASPAS (55/125). Using  $\chi^2$ , this difference is not significant ( $p = .713$ ). In the Choice treatment, 58% of subjects select WWF (29/50) and 42% select ASPAS (21/50). Using Z-test, these selection rates are not significantly different from 50% ( $p = .2579$ ). The proportion of subject who select WWF is the same as the one who select ASPAS. In the Vote treatment, 54.67% of subjects select WWF (41/75) and 45.33% of subjects select ASPAS (34/75). Once again, this difference is not significant ( $p = .4189$ ).

In summary, participants did not have strong difference in preferences over the two organiza-

Table 3.2: Statistical tests of differences on individual covariates and compliance measures

	B. vs V.	B. vs C.	V. vs C.
Monthly income	NS	*	NS
Age	**	**	NS
Men	*	NS	NS
French nationality	NS	NS	NS
Not speaking French at home	*	*	NS
Economic studies	***	NS	***
Believing in God	NS	NS	NS
Parents' financial help	NS	**	NS
Self honesty	**	*	NS
Others' honesty	NS	NS	NS
Happiness	NS	NS	NS
Knew WWF	-	-	NS
Knew ASPAS	-	-	NS
Perception of WWF's actions	NS	NS	NS
Perception of ASPAS's actions	-	-	NS
Opinion on WWF	-	-	NS
Opinion on ASPAS	-	-	NS
Importance of the stake	-	-	NS
Legitimacy of selection process	-	-	***
Fairness of selection process	-	-	***
Experimental Income	NS	NS	NS
Compliance (for WWF) when WWF is selected	***	NS	NS
Compliance (for WWF)	-	-	NS
Compliance (for ASPAS)	-	-	NS

**Note.** The table features Wilcoxon rank-sum test in order to test mean differences for continuous variables and Fisher's exact test for binary variables. Both tests are run across Baseline vs Vote, Baseline vs Choice, and Vote vs Choice.

**Legend.** Significance levels: \*: 10% \*\*: 5% \*\*\*: 1%

tions across treatments.

## 3.5 Results

As participants only differ on few variables across treatments and their selection behavior have been found to be similar, treatments are thus comparable.

### 3.5.1 Descriptive statistics

Compliance for WWF (without separating treatments) is equal to 33.55%, therefore tax evasion is intense and spread (only one eighth of participants—13 subjects—declare their full income). Evasion decisions are very heterogeneous between participants. 7.20% of the participants (9 subjects) declare zero income, while 25% declare less than 9.61% of income and 50% less than 21.79%. Concerning the compliance for ASPAS, the average declaration is 32.25% and only 11 subjects declare their full income. 7.20% of the participants (9 subjects) declare zero income, while 25% declare less than 7.57% of income and 50% less than 21.78%. As a reminder of compliance for WWF in the Baseline, the average declaration rate is 48.98% and one fourth of participants—16 subjects—declare their full income. 5% of the participants (3 subjects) declare zero income, while 25% declare less than 17% of income and 50% less than 42%. Empirical analysis is thus possible on these three compliance distributions.<sup>8</sup>

### 3.5.2 Direct democracy effect disappears when taking into account the selection

One of the aim of this Chapter is to check if, when selection effect is addressed, there is still a direct democracy effect, with participants voting on the tax fund in a TEG. To reproduce this result, there should be an increase of compliance in the Vote and Choice treatments, where the participants have the possibility to vote and choose on their preferred tax fund, compared to the Baseline, where they do not have this possibility. Compliance rates for WWF in the treatments, when WWF is selected by the participants, are considered as they are the only comparison

<sup>8</sup>In Appendix, Figure 3.17 shows levels of income declared for WWF only in both treatments, with respect to income earned in the experiment, Figure 3.18 does the same for ASPAS and Figure 3.7, for WWF in the Baseline.



available in the Baseline. If there is an effect (commitment, social effect or else), it is supposed to be more important for the selected organization.

Results from lowest part in Table 3.1 feature compliance for WWF when WWF is selected in the three treatments. It shows that compliance for WWF is not increased when participants have the possibility to vote or make a choice compared to when they cannot. Using Wilcoxon rank-sum tests, there are not statistical significant differences between compliance for WWF across Baseline and Choice ( $p = .181$ ), Choice and Vote ( $p = .145$ ), but there is one between Baseline and Vote ( $p = .007$ )—compliance for WWF in the Vote is significantly lower than in the Baseline.

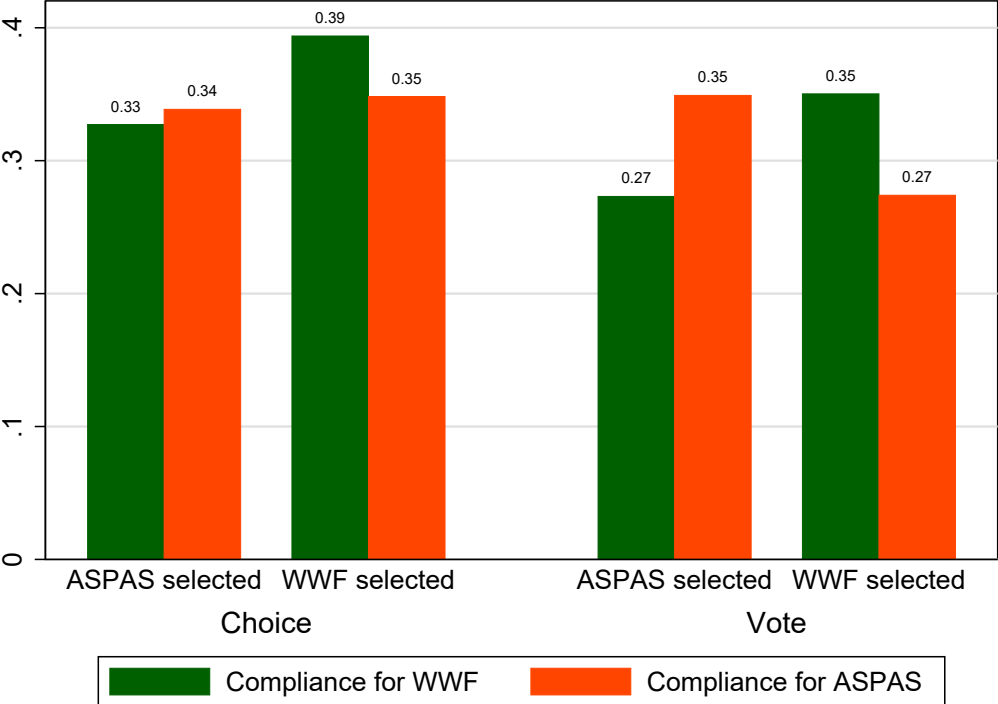
The origins of this absence of increase of compliance for WWF in the treatments could come from differences between treatments and Baseline. First, the cognitive cost of processing the set of information can be different in the treatments compared to the Baseline. In the treatments, the stage 2 is separated in two phases. It doubles the number of pages of information to process (from 1 to 2 pages). This amount of information could have diminished the investment in social dilemma. However, this explanation is only theoretical because participants under increased cognitive weight in other social dilemmas did not show this effect (Hauge, Brekke, Johansson, Johansson-Stenman, and Svedsäter, 2014). Second, participants are declaring twice the same income (compared to only one in the Baseline). Declaring twice the same income could have produced a psychological cost and therefore diminish compliance.

Even though direct democracy effect is not found in this experiment, attention is focused on compliance in each treatment to make appear social effect and commitment effect.

### 3.5.3 A commitment effect is found but no social effect

There is a social effect in the data if compliance rates are different in the Vote treatment compared to the Choice treatment, for the same selected/non-selected organization and for the same compliance considered. There is a commitment effect, if participants increase their compliance for the selected organization compared to the compliance for the other organization (method used by Rauchdobler, Sausgruber, and Tyran, 2010). Data are first studied using the full sample (without separating people who varied their compliance from those who did not) and then, the truncated sample (keeping only those who varied their compliance).

Figure 3.1: Bar charts of the compliance for WWF and ASPAS with respect to the treatment and the selected organization on the full sample



3.5.3.1 In the full sample

Table 3.1 (lowest part) also presents mean of compliances across treatments. The results show that there are no statistical difference between compliance for WWF across treatments ( $p = .1457$ ) or between compliance for ASPAS ( $p = .2401$ ) using Wilcoxon rank-sum test, when the selected organization is not taken into account. Compliances are not different if there is a vote or a simple choice. It suggests that, to find any social or commitment effect, more attention should be focused on how participants comply for the organizations that they specifically selected, across treatments.

Table 3.3 features above the compliance for WWF and ASPAS when each organization is selected, in the Choice and Vote treatments. It is also represented graphically in Figure 3.1. If most of the papers reviewed in Section 3.2 are followed, the Vote treatment should always have higher compliance rates than the Choice treatment. Voting in group should increase compliance compared to a choice alone. To discover any social effect, each compliance rate in the Choice treatment is compared to its equivalent in the Vote treatment, while taking into account the organization selected. Compliance for WWF when WWF is selected in the Choice is equal

Table 3.3: Summary statistics on compliance measures in full and truncated samples, with respect to the selected organization

Full sample				
Compliance	Choice		Vote	
	for WWF	for ASPAS	for WWF	for ASPAS
When WWF is selected	39.38%	34.82%	35.02%	27.39%
When ASPAS is selected	32.71%	33.86%	27.30%	34.91%

Truncated sample				
Compliance	Choice		Vote	
	for WWF	for ASPAS	for WWF	for ASPAS
When WWF is selected	39.02%	30.22%	40.51%	24.05%
When ASPAS is selected	26.73%	29.73%	22.40%	35.33%

**Note.** Above: compliance depending on the selected organization with full sample. Below: compliance depending on the selected organization with truncated sample (only subjects varying their declarations across organizations). Each table are presented as follow: in the first row are the treatments. In the second row are the compliances for WWF and ASPAS inside each treatment. In the third and fourth rows are the compliances for WWF and ASPAS when the participants selected WWF or ASPAS.

to 39.38%, and in the Vote to 35.02%. The computed difference is equal to -4.36%. Testing for significance—using Wilcoxon rank-sum test—proves that it is not ( $p = .2351$ ).<sup>9</sup> Focusing on compliance for ASPAS when ASPAS is selected, there is a (positive) difference of 1.05%, but it is not significant ( $p = .9723$ ). Difference of compliance for WWF when ASPAS is selected in both treatments is equal to -5.41% and is once again not significant ( $p = .4559$ ). It is the same for the difference of compliance for ASPAS when WWF is selected (-7.43%,  $p = .1557$ ). To sum up, compliance rates from Vote treatment are always lower than those in Choice treatment, at the exception of compliance for ASPAS when ASPAS is selected. However, these social effects are never significant. Voting in group did not raise compliance here.

To discover any commitment effect, we compare each compliance rate for the selected organization compared to the non-selected organization, in both treatments. If the commitment assumption is followed, there should be always an increase in compliance for the selected organization. In the Choice treatment, when WWF is selected, compliance for WWF is equal to 39.38% and compliance for ASPAS is equal to 34.82%. The computed difference is positive and equal to 4.56%. It is significant ( $p = .0427$ ). When ASPAS is selected, the difference of compliance for ASPAS is about 1.15% and it is not significant ( $p = .2142$ ). In the Vote treatment,

<sup>9</sup>Social effect is tested using a test dedicated to unpaired sample (Wilcoxon rank-sum test) as participants are different in the Choice compared to the Vote. Commitment is tested using a test dedicated to paired samples (Wilcoxon matched-pairs signed-ranks test) as participants are the same across compliance.

when WWF is selected, the difference of compliance for WWF is equal to 7.63%. It is significant ( $p = .0001$ ). When ASPAS is selected, the difference of compliance for ASPAS is equal to 7.61%. Once again, this difference is significant ( $p = .0001$ ). In other words, there are significant commitment effects in the Choice and Vote treatments. When participants vote for/choose an option, they subsequently favor more this option than another not selected.

To conclude, social effect has been found to be non-significant. However, significant commitment effect has been found. Another way of discriminating compliances is explored to try to exacerbate social effect. If one can demonstrate social effect only on a subsample of participants, it is proven to exist nonetheless.

### 3.5.3.2 In the truncated sample: keeping people who vary their declarations

To better show the variations of income declaration, only the people who varied their declaration between WWF and ASPAS are kept (see Table 3.3, below). It also leads to fewer subjects in each sample: 8 people have chosen ASPAS, 20 have voted for ASPAS, 15 have chosen WWF, 19 have voted for WWF.<sup>10</sup>

The exact same manner of presenting results from the full sample is used again here. Social effect is first looked for.

Compliance for WWF when WWF is selected in the Choice is equal to 39.02%, and in the Vote to 40.51%. The computed difference is equal to 1.49%. Testing for significativity (using same tests as before) proves that it is not ( $p = .8082$ ). Focusing on compliance for ASPAS when ASPAS is selected, there is a difference of 5.60%, but it is not significant ( $p = .7219$ ). Difference of compliance for ASPAS when WWF is selected in both treatments is equal to -6.17% and is once again not significant ( $p = .3400$ ). It is the same for the difference of compliance for WWF when ASPAS is selected (-4.33%,  $p = .6109$ ). Despite using a truncated sample, social effects are still found to be non-significant.

Commitment effects are also studied. In the Choice treatment, when WWF is selected, compliance for WWF is equal to 39.02% and compliance for ASPAS is equal to 30.22%. The computed difference is positive and equal to 8.80%. It is significant ( $p = .0268$ ). When ASPAS is selected, the difference of compliance for ASPAS is about 3% and it is not significant ( $p = .4838$ ). In

<sup>10</sup>As before, it is represented graphically in Figure 3.19 in Appendix.

the Vote treatment, when WWF is selected, the difference of compliance for WWF is equal to 16.46%. It is significant ( $p = .0003$ ). When ASPAS is selected, the difference of compliance for ASPAS is equal to 12.92%. Once again, this difference is significant ( $p = .0010$ ). Compared to previous sample, results still show significant commitment effects in the Choice and in the Vote conditions (except for ASPAS selected in the Choice). Participants really increased their compliance for their selected organization.

To sum up, there is a significant commitment effect in both samples: even though the two organizations are similar, when participants target one organization through the mere act of voting for it or choosing it, they subsequently comply more for this organization. However, there are no significant differences when participants vote in group or when they choose alone in terms of compliance, in both samples. This leads to conclude that commitment probably plays a bigger role than social aspect in the direct democracy effect.

#### **3.5.4 Are other variables influencing compliance?**

Wahl, Muehlbacher, and Kirchler (2010); Grossman and Baldassarri (2012); Feld and Tyran (2002) recognized the importance of fairness and legitimacy of the vote as possible sources of direct democracy effect. Fairness and legitimacy are listed in Section 3.2 as part of the third other channel of compliance. Does the perception of fairness and legitimacy of the process impact compliances? Perceived fairness and legitimacy of the selection procedure are studied here, associated to the importance of having the possibility to select the organization, as they were grouped in a same block of questions.

##### **3.5.4.1 Questionnaires' answers are rather different**

Table 3.1 (third lowest part) reports the scores (ranging from 1 to 5) from the different control variables. These control variables are the importance of having the possibility to select the organization that will get the tax fund, the legitimacy and the fairness of the process evaluated by the participants in the two treatments.

Subjects' scores are equal concerning the importance of having the possibility to select the organization. It means that they are equally interested in selecting the organization that will get

the collected taxes across treatments. They rate this opportunity overall as just higher than medium importance. However, in the vote treatment, participants designate the vote process as being significantly more legitimate ( $p = .0017$ ) and more fair ( $p = .0083$ ) than the Choice treatment, using Wilcoxon rank-sum test. A vote is thus perceived as more fair and legitimate than a simple choice with some probabilities.

#### 3.5.4.2 Perceived legitimacy, fairness and importance of the selection: their impact on compliance

Two questions are asked to participants to measure their perception of the legitimacy and fairness of the selection mode of the tax fund. Different repeated OLS models on compliance for WWF are presented in Table 3.4, using these questions' answers as explanatory variables. These models did not take into account specific treatments or the selected organization.<sup>11</sup> Results are globally equivalent when each particular situation is considered, for WWF and ASPAS.<sup>12</sup> The legitimacy and the fairness of the procedure have both a positive but non-significant influence on compliance for WWF (Model 2, 3, 4). Perceiving the selection process as legitimate or fair does not increase compliance for WWF in either condition.

To design a voting experiment triggering higher compliance rate to the dilemma, how participants perceive the importance of the vote's stake should matter. In Table 3.4, the correlation is negative but not significant between the compliance for WWF and the perception of the importance at stake (Model 1, Model 4).<sup>13</sup> This result shows that the stake of the vote did not really matter in this experiment.

## 3.6 Conclusion

Many experiments reproduce democratic institutions in the lab and offer participants to vote on one aspect of the social dilemma in which they are taking part. Often, it leads to an increase in the participants' investment in social dilemma, known as the direct democracy effect. However,

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<sup>11</sup>As there are few full compliers, the distinction between intensive and extensive margin is dispensable here. Probit regression on the extensive margin and an OLS regression on the intensive margin are not implemented, as it would scarce the information present in the data.

<sup>12</sup>See respectively Table 3.24 and Table 3.25 in Appendix.

