

Lab Experiment to Investigate Tax Compliance: Audit Strategies and Messaging

HM Revenue and Customs Research Report 308

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Executive Summary

This report describes an experiment on tax-compliance behaviour on a sample of 92 self-assessed taxpayers. The experiments and a follow-up survey of participants were conducted online between April and July 2013. This research was funded under contract by HM Revenue and Customs (HMRC).

The primary role of HMRC pertains to the collection and administration of the UK taxation system. Central to HMRC's policy tools is the ability to audit taxpayers on their income/revenue declarations and the imposition of fines where applicable. A better understanding on the drivers of taxation compliance decisions given the tools available to HMRC provides useful insight for deterring potential non-compliance by individuals or corporations.

Experiments have become a useful avenue for policy-makers in the area of tax compliance. For example the US Internal Revenue Service has recently commissioned a number of experiments (Alm et al., 2009, Alm et al., 2010) to complement the traditional econometric analysis of tax compliance based on taxpayers' returns.

To this effect, HMRC recently commissioned a series of laboratory experiments with a view to understand the role of auditing strategies, fines as well as social networks (Fonseca & Myles, 2012). The experimental sample included undergraduate students and PAYE taxpayers. The results showed substantial differences in the tax compliance behaviour between students and PAYE taxpayers.

The key difference between the two samples lay in their overall compliance levels. Students were on average less compliant than PAYE taxpayers, but more responsive to financial incentives, particularly to changes in the level of fines levied to noncompliers.

The present study is in response to a call by HMRC to study the following research questions:

- 1. How does targeting taxpayers for audit based on their declaration of income in relation to a peer group (e.g. other people in the same occupation) compare to random audit strategies in terms of taxpayer behaviour and compliance revenue?
- 2. How does a changing audit rate over time influence taxpayer behaviour and compliance revenue?
- 3. How do different levels of audit rate affect taxpayer behaviour?
- 4. How do ineffective audits, where less than 100% of evaded income is detected, influence taxpayer behaviour and compliance revenue?

We began the project by studying a baseline set up, similar to Fonseca and Myles (2012), with random audits. We found very high levels of compliance among the self-assessed population, which led us to focus on research question 3, and study the differences in behaviour between self-assessed taxpayers and the different populations studied in by Fonseca and Myles (2012). We leave the remaining research questions for future study.

As such, this study focuses on the following two questions:

- 1. How do different levels of a random audit rate affect taxpayer behaviour?
- 2. How do self-employed participants differ from PAYE and student participants?

The answers to these questions will enable us to understand the key behavioural differences between the traditional demographic in experimental economics, students, and the key demographic for policy purposes, self-assessed taxpayers.¹

The experiment consisted of 15 periods. In each period, participants in the experiment earned money by performing a simple task. Participants then had to declare their earnings to an experimental tax authority, which audited their returns with a known probability. If audited and caught under-reporting, participants had to pay the full tax on their earnings in that period, plus a fine. Participants were paid based on their accumulated income in the 15 periods. Participants took part in the experiment through the web, from their home or workplace. Participation was anonymous, in that the experimenters did not have access to the participants' identities, which were only known to the company who recruited the participants.

The following box summarises the results from the present experiment.

Main Findings

1. Raising the audit rate did not change compliance of self-assessed participants.

The average compliance levels in the self-assessed sample are significantly higher than those in the student sample reported in Fonseca and Myles (2012).

- 2. Increasing audit rates did increase total revenue, but that result was only significant for the student sample in the first set of experiments.
- 3. Increasing the audit rate led to very small and not statistically significant drops in the tax gap (the difference between the maximum collectable tax revenue and the actual collected revenue) in all samples.
- 4. Post-experiment questionnaire data shows compliant participants are driven by strong norms of honesty. In contrast, non-compliant participants are driven by profit maximisation.
- 5. The two previous results suggest that the deterrence power of random audits is quite limited.
- 6. We do not find any evidence that compliance levels drop immediately after an audit (the bomb-crater effect), neither in compliant participants nor in non-compliant ones. This is in contrast to previous experimental evidence using student participants (see section 3.2.3 for details).

¹ The self-assessed sample refers to a population of self-employed individuals. We refer to them as self-assessed to emphasise their tax status, rather than employment status.

1. Experimental Design

The experimental design involved three distinct parts. Part One investigates our main research question, Part Two elicits the risk preferences and Part Three collects some personality measures and demographic information for each participant.

Parts One and Two involved decisions with monetary or payment consequences. As the experiment progressed participants accumulated a payoff that was expressed in Experimental Currency Units (ECUs). The ECUs were converted to cash payments at the end of the experiment using an exchange rate known to participants in advance. We describe each part in turn. The Appendix to this report has copies of all the materials used in the recruitment of participants as well as the experiment itself.

1.1 Part One: Tax Compliance Experiment

In Part One, we utilised an experimental design similar to Fonseca and Myles (2012), which consisted of four stages.² This permits direct comparison to the results of the previous study involving students and PAYE taxpayer participants and, to some extent, the existing literature on tax compliance.

The four stages of the experiment were as follows:

- 1. Income generation
- 2. Declaration of income for tax purposes
- 3. Auditing
- 4. Payoffs.

A period in the experiment consisted of all four stages. Each participant repeated the experiment 15 times (or 15 periods), with their payoffs being accumulated as they progressed through the periods.

We chose 15 periods as a compromise between maximising the amount of data collected per participant, and the need to keep the duration of the experiment within a reasonable limit. The standard practise in experimental economics is to keep the duration of an experiment under two hours, to prevent subject fatigue.

The individual stages of Part One are described as followed:

Stage 1: Real-effort task

Participants performed a real-effort task for a fixed piece rate. The task required time and effort from the participants and the outcome of the task was dependent on the abilities or 'skills' of the participants.³ The participants' performance in this task generated their income for that period.

The task begins with the participants observing 48 sliders on their screens (Gill and Prowse, 2012). Participants earned 1 Experimental Currency Unit (ECU) for each slider they placed at its halfway point. Participants were allowed 100 seconds to

² The main difference between the current experiment and the equivalent treatments in Fonseca and Myles (2012) is that in the latter, participants were invited to take part in the experiment at a predetermined time, such that multiple participants played separately but simultaneously. In addition, while most of the PAYE sample in Fonseca and Myles (2012) did the experiment online, some did the experiment in the FEELE lab. No consistent differences in behaviour were reported. ³ Note that the real effort task will naturally give rise to different levels of income, which are due to how

³ Note that the real effort task will naturally give rise to different levels of income, which are due to how skilled each participant is at solving this task, which may also depend on whether the participant used a touchpad or a standard mouse. We will be able to exploit these individual differences in our analysis.

solve as many sliders as possible. Their 'income' for the period was the number of ECU earned in that period.⁴

Stage 2: Tax declaration

Participants were informed of their income from Stage 1 and were required to declare their taxable income. This involved typing a number into a simplified tax return.

Stage 3: Auditing

Participants were audited with a fixed probability *P* that was known to participants. Participants were told what the audit probability was at the start of the experiment. If an audit occurred and participants truthfully declared their taxable income, no penalty was levied. Otherwise, subjects paid a fine equal to 100% of unpaid tax.

Stage 4: Final Payoffs and Accumulated Payoffs

Participants' end-of-period payoff was their income after taxes minus any fines or plus any refunds (should they mistakenly over-declare they income). In addition, participants were also present with their accumulated payoff up to that period of the experiment.

The experimental protocol in summarised in Figure 1.

Figure 1: Experimental Procedure



The experimental design is a stylised model of the real world. It provides a simplified representation of the taxpayers tax compliance decisions and HMRC's ability to

⁴ Each ECU had a pre-defined exchange rate with sterling. See section 4 for more details.

monitor and pursue non-compliant taxpayers. Furthermore this simplified set-up facilitates participants' understanding of the task and increases the quality of the data collected.

Most importantly, this approach enables us to focus on the main research question of tax-compliance behaviour given a predetermined audit rate of *P*. As such, there are obvious limits on the extent to which we can generalise the results from the lab to the real world.

Three experimental treatments were conducted, that differed only in their audit rates: Low P (5%), Medium P (20%) and High P (40%). We chose these parameters in order to ensure that there was a sufficiently high likelihood that a subject would be audited at least once in the experiment, so as to make audits credible. Table 1 outlines our treatments.

 Table 1: Experimental Design

Treatments	LOW P	MEDIUM P	HIGH P
AUDIT- RATES (P)	5%	20%	40%
SELF-ASSESSED SAMPLE SIZE	31	31	30

These three treatments address the main research question in our experiment: whether the tax declaration behaviour of self-assessed participants is influenced by the audit rate. If this is indeed true, we should observe consistent differences in the behaviour of participants at the aggregated level across treatments.

1.2 Part Two: Risk Attitude Elicitation

The second part of the experiment involves eliciting the risk preferences for the individual participants. We utilise a widely used instrument by Holt and Laury (2002), where participants choose between ten pairs of lotteries.

In each pair, one lottery has a very high payoff and a very low payoff (e.g. 77 and 2). The other lottery had two intermediate-sized payoffs (e.g. 40 and 32). By systematically varying the probability of obtaining the high payoff, we were able to determine the risk preference for each participant.

1.3 Part Three: Personality Measures and Socio-Demographics

The final part of the experiment consisted of a set of questionnaires aimed at obtaining measures of personality, using a widely accepted model among personality researchers in social psychology. This model argues that a comprehensive description of an individual's personality rests upon five broadly defined factors: Extraversion, Agreeableness, Conscientiousness, Emotional Stability and Openness (John and Srivastava, 1999; McCrae and Costa, 1999).