<sup>13</sup>Results are globally equivalent but not always significant in each particular situation considered, see Table 3.24 and Table 3.25 in Appendix.

Table 3.4: Multivariate regressions of compliance for WWF on importance, legitimacy and fairness

	(1)	(2)	(3)	(4)
	Model 1	Model 2	Model 3	Model 4
Importance	-0.0525*			-0.0514*
	(0.0271)			(0.0276)
Legitimacy		0.0203		0.0100
		(0.0333)		(0.0407)
Fairness			0.0113	0.00486
			(0.0330)	(0.0399)
Intercept	0.479***	0.274**	0.301***	0.431***
	(0.0792)	(0.106)	(0.103)	(0.144)
<i>N</i>	125	125	125	125
adj. $R^2$	0.022	-0.005	-0.007	0.007

**Note.** OLS regressions of compliance rate (declared income divided by income earned) on scores to covariates with standard errors in parentheses.

**Legend.** Significance levels: \*: 10% \*\*: 5% \*\*\*: 1%

the channel(s) of this effect remain unclear (social, commitment or other). This experiment—a tax evasion game that takes into account selection effects—offers a first step to answer this question. To do so, two treatments are compared where participants are asked to vote in groups of three (Vote treatment) or choose alone (Choice treatment) on the organization that will get their taxes.

First, the results show that this experiment does not reproduce direct democracy effect, compared to a Baseline in which participants are not voting or choosing. Second, there is indeed a significant commitment effect: participants increased their compliance for the selected option. However, voting in groups should increase furthermore compliance compared to a choice alone. This social effect has been found to be not significant. In the end, this result does not confirm that social effect plays a bigger role than commitment, in terms of compliance in social dilemma. Third, participants perceived the vote as a more legitimate and fair selection process, compared to a choice. It is concordant with what Wahl, Muehlbacher, and Kirchler (2010); Feld and Tyran (2002) and Grossman and Baldassarri (2012) hypothesized. But once again, this perception does not produce anything in the results in terms of compliance. To sum up, voting

on an issue in group does not bring anything more than making a decision alone, with some probability, even though the vote is considered more fair, more legitimate and have at least as many chances to see the selected organization winning.

This result does not plead for considering social effect as the main factor of the direct democracy effect, as put forward by a majority of the literature. It is in line with previous results. In the robustness treatment done by Dal Bó, Foster, and Putterman (2010), they communicated to participants that at least 2 or at most 2 participants have voted in favor of the proposition in a referendum. The results show that this information about the other's behaviors was explaining between 0% and at most 20% of the direct democracy effect. More striking results have been found by Kamei (2014), using a similar procedure: when participants to the PGG received information about the behaviors of other subjects, they did not modify at all their contribution decisions.

There are different possible limitations and improvements to this study. First, the Baseline is not exactly equivalent to the treatments. In the treatments, participants have to process more information and declare twice the same income, as compared to the Baseline coming from Chapter 2. It is thus impossible to know if the absence of direct democracy effect in the TEG is due to this inequivalence or other. An equivalent Baseline could produce lower compliance than the one available here, and demonstrate e.g. a significant social effect. The second stage of this new Baseline would have two phases. In the first phase, participants would declare their amount of money for WWF and ASPAS. A totally random draw would thus choose one of their declaration. Participants would know this process and be informed that they do not determine which organization gets the tax fund. In the second phase, participants would have to choose one of the organization that they would like to see selected, to know their preference over the organization. It would come after the declaration phase to not trigger any commitment effect. Second, a possible limitation could come from the nature of the treatments. Participants in the vote face ambiguity, while participants in the choice treatment face risk. According to the Ellsberg paradox, people prefer risk over ambiguity. Following this assumption, participants should comply more in the Choice in comparison to the Vote. However, it is not what is observed here. Third, to trigger any social effect, a treatment implementing interactions between participants could be implemented. As in Alm, McClelland, and Schulze (1999), this treatment would let participants (cheap-)talk about their respective vote. It would be interesting to verify whether this new treatment could provoke enhanced compliance in comparison to the Choice



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treatment. Fourth, in order to validate the preeminence of commitment over social in the direct democracy effect, one should use different social dilemmas (such as prisoner's dilemma or public good game), along with different methods other than the strategy method.

# Conclusion

As a synthesis, this thesis shows that personality traits did not really explain the observed evaded taxes in the lab. A modification of the context of decision-making, by making participants sign an oath to tell the truth or letting them select the destination of the tax fund, was found in order to be able to foster tax compliance.

This thesis demonstrates that the experimental approach is a promising method of research. It will not replace the theoretical approach, but could really complement it. For example, in Chapter 1, the hypotheses coming from different models are tested: people with some individual determinants (highest sense of morality, feeling of moral emotions or conformity) should declare more income. Results showed that it is rather not the case. Experiments can also open theory possible scope. In this thesis, some contexts are found to limit tax evasion, something that could be modeled by theoretical economists.

The main finding of this thesis is that institutional context is probably a better lever than individual personality traits. Public policies should thus focused more on the decision environment in which taxpayers are embedded to produce more tax compliance.

Based on the social psychology of commitment, taxpayers' environment should be committing. For example, it could be implemented by switching the order of the declaration and signature to certify that the information provided is truthful. Shu, Mazar, Gino, Ariely, and Bazerman (2012) implemented it and proved that it was a very effective way to reduce dishonest information provision (see Chapter 2, Section 2.2). Results from Chapter 3 suggest that taxpayers should also have the possibility to take part in the fiscal decisions that would apply to themselves, as it is currently the case in Switzerland. Another possibility would be to produce a pre-committing environment for taxpayers. Pre-committing means an environment where participants have fewer possibilities to cheat. They would be pre-committed, for example, in a tax system where

taxes are directly withheld. Kleven, Knudsen, Kreiner, Pedersen, and Saez (2011) showed that taxes are mostly not evaded when they are withheld, and that evasion is rather coming from self-employed taxpayers. It pleads to adopt a tax system where taxes are withheld, like in the United States of America, the United Kingdom or Germany. The fact that France adopted it recently goes in this positive direction.<sup>14</sup>

Finally, Chapter 2 specifically insists on providing simple and non-ambiguous information to taxpayers. Fiscal reforms should totally reinvent the current French tax system from scratch. A drastic reform could be to abandon the actual system for setting a unique flat tax rate on personal incomes, as currently implemented in Romania since 2005. Adopting flat tax rates could resolve existing misunderstandings on what participants think they are paying (Erikson and Fallan, 1996) and what progressive taxes really are (Roberts, Hite, and Bradley, 1994). However this proposal is not what is advised here, as existing evidence shows that compliance could be deterred in the end (Heinemann and Kocher, 2013). The sole solution would be to set a fiscal “*Grand Soir*”, a revolution such as wished in Piketty, Saez, and Landais (2011), an idea that was especially present in France before the 2012 presidential elections. The authors proposed to implement a progressive tax system on incomes where the rates would be effective, not marginal. This income tax would also be individual and would no longer involve the family. This new system would be simpler and more transparent. Regrettably, this idea has totally disappeared from the French political agenda.

Building on this thesis, further research could address and dig into the same issues. The use of personality psychology in economics is still at its beginning. More research is needed to validate the result of the absence of correlations between personality traits and compliance. The interaction of situation and personality traits could make some correlations appear. For example, in Chapter 1 the most reliable correlation is a positive link between empathy and compliance. However Calvet and Alm (2014) did not present such link. These contradicting results could come from differences of designs. In Chapter 1, funds were donated to WWF while redistributed to participants in Calvet and Alm (2014). Parallely, Coricelli, Rusconi, and Villeval (2014) found a correlation between shame and compliance in an experiment with audits. It was not what was found in Chapter 1 with no audits. Some personality traits could be mute in some situation and very expressive in others. An alternative to questionnaires coming from psychology would be to create a new questionnaire specifically dedicated to try to measure tax

<sup>14</sup>Fiscal law n° 2016-1917 from 29th December 2016 for 2017 finances, article 60.

morale, while defining well its meaning.

Focusing on contexts now, further research is needed to find the monetary equivalent of these contextual determinants: how much do the oath allow to save in audit and fine? How much money could be saved in general if these simple nudges (framing, priming, committing) were implemented? Applying these contextual determinants in the field using randomized control trials should be next on agendas. Lastly, on the direct democracy effect, as the participatory democratization movement grows larger, one should especially measure its effect on citizens and taxpayers in the field. Giving more power to taxpayers will change the way people pay their taxes, how they perceive their tax burdens and their exchange with the states, a very promising area of future research.

# Appendix 1: Chapters 1, 2 and 3

## a Decision interface of Baseline

Figure 3.2: Screen-shot of the beginning of the task



Figure 3.3: Screen-shot of the task during the sorting

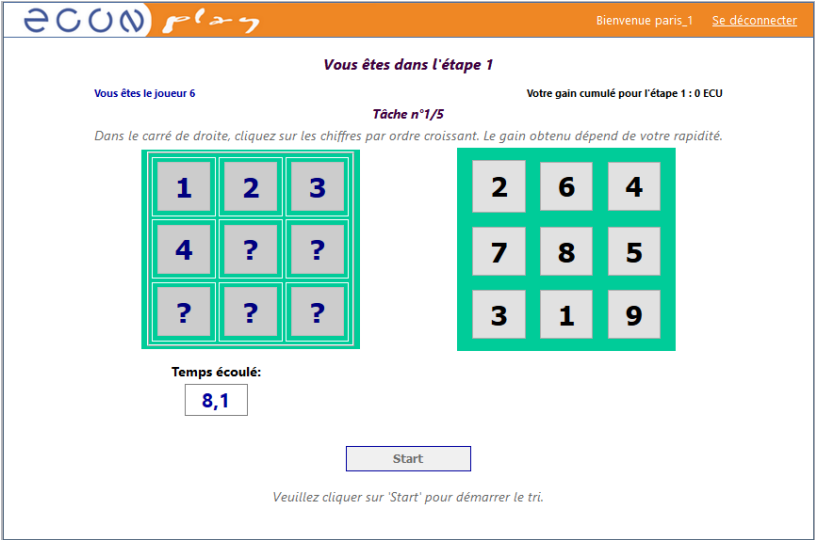


Figure 3.4: Screen-shot of the declaration for WWF

The screenshot shows a web interface for a decision support system. At the top, there is a header with the logo 'econ play' on the left and 'Bienvenue lees\_2 Se déconnecter' on the right. The main content area is titled 'Vous êtes dans l'étape 2'. Below the title, there are three paragraphs of text: 'Au cours de cette étape, nous vous demandons de déclarer le montant de votre revenu.', 'Ce revenu correspond à la somme que vous avez gagnée au cours de la première étape.', and 'Le montant du revenu que vous déclarez sera **taxé au taux de 35%**.' The next paragraph asks the user to choose their income amount using a slider: 'Veuillez choisir le montant de votre revenu que vous voulez déclarer en déplaçant le curseur ci-dessous. Prenez tout le temps qu'il vous est nécessaire pour répondre à cette question.' Below this text is a horizontal slider. The slider has a small vertical bar on the left and a larger box on the right containing a question mark '?' and the text 'ECU(S)'. Below the slider is a 'Valider' button. To the right of the slider, the text '410 ECUS' is displayed.

**econ play** Bienvenue lees\_2 Se déconnecter

**Vous êtes dans l'étape 2**

*Au cours de cette étape, nous vous demandons de déclarer le montant de votre revenu.*

*Ce revenu correspond à la somme que vous avez gagnée au cours de la première étape.*

**Le montant du revenu que vous déclarez sera taxé au taux de 35%.**

**Veuillez choisir le montant de votre revenu que vous voulez déclarer en déplaçant le curseur ci-dessous.**  
*Prenez tout le temps qu'il vous est nécessaire pour répondre à cette question.*

? ECU(S)

Valider

410 ECUS

## b Instructions from Experiment 1 (Baseline/Oath)

You are taking part in an experiment in which you might win some money. The amount of money that you will win depends on your decisions. **This experiment is a fiscal simulation.**

### PROCEDURE OF THE EXPERIMENT

The experiment will take place in three stages. The instructions for each stage will be given to you at the beginning of that stage. The currency used in the experiment is ECU (for *Experimental Currency Unit*). Its value will be described below.

### HOW WILL YOU MAKE YOUR DECISIONS?

You will make your decisions thanks to the computer in front of you. All the informations that will be useful to make your decisions will appear on the screen. To take your decisions, click on the buttons on the screen once you acknowledge these informations.

### CALCULATION AND PAYMENT OF YOUR EARNINGS

Your earnings during the experiment is expressed in ECU. These earnings in ECU will be converted into euros at the rate of 25 ECU = 1 euro. You will be paid the sum corresponding to this total individually, in cash, at the end of the experiment.

For scientific reasons which everyone will understand, **it is essential that you do not talk together during the experiment.** Unfortunately, any participant who fails to respect this rule will be asked to leave the room without any possibility of collecting their earnings.

**Thank you for your participation.**

\*\*\*\*\*

## PROCEDURE FOR THE FIRST STAGE

In the first stage, you will earn an income in ECU participating to a series of 5 tasks. **The sum that you will earned corresponds to your annual income.**

Each of the tasks take place as follow: on your screen appear two grids of 3x3 boxes, composed of 9 squares. When you click on Start, on the right hand grid appear digits between 1 and 9 in a random order. The goal is to click on the digits in an increasing order, thanks to the mouse. Thus, you have to click first on the digit 1, then on the digit 2, then on the 3 etc. When you click on 9, the task is finished. When you click on each digits, those have to appear in the left hand grid of the screen to be validated. The chrono starts when you click on Start. The time elapsing while you accomplish the task appears on the bottom of the screen: the faster you get to 9, the higher the sum that you will win.

Indeed, you are given at the beginning of this stage a sum equal to 150 ECU. This amount diminished by 13 ECU at each seconds.

Your earning in ECU at the end of each tasks is equal to

$$150 \text{ ECU} - (\text{your time} * 13).$$

Note that you cannot have a negative earning: **if your score at a task becomes negative**, it will be fixed at 0.

At the end of this stage, we will compute **the total of your ECU earned through the 5 tasks.** The longer you spend to do the five tasks, the lower will your gain be for this stage. At the end of this stage, a message will tell you the sum in ECU that you have earned through the five tasks for this stage. Click on OK once you learned about this information.

It is very important that you understand the rules of the experiment perfectly. If you have any questions, please raise your hand; somebody will come and answer them. Thank you for following these instructions.



\*\*\*\*\*

PLEASE COMPLETE THE FOLLOWING QUESTIONNAIRE:

1. The first stage has \_\_\_\_\_ tasks.  

YES                      NO
2. In the task, the goal is to click on the squares in the increasing order, from 1 to 9.  

YES                      NO
3. My gain for this stage depends on the time spend for the execution of the tasks: the quicker I am, the higher my gain.  

YES                      NO
4. My gain for this stage correspond to my annual income.  

YES                      NO
5. The earnings in Euros that I will be paid at the end of the experiment depend on my decisions and of my performance during this stage.  

YES                      NO

**If any of these points remain unclear, do not hesitate to ask questions.**

## PROCEDURE FOR THE SECOND STAGE

A few informations are needed to understand this stage properly.

The *World Wide Fund for Nature*, better known as the WWF, is an international non-governmental organization for the protection of nature and the environment, strongly involved in sustainable development. This organization is based in Gland, in Switzerland, and has more than 4.7 million members throughout the world and has an operational network in 96 countries. The aim of this private organization is to protect fauna, habitats, and nature in general, and to this end it collects funds for one-off actions. Its main activities are monitoring the application of international regulations, restoring damaged natural spaces and training.

To finance its environmental actions, the WWF invites individuals to participate in the adoption of endangered species of animals. The funds that are collected in this way allow the WWF to continue its efforts in terms of environmental protection and the conservation of bio-diversity. **During this stage, we ask you to declare the amount of your income, the tax applied to this amount will be given to WWF.**

Your income corresponds to the sum that you have earned in the first stage. The amount of income that you report will be taxed at a 35% rate. Thus, your gain at the end of this stage corresponds to:

$$\text{Your income} - (\text{the income that you declare} * 0.35)$$

To declare your income, move the slider in the grey zone till the amount of income that you wish to declare appear. Once you made your choice, press OK to validate. The total sum of money collected thanks to the tax will be given by us to WWF. It will be used to support its actions of environmental protection in participating in a dolphin adoption program. This donation to WWF will be certified by official certificates. For your information, these certificates will be send to you by email, at the latest in 3 weeks from today.

\*\*\*\*\*

PLEASE COMPLETE THE FOLLOWING QUESTIONNAIRE:

1. The income that I declare will be taxed at the rate of 35%.

YES NO

2. The sum of income corresponds at the amount of my earnings in ECU from the first stage

YES NO

3. The amount of tax applied to my income will be deducted from my earnings in the experiment.

YES NO

4. The sum of tax collected will be entirely given to WWF to support its actions for environmental protection.

YES NO

**If any of these points remain unclear, do not hesitate to ask questions.**

## PROCEDURE FOR THE THIRD STAGE

In this stage, we will ask you to answer at a certain number of questions. **All these information, along your earnings will remain strictly confidential.**

The first questions will help us to know you better (your age, professional activity, etc.).

In the following questionnaires, we will ask you to check the boxes that best correspond to your situation, among the different propositions.

In the last questionnaire, each question represent a situation likely to be encountered in everyday life, followed by common reactions to these situations. When you read these scenarios, try to put yourself in this situation. Then, indicate the probability that you react the way described.

In order to thank you for the time dedicated to these questionnaires, a fixed amount of 5 euros will be added to your gains at the end of this stage.

# Appendix 2: Chapters 1 and 3

## c Decision interface of Choice treatment

Figure 3.5: Choice procedure of the selected organization

The screenshot shows a web interface for 'econ play'. At the top, it says 'Bienvenue paris\_1' and 'Se déconnecter'. The main heading is 'Vous êtes dans l'étape 2'. Below this, it states: 'Au cours de cette étape, vous avez la possibilité de choisir entre les deux options suivantes:'. The section is titled 'Choix de votre option:'. There are two options presented in grey boxes: 'Option A: WWF' with the subtext '(2/3 chance que WWF gagne contre 1/3 chance que ASPAS gagne)' and 'Option B: ASPAS' with the subtext '(2/3 chance que ASPAS gagne contre 1/3 chance que WWF gagne)'. At the bottom, it says 'Veuillez faire votre choix en cliquant sur l'une des 2 options.'

Figure 3.6: Screen-shot of the declaration for WWF and ASPAS

The screenshot shows a web interface for 'econ play'. At the top, it says 'Bienvenue paris\_1' and 'Se déconnecter'. The main heading is 'Vous êtes dans l'étape 2'. Below this, it states: 'Vous allez déclarer votre revenu dans chacun des deux cas: une fois si WWF est le bénéficiaire de la taxe et une fois si ASPAS est le bénéficiaire de la taxe.' It then says: 'Ce revenu correspond à la somme que vous avez gagnée au cours de la première étape.' and 'Le montant du revenu pour chacun des deux cas que vous déclarez sera **taxé au taux de 35%**.' It continues: 'Pour chacun des 2 cas, veuillez choisir le montant de votre revenu que vous voulez déclarer en déplaçant le curseur ci-dessous. Prenez tout le temps qu'il vous est nécessaire pour prendre vos décisions.' There are two sliders. The first is labeled '- Si WWF est le bénéficiaire de la taxe:' and has a slider with a red question mark icon and 'ECU' next to it, and '492 ECUS' at the end. The second is labeled '- Si ASPAS est le bénéficiaire de la taxe:' and has a slider with a red question mark icon and 'ECU' next to it, and '492 ECUS' at the end. At the bottom, there is a 'Valider' button.

## d Instructions from Experiment 2 (Vote/Choice)

You are taking part in an experiment in which you might win some money. The amount of money that you will win depends on your decisions. **This experiment is a fiscal simulation.**

### PROCEDURE OF THE EXPERIMENT

The experiment will take place in three stages. The instructions for each stage will be given to you at the beginning of that stage. The currency used in the experiment is ECU (for *Experimental Currency Unit*). Its value will be described below.

### HOW WILL YOU MAKE YOUR DECISIONS?

You will make your decisions thanks to the computer in front of you. All the informations that will be useful to make your decisions will appear on the screen. To take your decisions, click on the buttons on the screen once you acknowledge these informations.

### CALCULATION AND PAYMENT OF YOUR EARNINGS

Your earnings during the experiment is expressed in ECU. These earnings in ECU will be converted into euros at the rate of 25 ECU = 1 euro. You will be paid the sum corresponding to this total individually, in cash, at the end of the experiment.

For scientific reasons which everyone will understand, **it is essential that you do not talk together during the experiment.** Unfortunately, any participant who fails to respect this rule will be asked to leave the room without any possibility of collecting their earnings.

**Thank you for your participation.**

\*\*\*\*\*

## PROCEDURE FOR THE FIRST STAGE

In the first stage, you will earn an income in ECU participating to a series of 5 tasks. **The sum that you will earned corresponds to your annual income.**

Each of the tasks take place as follow: on your screen appear two grids of 3x3 boxes, composed of 9 squares. When you click on Start, on the right hand grid appear digits between 1 and 9 in a random order. The goal is to click on the digits in an increasing order, thanks to the mouse. Thus, you have to click first on the digit 1, then on the digit 2, then on the 3 etc. When you click on 9, the task is finished. When you click on each digits, those have to appear in the left hand grid of the screen to be validated. The chrono starts when you click on Start. The time elapsing while you accomplish the task appears on the bottom of the screen: the faster you get to 9, the higher the sum that you will win.

Indeed, you are given at the beginning of this stage a sum equal to 150 ECU. This amount diminished by 13 ECU at each seconds.

Your earning in ECU at the end of each tasks is equal to

$$150 \text{ ECU} - (\text{your time} * 13).$$

Note that you cannot have a negative earning: **if your score at a task becomes negative**, it will be fixed at 0.

At the end of this stage, we will compute **the total of your ECU earned through the 5 tasks**. The longer you spend to do the five tasks, the lower will your gain be for this stage. At the end of this stage, a message will tell you the sum in ECU that you have earned through the five tasks for this stage. Click on OK once you learned about this information.

It is very important that you understand the rules of the experiment perfectly. If you have any questions, please raise your hand, somebody will come and answer them. Thank you for following these instructions.

\*\*\*\*\*

## PLEASE COMPLETE THE FOLLOWING QUESTIONNAIRE:

1. The first stage has \_\_\_\_\_ tasks.  

YES                      NO
2. In the task, the goal is to click on the squares in the increasing order, from 1 to 9.  

YES                      NO
3. My gain for this stage depends on the time spend for the execution of the tasks: the quicker I am, the higher my gain.  

YES                      NO
4. My gain for this stage correspond to my annual income.  

YES                      NO
5. The earnings in Euros that I will be paid at the end of the experiment depend on my decisions and on my performance during this stage.  

YES                      NO

**If any of these points remain unclear, do not hesitate to ask questions.**



## PROCEDURE FOR THE SECOND STAGE

A few information are needed to understand this stage properly.

The *World Wide Fund for Nature*, better known as the WWF, is an international non-governmental organization for the protection of nature and the environment, strongly involved in sustainable development. This organization is based in Gland, in Switzerland, and has more than 4.7 million members throughout the world and has an operational network in 96 countries. The aim of this private organization is to protect fauna, habitats, and nature in general, and to this end it collects funds for one-off actions. Its main activities are monitoring the application of international regulations, restoring damaged natural spaces and training.

The *Organization for the Protection of Wild Animals*, better known as ASPAS, is a french non-governmental organization for the protection of wildlife and the natural heritage. It is based in Crest, in France. The aim of this private organization is to protect fauna, preservation of natural heritage, defense of nature users' rights, and to this end it collects funds for one-off actions. Its main activities are to run informations campaigns to mobilize public opinion and to interpellate elected and to launch petitions to enforce environmental law.

To finance their environmental protection of environment activities, these two organizations propose to individuals to participate in their operations' fundings. The funds that are collected in this way allow them to continue its efforts in terms of environmental protection and the conservation of bio-diversity.

**During this stage, we ask you to declare the amount of your income.** Your income corresponds to the sum that you have earned in the first stage. The amount of income that you report will be taxed at a 35% rate. The amount of taxes collected will be collected from your income and given to the organization that you will select. Your role is thus to determine between WWF and ASPAS which organization will be the beneficiary of the amount of income collected thanks to the tax.

This stage is implemented in two phases. In the first phase, we ask you to select this organization to which the tax collected will be given. In a second phase, we ask you to declare your income.

Procedure of the first phase:

In this phase, you have to choose the organization that will get the amount of taxes collected. To do this, you have to choose between two options: the choice A and the choice B. These two choices have a part of chance. Once you have made your choice, a draw will determine the organization that will be effectively selected in the following way:

- If you choose Choice A: ASPAS is selected with one chance out of three (33,3%) and WWF is selected with two chances out of three (66,6%).
- If you choose Choice B: WWF is selected with one chance out of three (33,3%) and ASPAS is selected with two chances out of three (66,6%).

*[At the beginning of this phase, groups of three participants are formed randomly: yourself and two other participants. Inside each group, a vote determines the organization that will get collected taxes. To do this, each member of the group has to choose to vote for WWF or ASPAS. In each group, the organization selected is the one that get at least two votes. This organization will receive the sum of taxes given by the three group members in the second phase of this stage.]*

#### Procedure of the second phase:

The organization that have been selected will be announce uniquely at the end of this stage. In this phase, we ask you to declare your income in two situations different: first in the hypothesis where WWF is the tax beneficiary *[(it means that at least two participants of your group have voted for WWF)]* ; and then in the hypothesis where ASPAS is the tax beneficiary *[(it means that at least two participants of your group have voted for ASPAS)]*.

The amount of income that you report will be taxed at a 35% rate. To declare your income, move the slider in the grey zone till the amount of income that you wish to declare appear. Once you made your choice click OK to validate.

Your gain at the end of this stage corresponds to:

**Your income -(the income that you declare for the chosen organization \* 0.35)**

The total sum of money collected thanks to the tax correspond to your choice of declaration of the organization that have been selected in the first phase. This sum will be given by us to the chosen organization, to support its actions of environmental protection. It is either WWF or ASPAS, according to the chosen organization in the first phase. This donation to WWF or

ASPAS will be certified by official certificates. For your information, these certificates will be send to you by email, at the latest in 3 weeks from today.

\*\*\*\*\*

## PLEASE COMPLETE THE FOLLOWING QUESTIONNAIRE:

1. I determine the unique organization, WWF or ASPAS, that will get my tax.

YES NO

2. I declare two times my income, once if WWF is selected, and once if ASPAS is selected.

YES NO

3. The sum of income corresponds at the amount of my earnings in ECU from the first stage

YES NO

4. The amount of tax applied to my income will be deducted from my earnings in the experiment.

YES NO

5. The sum of tax collected will be entirely given to WWF or to ASPAS to support its actions for environmental protection.

YES NO

**If any of these points remain unclear, do not hesitate to ask questions.**

### PROCEDURE FOR THE THIRD STAGE

In this stage, we will ask you to answer at a certain number of questions. **All these information, along your earnings will remain strictly confidential.**

The first questions will allow us to get your reaction about this experiment. The second questions will help us to know you better (your age, professional activity, etc.). In the following questionnaires, we will ask you to check the boxes that best correspond to your opinion, among the different propositions.

Take your time to answer these questions. In order to thank you for the time dedicated to these questionnaires, a fixed amount of 5 euros will be added to your gains at the end of this stage.

# Appendix 3: Chapter 1

## e Description of the questionnaires used in Experiment 1

Questionnaires	Sub-scales	Measures	Description	Nb of items
Concern for Appropriateness Scale (CAS)	Cross-Situational Variability of Behavior (CSV)	Behavioral variability	CSV taps the behavioral variability that is a consequence of continually tailoring one's actions so as to avoid disapproval	7
	Attention to Social Comparison Information (ATSCI)	Tendency to compare behavior	Many of the items of the ATSCI subscale have a defensive connotation and of behavior comparison	13
Questionnaire for Cognitive and Affective Empathy (QCAE)	Perspective Taking (PT)	Intuitive perspective taking	Intuitively putting oneself in another person's shoes in order to see things from his/her perspective	10
	Online Simulation (OS)	Costly perspective taking	An effortful attempt to put oneself in another person's position by imagining what that person is feeling. Online simulation is likely to be used for future intentions	9
	Emotion Contagion (EC)	Emotional contagion	The automatic mirroring of the feelings of others	4
	Peripheral Responsivity (PERIR)	Mood transmission in a detached social context	The affective response when witnessing the mood of others in a detached social context	4
	Proximal Responsivity (PROXR)	Mood transmission in a closed social context	The affective response when witnessing the mood of others in a close social context	4
Guilt And Shame Prone-ness (GASP)	Guilt - Negative Behavior-Evaluations (NBE)	Guilt	Guilt - NBE items describe feeling bad about how one acted	4
	Guilt - Repair responses (GR)	Correction of transgressions	Guilt - repair items describe action tendencies (i.e., behavior or behavioral intentions) focused on correcting or compensating for the transgression	4
	Shame - Negative Self-Evaluations (NSE)	Shame	Shame - NSE items describe feeling bad about oneself	4
	Shame - Withdrawal Responses (SW)	Willingness to hide oneself	Shame - withdraw items describe action tendencies focused on hiding or withdrawing from public	4

## f Description of the questionnaires used in Experiment 2

Questionnaire	Sub-scales	Measures	Description	Nb of items
Ethics Position Questionnaire (EPQ)	Relativism	The extent to which the individual rejects universal moral rules in favor of relativism	Some individuals use moral absolutes in making moral judgments. Others do not rely on such universal moral rules	10
	Idealism	The extent to which the individual idealizes moral rules	Some individuals believe that "right" actions will always produce beneficial consequences. Others think that beneficial consequences will be mixed with non-beneficial ones	10
Integrity scale (IS)	Integrity	Level of integrity	Higher integrity involves personal commitment to moral identity that increases positive activities and reduces illicit temptations	18
Moralization of Everyday Life Scale (MELS)	Factor 1	Use of deception	Lying or cheating to get something that one should not have had in the first place	5
	Factor 2	Social norm violations that harm community members	Violations of social norm that harm community members	5
	Factor 3	Laziness	Behaviors adopted because of laziness	5
	Factor 4	Failures to do good	Failures to take an opportunity to act in a good way for the community	5
	Factor 5	Violations of the body	Use or modifications of the body in ways that threaten body purity	5
	Factor 6	Disgusting behaviors	Behaviors that are related to animal-like aspect of human nature	5

## g Additional statistics on Experiment 1

Figure 3.7: Earned and declared income in Experiment 1

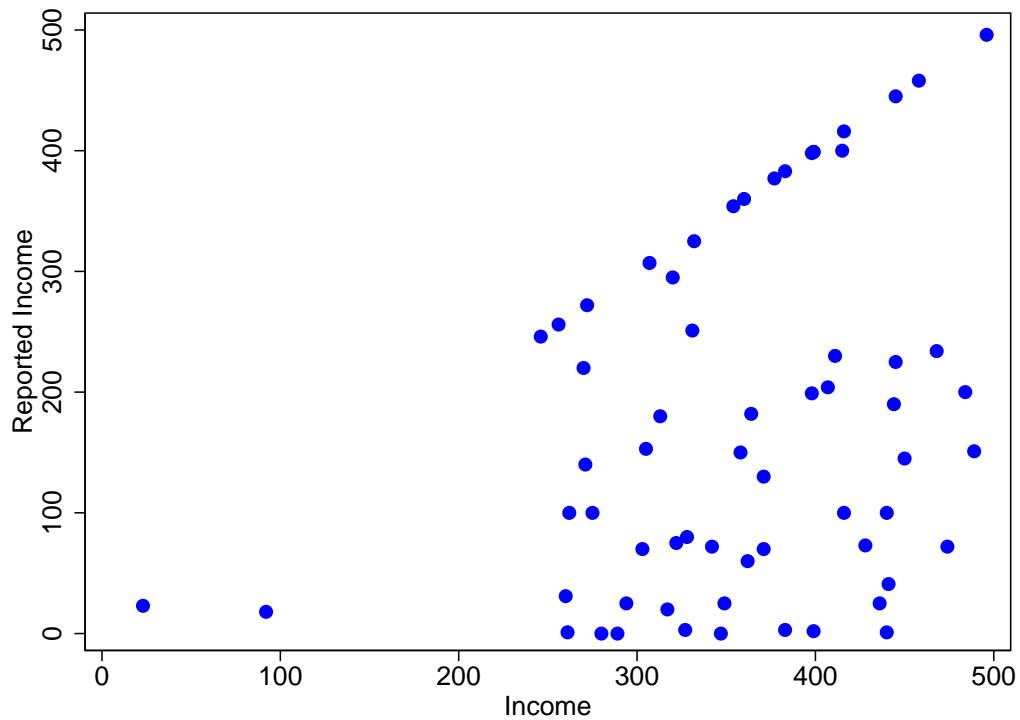


Figure 3.8: Normalized personality scores in Experiment 1

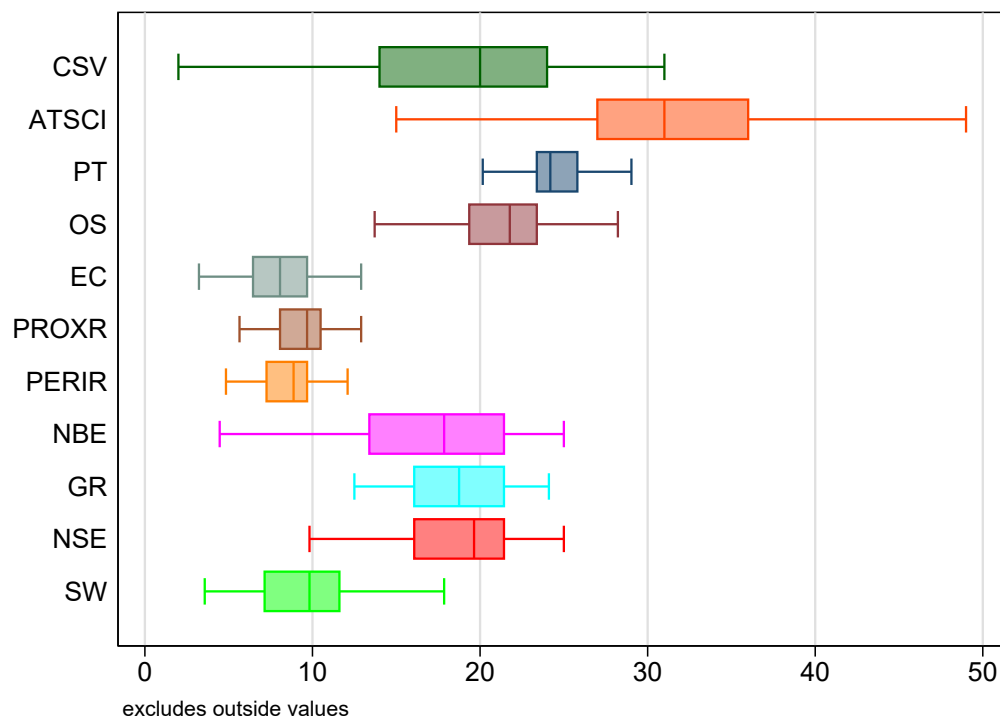




Table 3.5: Principal components from the PCA and their eigenvalues in Experiment 1

Component	Eigenvalue	Difference	Proportion	Cumulative
Component 1	2.9567	1.0530	0.2688	0.2688
Component 2	1.9037	.6522	0.1731	0.4419
Component 3	1.2515	.1983	0.1138	0.5556
Component 4	1.0531	.2054	0.0957	0.6514
Component 5	0.8476	.1008	0.0771	0.7284
Component 6	0.7468	.0679	0.0679	0.7963
Component 7	0.6828	.1275	0.0621	0.8584
Component 8	0.5553	.1593	0.0505	0.9089
Component 9	0.3959	.0350	0.0360	0.9449
Component 10	0.3608	.1150	0.0328	0.9777
Component 11	0.2458	–	0.0223	1.0000

Table 3.6: Unrotated eigenvectors from the four principal components selected (&gt;.30) in Experiment 1

	Component 1	Component 2	Component 3	Component 4	Unexplained
_CSV	–	0.4975	–	–	.3657
_ATSCI	–	0.4448	–	–	.4772
_PT	–	–	0.7556	–	– .2093
_OS	0.3231	–	–	–	.4492
_EC	0.3559	–	–	-0.4672	.3544
_PROXR	0.4651	–	–	-0.3562	.1914
_PERIR	–	–	0.3740	-0.4745	.4180
_NBE	0.3799	-0.3360	–	–	.2792
_GR	–	-0.3722	-0.4172	–	.3805
_NSE	0.4421	–	–	0.3331	.2817
_SW	–	0.4254	–	–	.4284

Table 3.7: Oblique rotation (promax) (&gt;.30) in Experiment 1

	Component 1	Component 2	Component 3	Component 4	Unexplained
_CSV	-	0.5851	-	-	.3657
_ATSCI	-	0.4252	-	-	.4772
_PT	-	-	-	0.7925	.2093
_OS	0.3967	-	-	0.3241	.4492
_EC	-	-	0.5567	-	.3544
_PROXR	-	-	0.5679	-	.1914
_PERIR	-	-	0.5749	-	.4180
_NBE	0.5689	-	-	-	.2792
_GR	0.5236	-	-	-	.3805
_NSE	0.4054	0.3983	-	0.3331	.2817
_SW	-	0.5285	-	-	.4284

Table 3.8: Heckman model on the raw scores of Experiment 1

Variable	Coefficient	(Std. Err.)
Equation 1 : Compliance for WWF		
_CSV	0.008	(0.006)
_ATSCI	-0.003	(0.005)
_PT	-0.005	(0.010)
_OS	-0.014	(0.013)
_EC	0.004	(0.021)
_PROXR	0.038	(0.025)
_PERIR	0.019	(0.017)
_NBE	0.000	(0.009)
_GR	-0.001	(0.013)
_NSE	-0.010	(0.012)
_SW	0.001	(0.015)
Intercept	0.347	(0.495)
Equation 2 : select		
Heckman variable	91078.406	(0.000)
_CSV	75.131	(0.000)
_ATSCI	100.512	(0.000)
_PT	-192.255	(0.000)
_OS	-194.059	(0.000)
_EC	-9.827	(0.000)
_PROXR	-268.514	(0.000)
_PERIR	-603.896	(0.000)
_NBE	-331.812	(0.000)
_GR	-55.643	(0.000)
_NSE	-95.935	(0.000)
_SW	372.790	(0.000)
Intercept	-2800.264	(0.000)
Equation 3 : athrho		
Intercept	-0.093	(0.000)
Equation 4 : lnsigma		
Intercept	-1.444***	(0.107)
N	63	
Log-likelihood	1.092	
$\chi^2_{(11)}$	10.256	

Table 3.9: Heckman model on the components of Experiment 1

Variable	Coefficient	(Std. Err.)
Equation 1 : Compliance for WWF		
Guilt	-0.031	(0.030)
Public Morality	-0.002	(0.029)
Affective Empathy	0.068**	(0.030)
Cognitive Empathy	-0.008	(0.036)
Intercept	0.337***	(0.039)
Equation 2 : select		
Heckman variable	15.098	(198077105.842)
Guilt	-0.101	(1447297.220)
Public Morality	0.272	(3802841.718)
Affective Empathy	-0.444	(2875599.885)
Cognitive Empathy	-0.397	(5777998.757)
Intercept	-8.274	(4211073.970)
Equation 3 : athrho		
Intercept	1.220	(58711340.267)
Equation 4 : Insigma		
Intercept	-1.403***	(0.107)
N		63
Log-likelihood		-713
$\chi^2_{(4)}$		5.982

Table 3.10: Correlation matrix of the variables in Experiment 1

	CAS	CSV	ATSCI	COG. E.	PT	OS	AFF. E.	EC	PROXR	PERIR	GUILT	NBE	GR	SHAME	NSE	SW
CAS	1.0000															
CSV	0.7661	1.0000														
ATSCI	0.8581	0.3275	1.0000													
COG.E.	-0.0550	0.0150	-0.0928	1.0000												
PT	-0.0708	0.0464	-0.1412	0.7998	1.0000											
OS	-0.0108	-0.0273	0.0060	0.7411	0.1898	1.0000										
AFFE	0.1790	0.0810	0.1984	0.2068	0.0312	0.3034	1.0000									
EC	0.2417	0.1751	0.2155	0.0115	-0.1057	0.1371	0.7702	1.0000								
PROXR	0.1006	-0.0103	0.1561	0.2688	0.0250	0.4118	0.8551	0.5803	1.0000							
PERIR	0.0631	0.0154	0.0805	0.2015	0.1587	0.1520	0.6688	0.1662	0.3852	1.0000						
GUILT	-0.1440	-0.1502	-0.0917	0.2423	-0.0072	0.4045	0.3177	0.1749	0.4731	0.0844	1.0000					
NBE	-0.1199	-0.1013	-0.0953	0.3134	0.0756	0.4281	0.3527	0.2325	0.4938	0.0850	0.9079	1.0000				
GR	-0.1223	-0.1666	-0.0467	0.0222	-0.1402	0.1931	0.1246	0.0057	0.2374	0.0475	0.7248	0.3693	1.0000			
SHAME	0.4649	0.3897	0.3722	0.1273	-0.0370	0.2496	0.3782	0.3078	0.3564	0.2028	0.3103	0.3716	0.0772	1.0000		
NSE	0.3569	0.2892	0.2936	0.2074	0.0329	0.3026	0.3958	0.3412	0.3878	0.1773	0.4655	0.4789	0.2448	0.8754	1.0000	
SW	0.4292	0.3724	0.3334	-0.0231	-0.1127	0.0882	0.2140	0.1497	0.1826	0.1594	-0.0047	0.0950	-0.1666	0.7851	0.3878	1.0000

### h Additional statistics on Experiment 2

Figure 3.9: Earned and declared (for WWF) income in Experiment 2

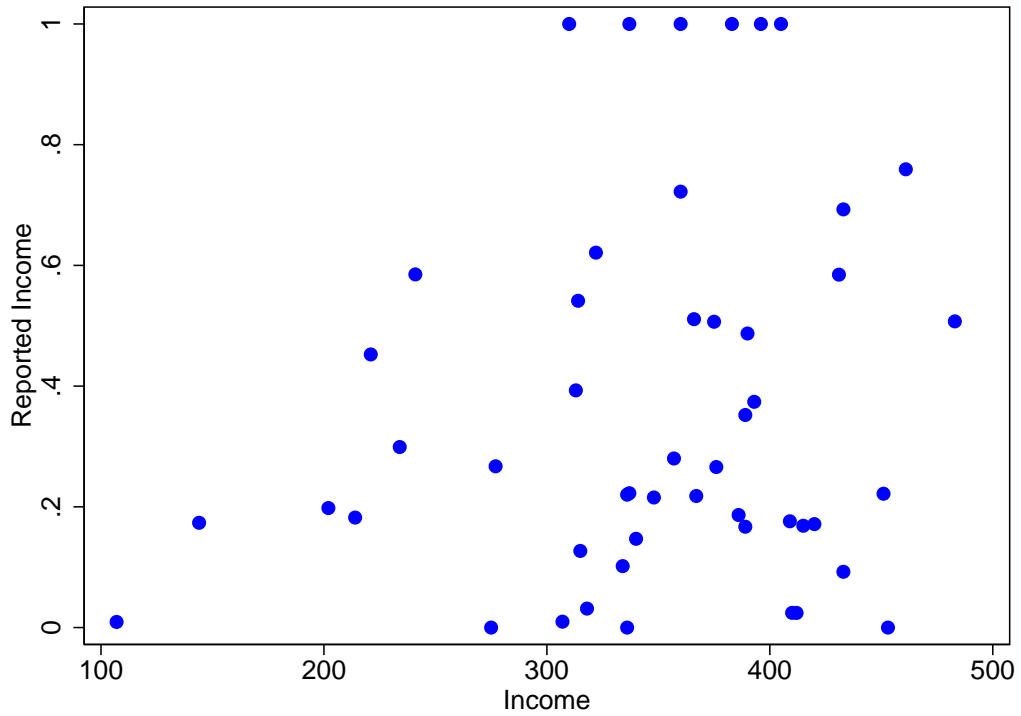


Figure 3.10: Normalized personality scores in Experiment 2

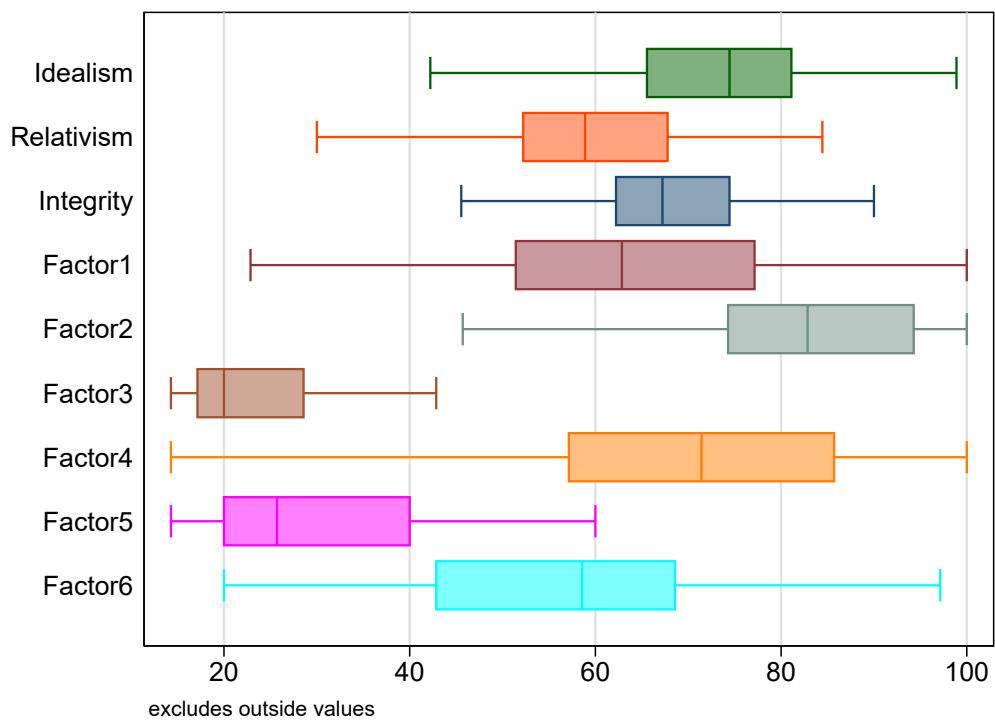


Table 3.11: Principal components from the PCA and their eigenvalues in Experiment 2

Component	Eigenvalue	Difference	Proportion	Cumulative
Component 1	3.2317	1.6890	0.3591	0.3591
Component 2	1.5426	0.1012	0.1714	0.5305
Component 3	1.4414	0.4315	0.1602	0.6907
Component 4	1.0099	0.2904	0.1122	0.8029
Component 5	0.7195	0.3816	0.0799	0.8828
Component 6	0.3378	0.0168	0.0375	0.9204
Component 7	0.3209	0.1097	0.0357	0.9560
Component 8	0.2112	0.0266	0.2350	0.9795
Component 9	0.1845	–	0.0205	1.0000

Table 3.12: Unrotated eigenvectors from the four principal components selected (&gt;.30) in Experiment 2

	Component 1	Component 2	Component 3	Component 4	Unexplained
_Idealism (EPQ)	–	.5593	–	.3475	.1568
_Relativism (EPQ)	–	–	.4610	.7245	.1135
_Integrity	–	.5823	–	–	.1831
_Factor1	.4545	–	–	–	.2821
_Factor2	.3467	–	-.4058	.4579	.1088
_Factor3	–	–	.6052	–	.0992
_Factor4	.4365	–	–	–	.2664
_Factor5	.4397	–	–	–	.1843
_Factor6	.3197	-.4213	–	–	.3799

Table 3.13: Oblique rotation (promax) (&gt;.30) in Experiment 2

	Component 1	Component 2	Component 3	Component 4	Unexplained
_Idealism (EPQ)	-	-	.6907	.3578	.1568
_Relativism (EPQ)	-	-	-	.8889	.1135
_Integrity	-	-	.6419	-	.1831
_Factor1	.3262	-	-	-	.2821
_Factor2	.7343	-	-	-	.1088
_Factor3	-	.7545	-	-	.0992
_Factor4	.4470	-	-	-	.2664
_Factor5	-	.5432	-	-	.1843
_Factor6	.3143	.3467	-	-	.3799

Table 3.14: Correlation matrix of the variables in Experiment 2

	Idealism	Relativism	Integrity	F1	F2	F3	F4	F5	F6
Idealism	1.0000								
Relativism	0.1435	1.0000							
Integrity	0.5995	-0.1776	1.0000						
F1-Deception	0.2980	-0.2061	0.3747	1.0000					
F2-Norm violation	0.1388	-0.0981	-0.0282	0.4877	1.0000				
F3-Laziness	0.0801	0.1460	0.1056	0.2002	-0.0621	1.0000			
F4-Failure	0.2083	-0.2284	0.2483	0.6572	0.5686	0.0885	1.0000		
F5-Body violations	0.1517	-0.0620	0.2501	0.5484	0.2796	0.6287	0.5442	1.0000	
F6-Disgust	0.0004	-0.0625	0.0338	0.2597	0.5043	0.4143	0.2562	0.4361	1.0000



Table 3.15: Multivariate regressions of compliance (for ASPAS) decisions on psychometric scores

Variable	Coef.	(St. e.)
_Idealism	0.003	(0.005)
_Relativism	-0.002	(0.004)
_Integrity	-0.010	(0.008)
_F1-Deception	0.008	(0.011)
_F2-Norm violation	0.002	(0.012)
_F3-Laziness	-0.005	(0.015)
_F4-Failure	-0.001	(0.011)
_F5-Body violations	0.005	(0.012)
_F6-Disgust	-0.007	(0.009)
Intercept	0.827	(0.506)
<hr/>		
N	50	
R <sup>2</sup>	0.09	
F <sub>(9,40)</sub>	.437	

Identifying a model in absence of restrictions of exclusion led to problems of convergence. To overcome this problem, the fifth factor from the MELS, Body violations, was excluded as it was the least correlated with compliance for WWF.

Table 3.16: Heckman model on the raw scores of Experiment 2

Variable	Coefficient	(Std. Err.)
Equation 1 : compliancewwfheckman		
_Idealism	0.005	(0.004)
_Relativism	0.000	(0.004)
_Integrity	-0.008	(0.006)
_F1-Deception	0.007	(0.007)
_F2-Norm violation	-0.008	(0.008)
_F3-Laziness	-0.008	(0.009)
_F4-Failure	0.000	(0.007)
_F5-Body violations (omitted)	.	.
_F6-Disgust	0.001	(0.006)
Intercept	0.587*	(0.354)
Equation 2 : select		
heckmanvar	11.856	(1513.075)
_Idealism	0.000	(77.063)
_Relativism	0.000	(63.303)
_Integrity	0.000	(114.190)
_F1-Deception	0.000	(185.016)
_F2-Norm violation	0.000	(209.550)
_F3-Laziness	0.000	(233.867)
_F4-Failure	0.000	(183.712)
_F5-Body violations (omitted)	.	.
_F6-Disgust	0.000	(177.208)
Intercept	-5.856	(8016.571)
Equation 3 : athrho		
Intercept	0.000	(17848.887)
Equation 4 : lnsigma		
Intercept	-1.611***	(0.110)
N		50
Log-likelihood		7.858
$\chi^2_{(s)}$		3

Table 3.17: Heckman model on the components of Experiment 2

Variable	Coefficient	(Std. Err.)
Equation 1 : Compliance for WWF		
Morality towards Others	-0.004	(0.021)
Morality towards Self	0.010	(0.025)
Idealism	0.002	(0.025)
Relativism	0.006	(0.040)
Intercept	0.299***	(0.032)
Equation 2 : select		
Heckman variable	13.902	(0.000)
Morality towards Others	0.109	(3322.451)
Morality towards Self	-0.073	(6161.961)
Idealism	-0.097	(4163.822)
Relativism	-0.018	(5602.291)
Intercept	-6.283	(5876.996)
Equation 3 : athrho		
Intercept	-4.849	(0.000)
Equation 4 : lnsigma		
Intercept	-1.578***	(0.110)
N	50	
Log-likelihood	6.513	
$\chi^2_{(4)}$	.205	

## i Questionnaires from Experiment 1: CAS, QCAE & GASP

### i.1 Questionnaire 1 – Concern for Appropriateness Scale

1. I tend to show different sides of myself to different people.
2. It is my feeling that if everyone else in a group is behaving in a certain manner, this must be the proper way to behave.
3. I actively avoid wearing clothes that are not in style.
4. In different situations and with different people, I often act like very different persons.
5. At parties I usually try to behave in a manner that makes me fit in.
6. When I am uncertain how to act in a social situation, I look to the behavior of others for cues.
7. Although I know myself, I find that others do not know me.
8. I try to pay attention to the reactions of others to my behavior in order to avoid being out of place.
9. I find that I tend to pick up slang expressions from others and use them as part of my own vocabulary.
10. Different situations can make me behave like very different people.
11. I tend to pay attention to what others are wearing.
12. The slightest look of disapproval in the eyes of a person with whom I am interacting is enough to make me change my approach.
13. Different people tend to have different impressions about the type of person I am.
14. It's important to me to fit in to the group I'm with.
15. My behavior often depends on how I feel others wish me to behave.
16. I am not always the person I appear to be.

17. If I am the least bit uncertain as to how to act in a social situation, I look to the behavior of others for cues.
18. I usually keep up with clothing style changes by watching what others wear.
19. I sometimes have the feeling that people don't know who I really am.
20. When in a social situation, I tend not to follow the crowd, but instead behave in a manner that suits my particular mood at the time.

**i.2 Questionnaire 2 – Questionnaire of Cognitive and Affective Empathy**

1. I sometimes find it difficult to see things from the other guy's point of view.
2. I am usually objective when I watch a film or play, and I don't often get completely caught up in it.
3. I try to look at everybody's side of a disagreement before I make a decision.
4. I sometimes try to understand my friends better by imagining how things look from their perspective.
5. When I am upset at someone, I usually try to put myself in his shoes for a while.
6. Before criticizing somebody, I try to imagine how I would feel if I was in their place.
7. I often get emotionally involved with my friends' problems.
8. I am inclined to get nervous when others around me seem to be nervous.
9. People I am with have a strong influence on my mood.
10. It affects me very much when one of my friends seems upset.
11. I often get deeply involved with the feelings of a character in a film, play, or novel.
12. I get very upset when I see someone cry.
13. I am happy when I am with a cheerful group and sad when the others are glum.
14. It worries me when others are worrying and panicky.
15. I can easily tell if someone else wants to enter a conversation.
16. I can pick up quickly if someone says one thing but means another.
17. It is hard for me to see why some things upset people so much.
18. I find it easy to put myself in somebody else's shoes.
19. I am good at predicting how someone will feel.

20. I am quick to spot when someone in a group is feeling awkward or uncomfortable.
21. Other people tell me I am good at understanding how they are feeling and what they are thinking.
22. I can easily tell if someone else is interested or bored with what I am saying.
23. Friends talk to me about their problems as they say that I am very understanding.
24. I can sense if I am intruding, even if the other person does not tell me.
25. I can easily work out what another person might want to talk about.
26. I can tell if someone is masking their true emotion.
27. I am good at predicting what someone will do.
28. I can usually appreciate the other person's viewpoint, even if I do not agree with it.
29. I usually stay emotionally detached when watching a film.
30. I always try to consider the other fellow's feelings before I do something.
31. Before I do something I try to consider how my friends will react to it.

### i.3 Questionnaire 3 – Guilt and Shame Proneness

1. After realizing you have received too much change at a store, you decide to keep it because the salesclerk doesn't notice. What is the likelihood that you would feel uncomfortable about keeping the money?
2. You are privately informed that you are the only one in your group that did not make the honor society because you skipped too many days of school. What is the likelihood that this would lead you to become more responsible about attending school?
3. You rip an article out of a journal in the library and take it with you. Your teacher discovers what you did and tells the librarian and your entire class. What is the likelihood that this would make you would feel like a bad person?
4. After making a big mistake on an important project at work in which people were depending on you, your boss criticizes you in front of your coworkers. What is the likelihood that you would feign sickness and leave work?
5. You reveal a friend's secret, though your friend never finds out. What is the likelihood that your failure to keep the secret would lead you to exert extra effort to keep secrets in the future?
6. You give a bad presentation at work. Afterwards your boss tells your coworkers it was your fault that your company lost the contract. What is the likelihood that you would feel incompetent?
7. A friend tells you that you boast a great deal. What is the likelihood that you would stop spending time with that friend?
8. Your home is very messy and unexpected guests knock on your door and invite themselves in. What is the likelihood that you would avoid the guests until they leave?
9. You secretly commit a felony. What is the likelihood that you would feel remorse about breaking the law?
10. You successfully exaggerate your damages in a lawsuit. Months later, your lies are discovered and you are charged with perjury. What is the likelihood that you would think



- you are a despicable human being?
11. You strongly defend a point of view in a discussion, and though nobody was aware of it, you realize that you were wrong. What is the likelihood that this would make you think more carefully before you speak?
  12. You take office supplies home for personal use and are caught by your boss. What is the likelihood that this would lead you to quit your job?
  13. You make a mistake at work and find out a coworker is blamed for the error. Later, your coworker confronts you about your mistake. What is the likelihood that you would feel like a coward?
  14. At a coworker's housewarming party, you spill red wine on their new cream-colored carpet. You cover the stain with a chair so that nobody notices your mess. What is the likelihood that you would feel that the way you acted was pathetic?
  15. While discussing a heated subject with friends, you suddenly realize you are shouting though nobody seems to notice. What is the likelihood that you would try to act more considerately toward your friends?
  16. You lie to people but they never find out about it. What is the likelihood that you would feel terrible about the lies you told?

## j Questionnaires from Experiment 2: EPQ, IS & MELS

### j.1 Questionnaire 1 – Ethics Position Questionnaire

1. People should make certain that their actions never intentionally harm another even to a small degree.
2. Risks to another should never be tolerated, irrespective of how small the risks might be.
3. The existence of potential harm to others is always wrong, irrespective of the benefits to be gained.
4. One should never psychologically or physically harm another person.
5. One should not perform an action which might in any way threaten the dignity and welfare of another individual.
6. If an action could harm an innocent other, then it should not be done.
7. Deciding whether or not to perform an act by balancing the positive consequences of the act against the negative consequences of the act is immoral.
8. The dignity and welfare of the people should be the most important concern in any society.
9. It is never necessary to sacrifice the welfare of others.
10. Moral behaviors are actions that closely match ideals of the most “perfect” action.
11. There are no ethical principles that are so important that they should be a part of any code of ethics.
12. What is ethical varies from one situation and society to another.
13. Moral standards should be seen as being individualistic; what one person considers to be moral may be judged to be immoral by another person.
14. Different types of morality cannot be compared as to “rightness”.

15. Questions of what is ethical for everyone can never be resolved since what is moral or immoral is up to the individual.
16. Moral standards are simply personal rules that indicate how a person should behave, and are not being applied in making judgments of others.
17. Ethical considerations in interpersonal relations are so complex that individuals should be allowed to formulate their own individual codes.
18. Rigidly codifying an ethical position that prevents certain types of actions could stand in the way of better human relations and adjustment.
19. No rule concerning lying can be formulated; whether a lie is permissible or not permissible totally depends upon the situation.
20. Whether a lie is judged to be moral or immoral depends upon the circumstances surrounding the action.

## j.2 Questionnaire 2 – Integrity Scale

1. It is foolish to tell the truth when big profits can be made by lying.
2. No matter how much money one makes, life is unsatisfactory without a strong sense of duty and character.
3. Regardless of concerns about principles, in today's world you have to be practical, adapt to opportunities, and do what is most advantageous for you.
4. Being inflexible and refusing to compromise are good if it means standing up for what is right.
5. The reason it is important to tell the truth is because of what others will do to you if you don't, not because of any issue of right and wrong.
6. The true test of character is a willingness to stand by one's principles, no matter what price one has to pay.
7. There are no principles worth dying for.
8. It is important to me to feel that I have not compromised my principles.
9. If one believes something is right, one must stand by it, even if it means losing friends or missing out on profitable opportunities.
10. Compromising one's principles is always wrong, regardless of the circumstances or the amount that can be personally gained.
11. Universal ethical principles exist and should be applied under all circumstances, with no exceptions.
12. Lying is sometimes necessary to accomplish important, worthwhile goals.
13. Integrity is more important than financial gain.
14. It is important to fulfill one's obligations at all times, even when nobody will know if one doesn't.
15. If done for the right reasons, even lying or cheating are ok.

16. Some actions are wrong no matter what the consequences or justification.
17. One's principles should not be compromised regardless of the possible gain. Some transgressions are wrong and cannot be legitimately justified or defended regardless of how much one tries.

### j.3 Questionnaire 3 – Moralization of Everyday Life Scale

1. Noah is at an ATM outside a bank, and the machine dispenses \$60 more than he requested. He keeps the money rather than taking it into the bank and explaining the situation to a bank clerk.
2. John is in a class where the students are asked to grade their own exams as the professor reads off the correct answers. John reports his test score as being much higher than it really was.
3. Elizabeth fakes an injury after an automobile accident in order to collect on insurance.
4. Josh, an older looking 50-year-old, lies about his age in order to get senior discounts.
5. After her movie is over, Makayla sneaks into another film at the movie theater.
6. Ava parks in a "handicapped" zone even though she is not handicapped.
7. Joseph starts smoking a cigarette in a non-smoking section of a restaurant.
8. Kylie goes into a college dorm community bathroom and uses a random toothbrush (belonging to someone else) that is lying around. She puts the toothbrush back and leaves.
9. Charles tells a co-worker that he will help with a big presentation to the company's clients. Charles doesn't do his part of the work, and the presentation consequently goes poorly.
10. Kim has sex with another man while her boyfriend is out of town for the weekend.
11. Julia's clothes are all dirty, but she has just finished a hard day's work, so she doesn't feel like moving. Instead of doing laundry, she watches TV lying around in her dirty clothes.
12. Samuel is going to bed and sets his alarm for 11:00 am rather than 7:00 am, even though he has lots to do the next day.
13. Maya is leaving town for two weeks, and, instead of packing things a few days in advance, she does all of her packing at the very last minute.
14. Alejandro is purchasing a car. Without doing any research on prices, features, and relia-

- bility, he simply goes to the closest dealer he can find and takes the first car that they offer him.
15. Nathan takes the elevator up one floor rather than taking the stairs.
  16. Evelyn, is taking a casual walk around the block on a snowy day, and she notices a driver whose car is stuck in the snow. She keeps walking rather than stopping to see if she can help.
  17. Cody cleans out his closet and finds several pieces of clothing he no longer wears. He can dispose of them or drive five miles to the Salvation army and drop them in their drop-off box. He throws away the clothes.
  18. Blake is walking home and passes a woman he barely knows. The woman is carrying three large bags of groceries with some difficulty. Blake continues walking toward his home without helping the woman.
  19. Alexis, a 16-year-old, does not offer her seat on the bus to a disabled old woman.
  20. Allison almost trips over a huge rock on the sidewalk, but continues walking without moving the rock out of the way for the sake of other pedestrians.
  21. William, a 40-year-old man, has consensual sex with an 18-year-old woman.
  22. Isabella made an abstinence-until-marriage vow when she was 16, but now she's 18 and in college, and she has sex with a boyfriend with whom she's in love.
  23. Jason gets a large tattoo that covers most of his neck and part of his face.
  24. Erica drinks 10 beers at a sorority party. She ends up vomiting several times.
  25. Devin is at a party and is offered the opportunity to smoke marijuana. He smokes it out of curiosity.
  26. Natalie and her brother, 13 and 14 years old, like to kiss each other on the mouth. When nobody is around, she and he find a secret hiding place, and Natalie kisses him passionately.
  27. After having a bowel movement in the bathroom, Grace does not wash her hands before

cooking dinner for herself.

28. Luke wears the same pair of jeans for three weeks without washing them.
29. Marissa is out to dinner with some friends and has some gas pains in her stomach. She decides to release gas, even though she knows it will make an awful smell.
30. Gabriel's work schedule has been allowing him very little sleep. He fails to shower for the fourth day in the row.



# Appendix 4: Chapter 2

## k Experiment 1

Figure 3.11: Histogram of the distribution of compliance across conditions

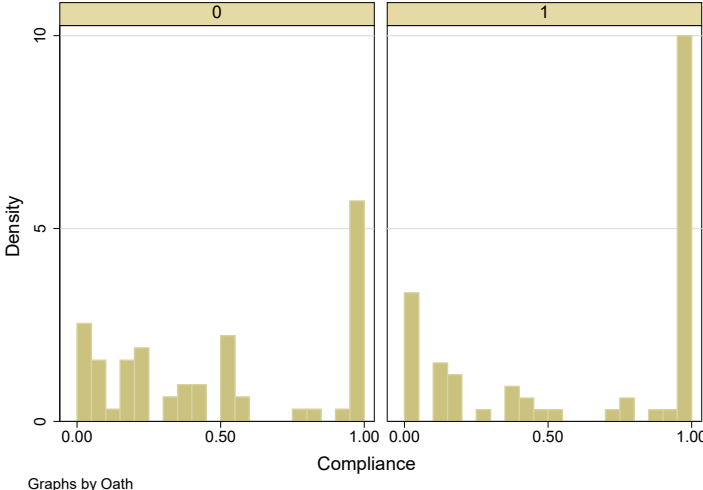


Table 3.18: Interaction effect between Oath and Self honesty

<b>Variable</b>	<b>Coefficient</b>	<b>(Std. Err.)</b>
Oath	-0.185	(0.185)
Self honesty	0.068***	(0.022)
Oath * Self honesty	0.053*	(0.031)
Intercept	0.115	(0.131)

---

N	129
R <sup>2</sup>	0.273
F <sub>(3,125)</sub>	15.676

Table 3.19: Experiment 1: Multivariate regressions of compliance decisions on socio-demographics variables, experimental measures and oath treatment

Variable	Extensive margin		Intensive margin	
	Coef.	(St. E.)	Coef.	(St. E.)
Monthly income	0.000	(0.000)	0.000	(0.000)
Age	0.027	(0.036)	0.011	(0.008)
Men	0.221	(0.309)	-0.133**	(0.065)
French nationality	-0.536	(0.572)	0.011	(0.099)
Not speaking French at home	-0.795**	(0.375)	-0.047	(0.078)
Economic studies	-0.010	(0.356)	-0.051	(0.081)
Believing in God	-0.514	(0.330)	-0.076	(0.068)
Parents' financial help	-0.060	(0.386)	0.101	(0.070)
Self honesty	1.606***	(0.593)	0.012	(0.015)
Happiness	0.058	(0.124)	-0.015	(0.028)
Oath	0.676**	(0.321)	-0.080	(0.065)
Intercept	-11.306***	(4.176)	0.218	(0.272)
(Pseudo) R <sup>2</sup>	0.4240		0.179	
$\chi^2_{(11)}$	72.63		$F_{(11,68)}$	1.352

### k.1 Moral emotions questionnaires' impact on compliance: the oath condition

Our interest here is to observe if varying the context in making honesty salient, through a truth-telling oath, modifies the correlations between compliance and moral emotions questionnaires, and thus changes conclusion from Chapter 1. Looking at the univariate analysis from Table 3.20 where coefficients, confidence intervals, p-values and  $R^2$  are reported, we observe that only AFF. E., its sub-scales PROXR and PERIR, GUILT and its sub-scale GR, and to a lesser extent ATSCI, have a significant positive impact on compliance when considering the full sample. Comparing with the Baseline from Chapter 1, Section 1.3.2.1, GUILT, GR and ATSCI were not significant, while PT, COG. E. and SW were significant. Considering the partial sample shows that AFF. E., PROXR, PERIR, and to a lesser extent, PT and GR, have a significant positive impact on compliance (at the exception of PT, that have a negative impact). In the Baseline, PT and GR were not significant, but EC was. Conclusively, this only confirms the importance of Affective Empathy in complying, as all other variables do not have a reliable effect.

Looking at the multivariate analysis in Table 3.21, once again we distinguish extensive from intensive margin (a Probit and an OLS model), while estimating two specifications: one based on the general scales—except for NSE and SW that are not aggregated—and one based on the specific sub-scales of each scale. Results show that only PERIR explains positively the extensive margin, at 10% and it is not congruent with what have been found in Chapter 1, Section 1.3.2.2. Regarding the intensive margin, AFF. E. is again significant, with its sub-scales PROXR and PERIR. AFF. E. only was found significant in the previous Chapter, on the Baseline. This again, confirms the importance of Affective Empathy.

To conclude, Affective Empathy is probably the most robust result from this study. This result is present in the Baseline and in the Oath conditions. Participants who are more affectively empathetic complied more in a TEG where taxes are redistributed to a real life public good. Table 3.22 shows an OLS regression of compliance on Affective Empathy scale, its sub-scales, the oath variable and the different interaction variables. No interaction variables are significant, meaning that oath did not interact with Affective Empathy scale or its subscales. Overall, the oath did not exacerbate Affective Empathy effect). All the other different moral emotions proved to be non significant, or not robust across conditions. Context manipulation thus proved to be once again quite ineffective.

In comparison, Calvet and Alm (2014) failed to correlate tax compliance with Davis Empathic Concern Scale—another measure of empathy created by Davis (1983). This difference could come from the nature of the DECS: this questionnaire is probably less recent and up-to-date than QCAE, it has only 7 items and evaluate empathy through questions towards people in need only. But it could also come from the redistribution mechanism: in our experiment, we converted tax fund into donations for WWF, while Calvet and Alm (2014) directly redistributed to participants taxes collected. If this second hypothesis is confirmed, this correlation with our Affective Empathy scale, involving tax donations to an organization, emphasizes the importance of the destination and the use of taxes. Adapted to the tax context, it indicates that to enhance compliance, tax authorities should communicate on the situation changes for those who receive assistance publicly funded. This type of action can question the principle of tax non assignment (the idea that in France taxes are not devoted to a specific goal): it would lead to target explicitly the fiscal spending in order to communicate the uses to taxpayers (as suggested in OECD, 2013, p. 8). This practice is already used by different non-governmental organizations to collect donations. It allows donators to directly see the concrete actions that can be implemented thanks to their money.

Table 3.20: Information on univariate correlations between compliance and moral emotions questionnaires in Oath condition

Variable	Full sample						Sample of compliance < 100%					
	Coef.	Conf. Inter.	p	R <sup>2</sup>	<i>r</i>	Coef.	Conf. Inter.	p	R <sup>2</sup>	<i>r</i>		
_CAS	.002	-.006	.010	.627	.003	.060	.000	-.010	.010	.960	.000	-.009
_CSV	-.008	-.023	.005	.217	.023	-.154	-.005	-.020	.009	.477	.016	-.128
_ATSCI	.011	-.001	.023	.076	.048	.219	.003	-.009	.016	.585	.009	.098
_COG. E.	-.005	.020	.009	.475	.008	-.089	-.010	-.028	.007	.257	.041	-.203
_PT	-.014	-.036	.008	.225	.022	-.151	-.020	-.044	.003	.091	.089	-.298
_OS	.001	-.022	.026	.891	.000	.017	.001	-.024	.028	.889	.000	.025
_AFF. E.	.024	.007	.041	.006	.112	.335	.024	.008	.040	.005	.231	.481
_EC	.032	-.006	.071	.101	.041	.203	.022	-.014	.058	.226	.046	.216
_PROXR	.044	.004	.084	.028	.073	.270	.046	.006	.085	.025	.152	.389
_PERIR	.057	.013	.101	.012	.095	.309	.052	.014	.089	.008	.208	.456
_GUILT	.013	.001	.024	.026	.075	.274	.007	-.004	.018	.213	.049	.222
_NBE	.015	-.004	.034	.121	.037	.192	.004	-.013	.023	.599	.009	.094
_GR	.024	.003	.045	.020	.081	.285	.017	-.003	.038	.093	.088	.296
_NSE	.015	-.004	.036	.128	.035	.189	.013	-.007	.034	.207	.050	.225
_SW	.008	-.019	.037	.544	.005	.076	.006	-.023	.036	.671	.005	.076

Table 3.21: Experiment 1: Multivariate regressions of compliance decisions on psychometric scores

Variable	Extensive margin				Intensive margin			
	Scales		Sub-scales		Scales		Sub-scales	
	Coef.	(St. E.)	Coef.	(St. E.)	Coef.	(St. E.)	Coef.	(St. E.)
_CAS	-0.003	(0.010)	-	-	0.000	(0.003)	-	-
_CSV	-	-	-0.016	(0.019)	-	-	0.004	(0.005)
_ATSCI	-	-	0.010	(0.016)	-	-	-0.003	(0.004)
_COG. E.	-0.003	(0.018)	.	.	-0.007	(0.005)	-	-
_PT	-	-	0.018	(0.029)	-	-	-0.010	(0.008)
_OS	-	-	-0.046	(0.036)	-	-	-0.010	(0.009)
_AFF. E.	0.035	(0.025)	-	-	0.022***	(0.006)	-	-
_EC	-	-	-0.013	(0.062)	-	-	-0.004	(0.016)
_PROXR	-	-	0.031	(0.072)	-	-	0.048**	(0.020)
_PERIR	-	-	0.113*	(0.058)	-	-	0.031**	(0.013)
_GUILT	0.019	(0.017)	-	-	0.001	(0.005)	-	-
_NBE	-	-	0.044	(0.028)	-	-	-0.005	(0.007)
_GR	-	-	-0.004	(0.033)	-	-	0.005	(0.009)
_NSE	-0.015	(0.032)	-0.009	(0.033)	-0.006	(0.008)	-0.003	(0.009)
_SW	-0.028	(0.036)	-0.032	(0.037)	0.000	(0.009)	-0.005	(0.010)
Intercept	-1.240	(1.168)	-1.335	(1.231)	0.067	(0.341)	0.143	(0.358)
(Pseudo) R <sup>2</sup>	0.0325		0.0640		0.197		0.245	
$\chi^2_{(6)}$	5.57		$\chi^2_{(11)}$ 10.97		$F_{(6,73)}$	2.979	$F_{(11,68)}$	2.003

Table 3.22: Interaction effect between Oath and Affective Empathy with its different sub-scales

	(1)	(2)	(3)	(4)
	Compliance	Compliance	Compliance	Compliance
Oath	-0.0384 (0.399)	-0.0938 (0.293)	0.0959 (0.322)	0.0810 (0.331)
Aff. E.	0.0186** (0.00894)			
Aff. E. * Oath	0.00579 (0.0122)			
EC		0.00941 (0.0206)		
EC * Oath		0.0230 (0.0278)		
PERIR			0.0532** (0.0208)	
PERIR * Oath			0.00398 (0.0294)	
PROXR				0.0378* (0.0212)
PROXR * Oath				0.00671 (0.0284)
Intercept	-0.115 (0.294)	0.394* (0.217)	-0.0776 (0.227)	0.0526 (0.250)
<i>N</i>	129	129	129	129
adj. <i>R</i> <sup>2</sup>	0.102	0.032	0.108	0.072

Standard errors in parentheses

\*  $p < 0.10$ , \*\*  $p < 0.05$ , \*\*\*  $p < 0.01$

## 1 Experiment 2

### 1.1 Instructions from Experiment 2 (Baseline/Oath repeated)

You are taking part in an experiment in which you might win some money. The amount of money that you will win depends on your decisions. **This experiment is a fiscal simulation.**

#### PROCEDURE OF THE EXPERIMENT

The experiment will take place in three stages. The instructions for each stage will be given to you at the beginning of that stage. The currency used in the experiment is ECU (for *Experimental Currency Unit*). Its value will be described below.

#### HOW WILL YOU MAKE YOUR DECISIONS?

You will make your decisions thanks to the computer in front of you. All the informations that will be useful to make your decisions will appear on the screen. To take your decisions, click on the buttons on the screen once you acknowledge these informations.

#### CALCULATION AND PAYMENT OF YOUR EARNINGS

Your earnings during the experiment is expressed in ECU. These earnings in ECU will be converted into euros at the rate of 25 ECU = 1 euro. You will be paid the sum corresponding to this total individually, in cash, at the end of the experiment.

For scientific reasons which everyone will understand, **it is essential that you do not talk together during the experiment.** Unfortunately, any participant who fails to respect this rule will be asked to leave the room without any possibility of collecting their earnings.

**Thank you for your participation.**



\*\*\*\*\*

## PROCEDURE FOR THE FIRST STAGE

In the first stage, you will earn an income in ECU participating to a series of 5 tasks. **The sum that you will earned corresponds to your annual income.**

Each of the tasks take place as follow: on your screen appear two grids of 3x3 boxes, composed of 9 squares. When you click on Start, on the right hand grid appear digits between 1 and 9 in a random order. The goal is to click on the digits in an increasing order, thanks to the mouse. Thus, you have to click first on the digit 1, then on the digit 2, then on the 3 etc. When you click on 9, the task is finished. When you click on each digits, those have to appear in the left hand grid of the screen to be validated. The chrono starts when you click on Start. The time elapsing while you accomplish the task appears on the bottom of the screen: the faster you get to 9, the higher the sum that you will win.

Indeed, you are given at the beginning of this stage a sum equal to 150 ECU. This amount diminished by 13 ECU at each seconds.

Your earning in ECU at the end of each tasks is equal to

$$150 \text{ ECU} - (\text{your time} * 13).$$

Note that you cannot have a negative earning: **if your score at a task becomes negative**, it will be fixed at 0.

At the end of this stage, we will compute **the total of your ECU earned through the 5 tasks**. The longer you spend to do the five tasks, the lower will your gain be for this stage. At the end of this stage, a message will tell you the sum in ECU that you have earned through the five tasks for this stage. Click on OK once you learned about this information.

It is very important that you understand the rules of the experiment perfectly. If you have any questions, please raise your hand; somebody will come and answer them. Thank you for following these instructions.

\*\*\*\*\*

## PLEASE COMPLETE THE FOLLOWING QUESTIONNAIRE:

1. The first stage has \_\_\_\_\_ tasks.  

YES                      NO
2. In the task, the goal is to click on the squares in the increasing order, from 1 to 9.  

YES                      NO
3. My gain for this stage depends on the time spend for the execution of the tasks: the quicker I am, the higher my gain.  

YES                      NO
4. My gain for this stage correspond to my annual income.  

YES                      NO
5. The earnings in Euros that I will be paid at the end of the experiment depend on my decisions and of my performance during this stage.  

YES                      NO

**If any of these points remain unclear, do not hesitate to ask questions.**

## PROCEDURE FOR THE SECOND STAGE

A few informations are needed to understand this stage properly.

The *World Wide Fund for Nature*, better known as the WWF, is an international non-governmental organization for the protection of nature and the environment, strongly involved in sustainable development. This organization is based in Gland, in Switzerland, and has more than 4.7 million members throughout the world and has an operational network in 96 countries. The aim of this private organization is to protect fauna, habitats, and nature in general, and to this end it collects funds for one-off actions. Its main activities are monitoring the application of international regulations, restoring damaged natural spaces and training.

To finance its environmental actions, the WWF invites individuals to participate in the adoption of endangered species of animals. The funds that are collected in this way allow the WWF to continue its efforts in terms of environmental protection and the conservation of bio-diversity.

This stage has **5 identical periods**. **At each of these periods, we ask you the amount of your income**. Your income corresponds to the sum that you have earned in the first stage. To declare your income, move the slider in the grey zone till the amount of income that you wish to declare appear. Once you made your choice, press OK to validate.

At the end of this stage, **only one period** will be randomly drawn among the 5. Only the declaration randomly drawn counts for this experiment. The amount of income that you declared in this period randomly drawn will be the only amount effectively taxed at 35%. The tax applied to this amount will be given to WWF.

Thus, your gain at the end of this stage corresponds to:

$$\text{Your income} - (\text{the income that you declare} * 0.35)$$

The total sum of money collected thanks to the tax will be given by us to WWF. It will be used to support its actions of environmental protection in participating in a dolphin adoption program. This donation to WWF will be certified by official certificates. For your information, these certificates will be send to you by email, at the latest in 3 weeks from today.

\*\*\*\*\*

## PLEASE COMPLETE THE FOLLOWING QUESTIONNAIRE:

1. The first stage has \_\_\_\_\_ periods.  

YES                      NO
2. One of these periods will be randomly drawn and will determine my earnings at the end of this stage.  

YES                      NO
3. The income that I declare will be taxed at the rate of 35%.  

YES                      NO
4. The sum of income corresponds at the amount of my earnings in ECU from the first stage  

YES                      NO
5. The amount of tax applied to my income will be deducted from my earnings in the experiment.  

YES                      NO
6. The sum of tax collected will be entirely given to WWF to support its actions for environmental protection.  

YES                      NO

**If any of these points remain unclear, do not hesitate to ask questions.**

### PROCEDURE FOR THE THIRD STAGE

In this stage, we will ask you to answer at a certain number of questions. **All these information, along your earnings will remain strictly confidential.**

The first questions will help us to know you better (your age, professional activity, etc.).

In the following questionnaires, we will ask you to check the boxes that best correspond to your situation, among the different propositions.

In the last questionnaire, each question represent a situation likely to be encountered in everyday life, followed by common reactions to these situations. When you read these scenarios, try to put yourself in this situation. Then, indicate the probability that you react the way described.

In order to thank you for the time dedicated to these questionnaires, a fixed amount of 5 euros will be added to your gains at the end of this stage.

## 1.2 Decision interface of Experiment 2

Figure 3.12: Screen-shot of the 5th declaration

**econ play** Bienvenue paris\_1 Se déconnecter

**Vous êtes dans l'étape 2**

Au cours de cette étape, nous vous demandons de déclarer le montant de votre revenu.

Ce revenu correspond à la somme que vous avez gagnée au cours de la première étape.

Le montant du revenu que vous déclarez sera **taxé au taux de 35%**.

Cette tâche sera répétée 5 fois et l'une des 5 déclarations sera tirée au sort pour le paiement des gains.

**Déclaration n° : 5 / 5**

Veillez choisir le montant de votre revenu que vous voulez déclarer en déplaçant le curseur ci-dessous.  
Prenez tout le temps qu'il vous est nécessaire pour répondre à cette question.

ECU(S)

**345 ECUS**

Figure 3.13: Screen-shot of the 5 declarations

**econ play** Bienvenue paris\_1 Se déconnecter

Votre gain de l'étape 1 : 345 ECUS

Taux d'imposition : 35%.

Vos déclarations :

Déclaration n°	Montant déclaré	Votre gain après déclaration	Gain association
1	173 ECUS	284,45 ECUS	60,55 ECUS
2	179 ECUS	282,35 ECUS	62,65 ECUS
3	160 ECUS	289 ECUS	56 ECUS
4	170 ECUS	285,5 ECUS	59,5 ECUS
5	177 ECUS	283,05 ECUS	61,95 ECUS

Veillez procéder au sort la déclaration qui sera pris en compte pour le paiement des gains en cliquant sur le bouton ci-dessus.

Figure 3.14: Screen-shot of the random draw

**econ play** Bienvenue paris\_1 Se déconnecter

Votre gain de l'étape 1 : 345 ECUS

Taux d'imposition : 35%.

Vos déclarations :

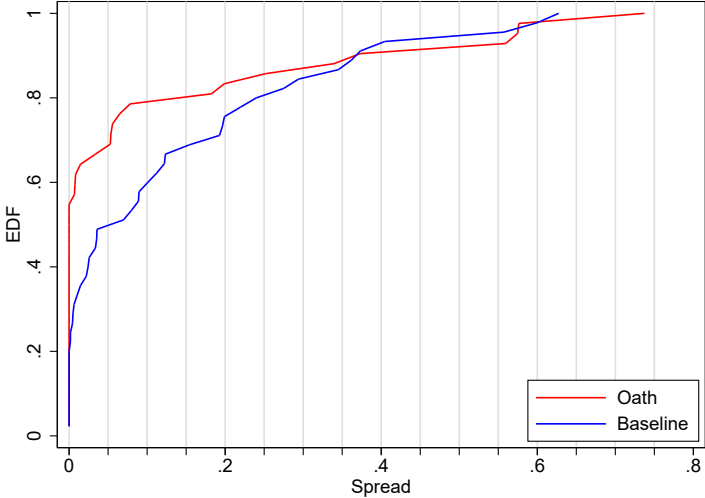
Déclaration n°	Montant déclaré	Votre gain après déclaration	Gain association
1	173 ECUS	284,45 ECUS	60,55 ECUS
2	179 ECUS	282,35 ECUS	62,65 ECUS
3	160 ECUS	289 ECUS	56 ECUS
4	170 ECUS	285,5 ECUS	59,5 ECUS
5	177 ECUS	283,05 ECUS	61,95 ECUS

**Résultat du tirage au sort : Déclaration n° 1.**

Veillez cliquer sur Suite pour continuer.

### 1.3 Additional statistics on Experiment 2

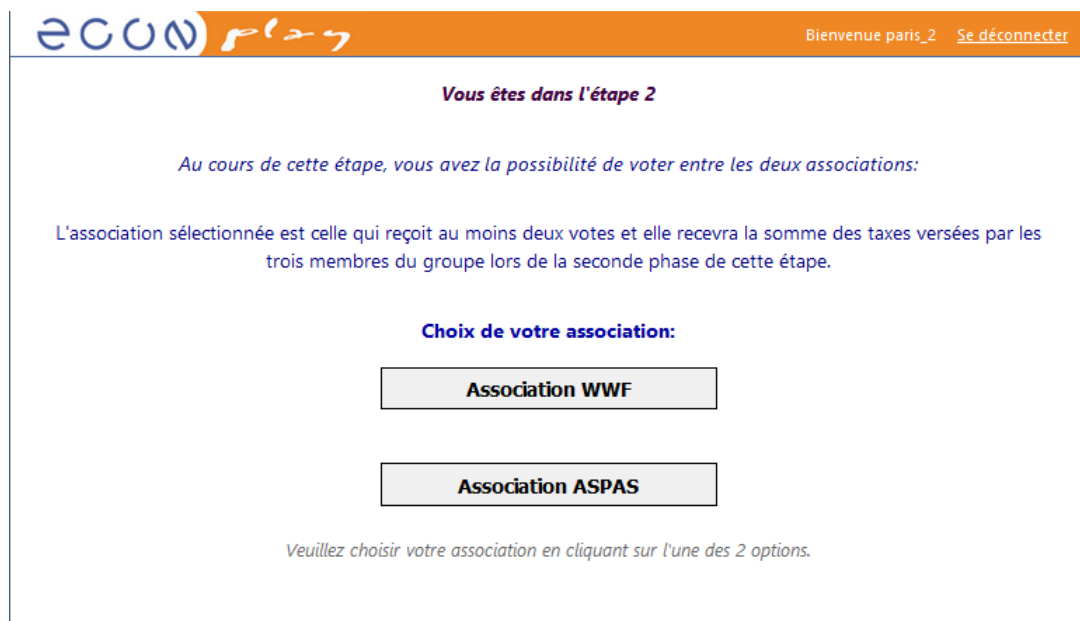
Figure 3.15: Empirical distribution function of the spread across conditions



# Appendix 5: Chapter 3

## m Decision interface of Vote treatment

Figure 3.16: Vote procedure of the selected organization



The screenshot shows a web interface for a voting procedure. At the top left is the logo "econ play" and at the top right is the text "Bienvenue paris\_2" and a link "Se déconnecter". The main content area has a heading "Vous êtes dans l'étape 2" and a sub-heading "Au cours de cette étape, vous avez la possibilité de voter entre les deux associations:". Below this is a paragraph: "L'association sélectionnée est celle qui reçoit au moins deux votes et elle recevra la somme des taxes versées par les trois membres du groupe lors de la seconde phase de cette étape." Underneath is the heading "Choix de votre association:" followed by two buttons: "Association WWF" and "Association ASPAS". At the bottom, there is a note: "Veuillez choisir votre association en cliquant sur l'une des 2 options."



## n Literature review on Voting experiments

Table 3.23: Literature review on Voting experiments

Authors	Type	N	Number of options	Options offered	Repetition of voting	Voting on	Sources mentioned
Bischoff	CPR	5	10 (supposed) and 6	10 level of extraction possible and 6 probability of detection	Yes (7)	The recommended level of extraction and probability of detection	None
Margreiter and Sutter	CPR	6	6	Each participants' proposition	Yes (10)	The proposed vectors of extraction	None
Walker, Gardner, Herr, and Ostrom	CPR	7	7	Each participants' proposition	Yes (10)	The allocation rule to the pool	Social
Vanberg	DG	46	10	From 0 to 10 euros	No	A donation in DG ranging from 0 to 10	Social
Dal Bó, Foster, and Putterman	PD	4	2	Modify or not	No	Whether to modify the payoffs or not	Social
Cinyabuguma, Page, and Putterman	PGG	16	2	Expel or not expel	Yes (15)	The members to expel from the PGG	None
Czap, Czap, and Bonakdarian	PGG	5	2	Two choices	Yes (20)	Two equivalent projects (with different provision point and rates of return)	Social, Commitment
Ehrhart and Feige	PGG	5	5	Each participants' proposition	No	Top down treatment: binding total contribution to the PGG and share of contribution among players. Bottom up treatment: contribution vector	None

Authors	Type	N	Number of options	Options offered	Repetition of voting	Voting on	Sources mentioned
Ehrhart, Feige, and Krämer	PGG	4	4	Each participants' proposition	No	Contribution vector and transfer vector	None
Kroll, Cherry, and Shogren	PGG	5	5	Each participants' proposition	Yes (20)	Minimum to contribute	Social
Rauchdobler, Sausgruber, and Tyran	PGG	3	2	High or low	No	The thresholds that participants must reach to have their share of the refund	Social, Commitment
Tyran and Feld	PGG	3	2	Yes or no	No	A (mild) sanction for free riders	Social, Commitment
Gallier, Kesternich, and Sturm	PGG	3	3	Equal contribution (eqcont) OR equal payoffs (eqpay) OR contribution proportional to endowment (propcont)	No	The proposed rule-based contribution scheme to the public fund	None
Grossman and Baldassarri	PGG	8 to 12	8 to 12	Each participants	No	The individual who will be a monitor	Social, Other
Le Sage and Van der Heijden	PGG	3	2	Yes or no	Yes (10)	Acceptation of the group total contribution, after the contribution has been made	None
Markussen, Putterman, and Tyran	PGG	5	2	No sanction, informal sanction, formal sanction	Yes (6)	The institution to set in place	None

Authors	Type	N	Number of options	Options offered	Repetition of voting	Voting on	Sources mentioned
Messer, Zarghamee, Kaiser, and Schulze	PGG	7	2	VCM or private lottery	Yes (10)	The participation to the VCM or not	Social
Messer, Suter, and Yan	PGG	7	2	VCM or private lottery	Yes (20)	The participation to the VCM or not	None
Putterman, Tyran, and Kamei	PGG	5	2, 20, 20	Public/private, 0 to 20, 0 to 20	Yes (4)	<i>“(a) whether contributing to the public or to the private account is subject to a penalty, (b) what (if any) level of contribution to the account in question is exempt from penalty, and (c) the maximum amount of the penalty”</i>	None
Sutter, Haigner, and Kocher	PGG	4	3	VCM standard, with reward, with punishment	No	Whether they want to supplement a standard VCM with reward/ punishment or the standard VCM	Social
Kamei	PGG (*2)	2	2	Yes or no	No	Imposing a mild sanction in each VCM or not (sanction that did not change the incentive to free ride)	None
Alm, Jackson, and McKee	TEG	15	2	Two organizations	Yes (25)	Recipient of the tax group fund	Social, Commitment
Alm, McClelland, and Schulze	TEG	11	2	High or low	Yes (30)	Tax rate, fine rate, probability of detection	Social
Feld and Tyran	TEG	3	2	Yes or no	No	A mild fine punishing evaders	Social, Commitment, Other

Authors	Type	N	Number of options	Options offered	Repetition of voting	Voting on	Sources mentioned
Wahl, Muehlbacher, and Kirchler	TEG	3	2	Two choices	Yes (3)	Experiment 1: Two equivalent probabilities of return rates. Experiment 2: The use of the taxes (two different scenarios)	Social, Other
Bogliacino, Jiménez, and Grimalda	TG	62	2	Keep all or share equally	No (but switch roles)	The preferred course of action for trustors and trustees	Social

**Note.** Detailed literature review on the articles featuring a vote treatment. From left to right are the authors' names, type of game implemented, the number of voters, options offered, repetition of the vote, description of the stake of the vote and the sources mentioned in the article to explain the vote effect. CPR: Common Pool Resource; DG: Dictator Game; PD: Prisoner's Dilemma; PGG: Public Good Game; TEG: Tax Evasion Game; TG: Trust Game.

o Additional statistics on Experiment

Figure 3.17: Earned and declared income for WWF

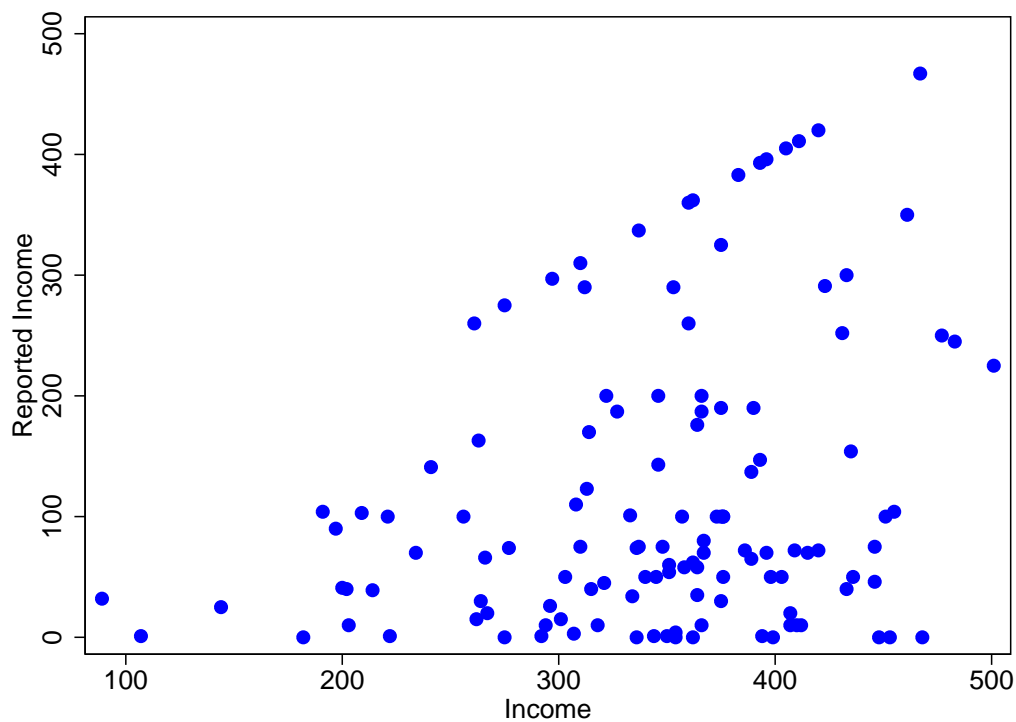


Figure 3.18: Earned and declared income for ASPAS

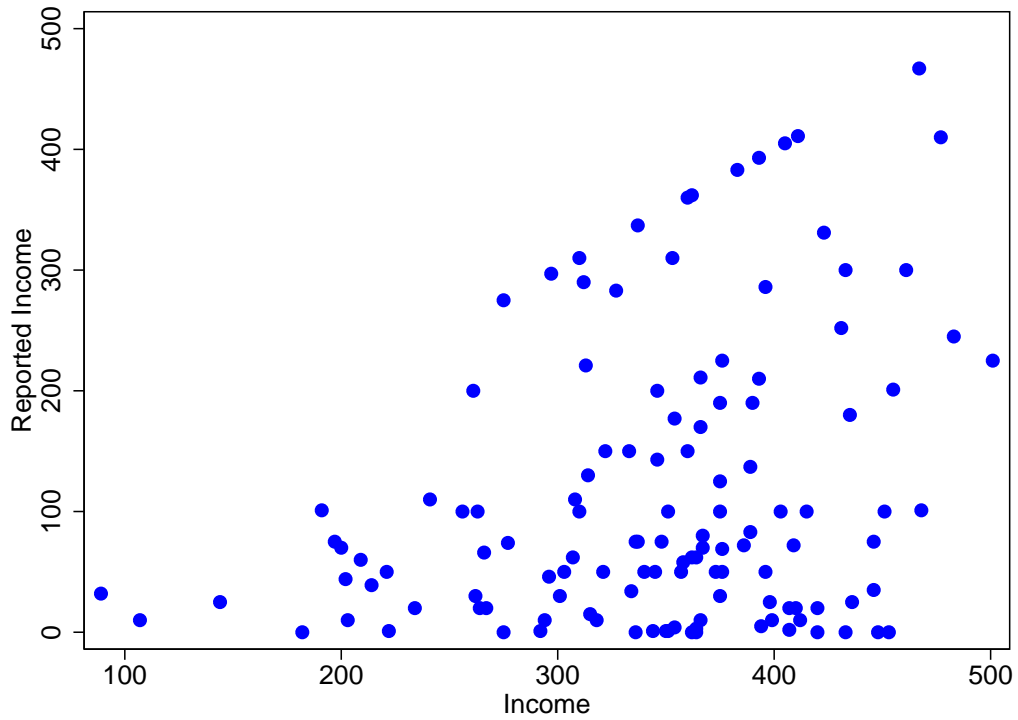


Figure 3.19: Bar charts of the compliance for WWF and ASPAS with respect to the treatment and the selected organization on the truncated sample

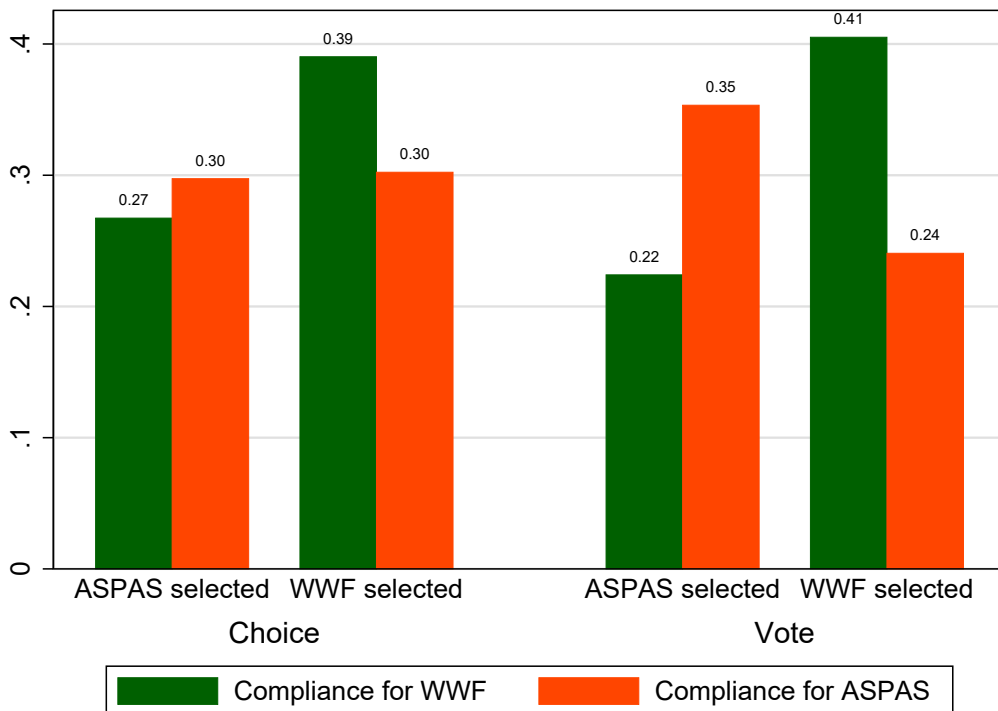


Table 3.24: Multivariate regressions of compliance for WWF when considered the treatments and the selected organization

	(1)	(2)	(3)	(4)
	Vote treatment	Choice treatment	WWF selected	ASPAS selected
Importance	-0.0490 (0.0386)	-0.0556 (0.0394)	-0.0882** (0.0396)	-0.0188 (0.0415)
Legitimacy	-0.0461 (0.0589)	0.0871 (0.0571)	0.0217 (0.0530)	0.00679 (0.0702)
Fairness	0.0368 (0.0578)	-0.0224 (0.0554)	-0.00822 (0.0540)	-0.00576 (0.0676)
Intercept	0.480** (0.211)	0.341* (0.202)	0.573** (0.229)	0.340* (0.190)
<i>N</i>	75	50	70	55
adj. $R^2$	-0.014	0.046	0.032	-0.053

Table 3.25: Multivariate regressions of compliance for ASPAS when considered alone, with the treatments and the selected organization

	(1)	(2)	(3)	(4)	(5)
	Compliance for ASPAS	Vote treatment	Choice treatment	WWF selected	ASPAS selected
Importance	-0.0601** (0.0266)	-0.0715* (0.0372)	-0.0452 (0.0383)	-0.0769** (0.0376)	-0.0508 (0.0415)
Legitimacy	0.0195 (0.0392)	-0.0301 (0.0567)	0.0835 (0.0555)	0.0438 (0.0504)	-0.0204 (0.0701)
Fairness	-0.0197 (0.0384)	-0.00348 (0.0556)	-0.0284 (0.0539)	-0.0418 (0.0513)	0.0187 (0.0675)
Intercept	0.486*** (0.138)	0.610*** (0.203)	0.317 (0.196)	0.513** (0.218)	0.485** (0.190)
<i>N</i>	125	75	50	70	55
adj. $R^2$	0.023	0.015	0.027	0.029	-0.028

# Résumé de la thèse

## **p Essais en Psychologie Economique du Comportement d'Évasion Fiscale**

### **p.1 Introduction**

Le problème de l'évasion fiscale est aussi vieux que l'existence des taxes elles-mêmes. Les anciens Empires, tels que l'Empire Babylonien en Mésopotamie rencontraient déjà de tels problèmes (Wildavsky and Webber, 1986). L'évasion fiscale est le crime de ne pas déclarer son revenu à une autorité (Murphy, 2014). En 2011, l'évasion fiscale totale était estimée à plus de 5,1% du PIB mondial (TJN, 2011). La taille de l'économie informelle est tellement importante dans le monde, qu'un dollar sur six n'est pas taxé. Pour l'Europe, il s'agit d'un euro sur cinq, allant même jusqu'à un euro sur quatre en Grèce ou en Italie. L'évasion fiscale est un énorme problème, car elle prive nos Etats de ressources, dans un contexte rendu d'autant plus compliqué par la Crise de 2007 et ses conséquences. Ce n'est donc pas surprenant de constater que la recherche – et particulièrement la recherche en économie expérimentale – a adressé assez tôt ce problème. Cela fera 40 ans que les résultats du premier jeu d'évasion fiscale, de Friedland, Maital, and Rutenberg (1978), auront été publiés dans le *Journal of Public Economics*. Comme noté par Torgler (2016), le nombre d'expériences fiscales augmente de plus en plus, qu'elles soient de terrain ou en laboratoire. Depuis 1978 et cette première publication, la discipline – connue sous le nom d'économie publique comportementale ou finance publique comportementale – est maintenant une sous discipline bien établie de l'économie expérimentale et a connu de très nombreux changements. Cette thèse vise aussi à les résumer. Il y a deux raisons principales pour lesquelles les chercheurs ont eu recours à la science expérimentale pour analyser l'évasion fiscale. La première est que de très nombreux intérêts étaient en jeu

pour réduire l'évasion fiscale et toute l'attention a été focalisée sur les moyens de réaliser cela. L'administration fiscale a donc financé des projets de recherche visant à lutter contre l'évasion fiscale ou construire des services plus invitants pour les contribuables. La seconde est qu'il y a un besoin de données observables et fiables à propos du comportement d'évasion fiscale, ce type de comportement étant par nature caché. Le mesurer sur le terrain est donc très compliqué (Muehlbacher and Kirchler, 2016). Les jeux d'évasion fiscale se substituent donc aux données de la vie réelle et permettent de mettre en place des expérimentations. Le biais de sélection présent dans les rares données de terrain disponibles rend difficile de se faire une idée précise de ce qu'est l'évasion fiscale globalement (nous n'avons les données provenant uniquement de ceux qui se font contrôler). Les expériences en laboratoire permettent d'isoler avec certitude les inférences causales des traitements que l'on met en place, ce qui n'est pas possible dans la vie réelle, les institutions étant adoptées de manière endogènes (Falk and Heckman, 2009). Par exemple, dans la vie réelle, les taux de contrôle fiscal peuvent être augmentés quand des preuves d'une hausse de la criminalité apparaissent. Enfin, le laboratoire permet de tester différentes institutions et d'observer directement le résultat en termes de soumission fiscale (constitué du revenu déclaré, divisé par le revenu gagné). Sans l'utilisation des expériences fiscales, cela serait beaucoup plus complexe à mettre en place voire impossible. Cette thèse fait donc partie de la discipline de l'économie publique comportementale. Ce résumé en français est organisé de la manière suivante : une analyse économique traditionnelle présente les défis de la compréhension des taux de soumission fiscale présents dans la vie réelle, je propose donc de prendre en compte le contexte et les déterminants individuels pour la compléter. Cette thèse utilise la science expérimentale, à travers un jeu d'évasion fiscale, qui est décrit entièrement. Ce jeu est ensuite utilisé dans trois chapitres qui montrent différents résultats. Enfin, la conclusion termine sur des recommandations de politique publique.

## **p.2 L'analyse économique traditionnelle de l'évasion fiscale**

Depuis les années 60 et la contribution séminale de Gary Becker, l'économie du crime fait partie du portfolio de base qui fait la discipline économique. Avant l'approche comportementale, l'analyse économique traditionnelle de l'évasion fiscale est née et s'est épanouie dans l'économie du crime. Le modèle de Allingham and Sandmo (1972) représente la décision de fraude fiscale, en utilisant la théorie de l'espérance d'utilité. Ce modèle prédit que la proba-



bilité de contrôle fiscal, ainsi que l'importance de l'amende doivent augmenter la soumission fiscale, tandis que le taux de taxe devrait avoir un effet ambigu sur cette dernière. L'addition de Yitzhaki (1974) lève cette ambiguïté et met en exergue que le taux de taxe devrait avoir un impact négatif sur l'évasion fiscale. La thèse, ensuite, fait une grande revue de la littérature de la majorité des jeux d'évasion fiscale pour tester l'impact de ces variables. Elle conclue à des effets qui vont exactement dans le sens proposé par Allingham and Sandmo (1972). Cependant, même si ces variables expliquent bien la soumission fiscale dans le laboratoire, elles peinent à expliquer la soumission fiscale dans la vie réelle. Ces paramètres (taux d'audit, de taxe, de pénalité) ont été démontré tellement bas qu'ils ne pouvaient pas expliquer la soumission fiscale complète observée. La question de recherche a changé depuis les années 90 de « Pourquoi les contribuables évadent ? » à « Pourquoi n'évadent-ils pas plus ? » (Alm, McClelland, and Schulze, 1992).

Le but de cette thèse est de répondre à cette seconde question en ouvrant l'analyse traditionnelle économique de l'évasion fiscale à d'autres thèmes, venant principalement de la psychologie : les traits de personnalité et les déterminants contextuels. Les traits de personnalité ont une importance capitale, qui sont trop souvent oubliés dans les recherches traditionnelles Borghans, Duckworth, Heckman, and Ter Weel (2008). Les déterminants contextuels (effet d'amorçage, effet de cadre, effet d'engagement) ont bénéficié de plus d'attention, mais rarement dans le domaine de l'évasion fiscale. Cela est fait donc dans trois chapitres, qui utilisent chacun un jeu d'évasion fiscale.

### **p.3 Le jeu d'évasion fiscal**

D'après les comportements d'évasion observés dans les différentes expériences en laboratoire existantes (voir, par exemple, Torgler, 2002, pour une revue de littérature complète), différentes dimensions semblent particulièrement importantes pour construire un jeu d'évasion fiscal. L'origine du revenu qui est déclaré dans le cadre du jeu d'évasion fiscale est l'une des dimensions les plus sensibles. Cet effet est largement documenté en économie expérimentale, qui montre une grande variabilité des comportements selon que la dotation initiale résulte de la rémunération d'une tâche préliminaire ou constitue une allocation « tombée du ciel » versée sans contrepartie aux participants de l'expérience. En matière d'évasion fiscale, l'effet de ce choix

sur les comportements d'évasion est empiriquement très ambigu<sup>15</sup>. Compte tenu de cette absence de consensus, l'option qui a été privilégiée est celle paraissant la plus conforme aux comportements d'évasion fiscale à l'extérieur du laboratoire en considérant un revenu formé par la rémunération d'une tâche préliminaire. Cette tâche est choisie de manière à rester aussi neutre que possible sur l'exercice de déclaration qui lui fait suite, tout en générant une hétérogénéité de revenu qui reflète des différences individuelles clairement identifiées. J'utilise une tâche à effort réel inspirée de Alm, Cherry, Jones, and McKee (2012), dans laquelle l'objectif est de trier 9 chiffres par ordre croissant. Les gains sont fonction de la rapidité avec laquelle cette tâche est exécutée à l'intérieur d'une grille dans laquelle les chiffres sont présentés dans un ordre aléatoire. Cette tâche est répétée 5 fois, et la rémunération de chaque participant est proportionnelle à sa rapidité dans l'exécution de l'ensemble des 5 tâches. A l'issue de cet exercice, les participants entrent dans la phase de déclaration. Il leur est demandé de choisir le montant de revenu qu'ils souhaitent déclarer à l'aide d'un curseur dont la valeur maximale correspond au montant de revenu gagné lors de l'étape précédente. Le taux d'imposition est fixe, commun à tous les participants, et cette tâche de déclaration n'est pas répétée. Le choix du taux est un autre paramètre sensible sur lequel la littérature est là encore divergente (Andreoni, Erard, and Feinstein, 1998; Blackwell, 2007), bien que l'essentiel des résultats tende à confirmer une évasion croissante du taux d'imposition<sup>16</sup>. En France, le barème d'imposition 2015 sur les revenus de 2014 comporte cinq tranches associées à des taux d'imposition croissants : 0%, 14%, 30%, 41% et 45%<sup>17</sup>. Afin de s'en tenir à un paramétrage à la fois réaliste et laissant place à une certaine hétérogénéité des décisions d'évasion, j'ai opté pour un taux d'imposition de 35%, annoncé aux participants avant que l'exercice de déclaration ne commence. Ces montants déclarés déterminent le montant taxé, et effectivement prélevé des revenus de l'expérience de chaque participant. Il est important de souligner qu'il n'y a pas de système de contrôle aléatoire sanctionnant l'évasion fiscale. Ce choix paraît naturel s'agissant de l'étude des déterminants de la morale fiscale, qui s'exprime de manière d'autant plus épurée qu'aucun mécanisme institutionnel ne contraint la déclaration. Dans de nombreuses expériences consacrées à cette question, les montants monétaires prélevés des gains de l'expérience bénéficient directement à l'expérimentaliste – au sens où ils ne font que diminuer le coût total de l'expérience. Ce choix

<sup>15</sup>Voir, entre autres, Boylan and Sprinkle, 2001; Kirchler, Muehlbacher, Hoelzl, and Webley, 2009; Boylan, 2010; Bühren and Kundt, 2013, pour des comparaisons expérimentales suivant lesquelles l'un ou l'autre choix conduit, suivant les études, à plus ou moins d'évasion fiscale.

<sup>16</sup>C'est le cas en particulier de l'étude de Friedland, Maital, and Rutenberg (1978) et de Alm, Jackson, and McKee (1992a). Fortin, Lacroix, and Villeval (2007) observent une tendance similaire, pour peu que le taux de taxe reste inférieur à 40%.

<sup>17</sup>Loi de finances n° 2014-1654 du 29 décembre 2014.

conduit à faire intervenir l'attitude des participants vis-à-vis du financement de la recherche en cours dans les comportements de déclaration. Il paraît en outre peu conforme au fonctionnement du système de taxation, destiné à financer l'investissement public. Les travaux qui s'efforcent de prendre en compte cette dimension recourent à deux types d'utilisation des fonds collectés. Certains travaux les allouent à l'abondement d'un fond commun (selon le principe du jeu classique de contribution volontaire à un bien public, Isaac and Walker, 1988) offrant un retour sur investissement direct aux participants (Alm, McClelland, and Schulze, 1992, par exemple). Dans ce cadre, il paraît difficile de savoir si les participants considèrent ce fond commun comme un bien public authentique, ou comme une réduction implicite du taux de taxe effectif global dans l'expérience. Une seconde solution (introduite, par exemple, par Mittone, 2006) consiste à utiliser les fonds pour financer un bien public réel. C'est la solution adoptée dans cette thèse, en transmettant les fonds collectés lors de l'exercice de simulation fiscale au World Wide Fund for Nature (WWF) ou à l'Association pour la Protection des Animaux Sauvages (ASPAS) (uniquement dans le troisième chapitre). A cette fin, les missions de soutien aux actions de protection de l'environnement et des espèces menacées du WWF et de l'ASPAS sont décrites aux participants au début de l'exercice de déclaration. Afin d'assurer la crédibilité des dons réalisés dans l'expérience, les sommes versées au WWF/ASPAS sont attestées par des certificats émis par l'organisme et envoyés directement par nos soins sous forme de courrier électronique à chacun des participants.

#### **p.4 Apports de cette thèse**

Fort d'avoir réglé les problèmes méthodologiques de la construction d'un jeu d'évasion fiscale adapté aux besoins de cette thèse, je décris maintenant le contenu des différents chapitres. Dans le premier chapitre, la psychologie de la personnalité est utilisée pour déterminer les traits de personnalité individuels qui poussent vers plus de soumission fiscale, qui sont connus sous le terme générique de « morale fiscale ». Dans différents modèles, l'accent est mis sur les déterminants individuels qui pourraient endosser ce rôle, principalement liés aux émotions, la moralité et la conformité. Par exemple, Cowell and Gordon (1988) intègrent la conformité dans leur modèle, Gordon (1989), un paramètre d'honnêteté, Erard and Feinstein (1994) et Andreoni, Erard, and Feinstein (1998), des sentiments de honte et de culpabilité, Myles and Naylor (1996), la conformité au groupe et les coutumes sociales, Traxler (2010), les normes so-

ciales et Thomas (2015) parle d'un coût psychique à évader. Partant des hypothèses de ces modèles, différents questionnaires liés aux préférences non monétaires sont étudiés ici. Ils sont liés aux émotions morales (e.g. empathie affective, empathie cognitive, propension à sentir la honte et la culpabilité), aux jugements moraux (e.g. les principes d'éthiques, l'intégrité et la moralisation de la vie de tous les jours) ainsi que la soumission à la norme. Deux expériences de laboratoire sont mises en place pour corrélérer les réponses à ces questionnaires avec la soumission fiscale capturée en laboratoire (N=63 et N=50). L'analyse est mise en œuvre de deux façons : d'abord en utilisant une Analyse en Composante Principale, c'est-à-dire en laissant les données se regrouper en des composantes les plus significatives. Ensuite, en utilisant les scores bruts des questionnaires. Les deux méthodes tendent à conclure à une absence de résultats fiables et significatifs. Cette absence de corrélation forte entre traits de personnalité individuels et soumission fiscale laisse penser que le contexte institutionnel devrait probablement jouer un plus grand rôle pour comprendre le comportement d'évasion fiscale. Les second et troisième chapitres créent un contexte en utilisant la psychologie sociale de l'engagement (Joule and Beauvois, 1998). D'abord, dans le second chapitre, une revue de la littérature résume 25 ans de recherche sur les engagements destinés à influencer les décisions liées à l'honnêteté. Cette revue conclue que le serment à dire la vérité, développé par Jacquemet, Joule, Luchini, and Shogren (2013) respecte toutes les conditions nécessaires afin d'être un engagement effectif. Ce serment à dire la vérité est ensuite appliqué dans un jeu d'évasion fiscale. Dans une condition Contrôle (N=63), les participants jouent le jeu d'évasion typique. Dans une condition Serment (N=66), les participants se voient d'abord offrir de signer volontairement un serment à dire la vérité avant de jouer le jeu d'évasion fiscale. Les résultats montrent que dans l'Expérience 1, la soumission fiscale augmente d'un tiers comparé au Contrôle. Dans l'Expérience 2 (Contrôle N=45 ; Serment N = 42), ce résultat est reproduit et un résultat nouveau est mis en avant : l'effet du serment pourrait être dû à un changement dans les préférences des contribuables, vers des préférences entièrement honnêtes ou malhonnêtes. Un contexte créé ex nihilo dans le laboratoire influence bel et bien la soumission fiscale. Le troisième chapitre veut démontrer le même effet d'engagement dans une institution du monde réel, la démocratie directe. La démocratie directe est l'un des outils le plus efficient pour éviter le phénomène du passager clandestin en économie expérimentale. Quand les participants ont la possibilité de voter à propos de l'un des aspects du dilemme social dans lequel ils vont jouer (par exemple adopter une amende pour les évadés fiscaux dans un jeu de l'évasion fiscale), la soumission fiscale dans le dilemme social est plus élevée. Ce schéma est aussi présent dans la vie réelle (par exemple la

démocratie directe dans les cantons suisses serait l'une des sources de la formidable soumission fiscale des contribuables suisses). Mais d'où vient cet effet de la démocratie directe ? La plupart des sources mises en avant dans la littérature sont soit liées à un effet social entre les votants (voter servirait de norme sociale, de signal etc.) soit un effet d'engagement (les votants se sentiraient comme engagés dans le processus démocratique après avoir voté). Le but de ce chapitre est d'étudier ces causes et de démêler l'influence de chacune. Pour cela, je mets en place un jeu d'évasion fiscale où les participants doivent déclarer leur revenu en faveur de deux associations. Pour déterminer quelle association reçoit effectivement ces fonds fiscaux, deux traitements différents sont mis en œuvre : Vote et Choix (N=75 et N=50). Le traitement Choix est exactement le même que le traitement Vote, sauf que les participants sont seuls, sans interaction sociale. Les résultats montrent que cette expérience ne permet pas de répliquer un effet de la démocratie directe, et que les effets sociaux ne sont pas significatifs. Cependant, il y a un effet d'engagement significatif. Cela permet de conclure, à nouveau, que le contexte permet d'influencer la soumission fiscale.

## **p.5 Conclusion et recommandation**

Pour conclure, cette thèse utilise l'approche expérimentale, et permet de compléter l'analyse traditionnelle économique, afin de capturer la grande image du comportement d'évasion fiscale. Globalement, cette thèse met en avant que le contexte institutionnel est probablement un meilleur levier d'action que les caractéristiques individuelles liées à la morale fiscale. En termes de politiques publiques, cela pourrait se traduire vers un système fiscal qui serait spécifiquement engageant, par exemple en faisant signer une déclaration d'honnêteté au début plutôt qu'à la fin de la déclaration fiscale (e.g., Shu, Mazar, Gino, Ariely, and Bazerman, 2012), ou pré-engageant, en instaurant par exemple un prélèvement à la source pour les revenus salariés (voir Dwenger, Kleven, Rasul, and Rincke, 2016), enfin un système fiscal qui serait simple et non ambigu, l'information devant être simplifiée et immédiatement accessible.

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