The role of each of these factors is the follows:

- Extraversion looks at one's preference for social contact;
- Agreeableness embodies the tendency for compassion and cooperation;
- *Conscientiousness* reflects the ability for self-discipline, organization and ability for planning behaviour;
- *Emotional Stability* captures the degree of stability and impulsivity in emotional responses;

• *Openness* captures the degree of intellectual curiosity, creativity, and a taste for novelty.

This 'Big Five' model is an empirically derived construct of how human personality can be categorised in social psychology. In a recent application of the Big Five model to criminal behaviour, Alaheto (2003) found that individuals who had high scores on the extraversion and emotional instability, as well as low scores on agreeableness, were more likely to commit white collar crimes, of which tax evasion is an example. As such we included a questionnaire on the big five, to understand to what extent Alaheto's findings extend to our data set.

We opted for a questionnaire developed by Woods and Hampson (2005), which only encompasses one question per personality factor. This questionnaire provides two descriptions for each personality factor and asks individuals to rate how close is each description to what they believe they are like.

2. Experimental Sample and Implementation

2.1 Participant Recruitment and Payments

The experiment involved 92 participants recruited across the UK, who were volunteer members of a panel run by the market research firm ICM Market Research. ICM screened participant eligibility on the basis of two criteria: Participants had to be full-time UK residents for tax purposes and be self-employed either full- or part-time, which meant they pay their tax through self-assessment. For the remainder of the report, we will denote the sample as 'self-assessed' so as to match their tax profile, rather than their employment status.

The entire experiment was conducted online.⁵ Eligible participants were given a username and password to log on the experimental website and take part in the experiment. The username was also used to pay participants. However, only ICM was able to match a username to the identity of participants, and therefore ICM assigned usernames to participants and handled their payments. ICM did not know what treatment each username was assigned to. There was never any direct communication between the University of Exeter research team and the participants.

Participants were told of this protocol before agreeing to take part in the experiment. As such, participants knew their anonymity was assured vis-à-vis the research team. This diminishes the potential influences of "observer effects" upon the behaviour of the participants. Furthermore, random assignment of participants to treatments (a crucial element in any experimental design) was ensured.

The experiments were conducted between April and July 2013. The average payment was £46.94, which included a show-up fee of £30. Once the experiment ended, a debrief screen informed participants of the objectives of the research, as well as the project's source of funding. Participants were presented the opportunity to remove their experimental data from the project by filling a short form and submitting the form to the University of Exeter FEELE laboratories. We received no such requests a month after completing the data collection.

2.2 Participant Demographic Details

The only demographic details we have on the participants were those which they had self-declared in the Part 3 of the experiment. We have no reason to believe that the participants had responded falsely to the survey questionnaire. The demographic information is summarized below. We compare our sample breakdown to the official HMRC statistics on self-assessed taxpayers (HMRC, 2013) whenever possible. We find some important differences between the breakdown of our participant pool and the distribution of self-assessed taxpayers in the UK.

- **Gender**: 63% male. This is slightly below the share of males reporting selfemployment income in official HMRC statistics (72%)
- Age: The average age was 49 years with the youngest being 38 years old and the oldest being 72 years old. The median age group in HMRC statistics is 45-49.

⁵ As mentioned earlier, the previous experiment with students and PAYE taxpayers was partially conducted in the lab. Also, unlike that experiment, participants could log on at any time within a week of receiving their invitation to complete the experiment. This temporal flexibility also increases the realism of the task.

- Education: The majority of participants were educated up to a Degree level or equivalent (See Figure 2.)
- **Industry**: Our subject pool has a diverse background in terms of industries. The modal industry was the Consultancy and Professional services. (See Figure 3). This is in contrast to HRMC's self-assessed taxpayer breakdown by industry, where the Construction industry accounts for over 30% of the sample.
- **Experience:** The average duration by which the participants had been working in their respective industry was 14 years.

2.3 Experiment Implementation

Our experimental protocol was similar to that of Fonseca and Myles (2012), to facilitate comparison of behaviour against students and PAYE participants. Participants read the instruction set on the computer screen for 10 minutes before the experiment started. Participants proceeded into Part One of the experiment. Each period took approximately 3 minutes: 100 seconds for the slider task, 30 seconds for the income declaration task, and 30 seconds to view the end-of-period information.

Payoffs in the experiment were denominated in a fictitious currency, the Experimental Currency Unit (ECU). This was done in order to keep the same numerical parameters in the experiment as in the previous experiment, while being able to change the financial incentives through the exchange rate between ECU and pound sterling. Each participant took on average 60 minutes to complete the experiment.

2.4 Pilots

As in any experimental study involving participants who were unfamiliar with economic experiments, we were concerned about the clarity of instructions and the complexity of the task. To address these concerns we ran a pilot experiment on student participants, where participants were required to review the instructions and complete a simple questionnaire pertaining to the instructions and proceed through the experimental design.⁶ Three indicators of interest were:

Clarity of Instructions: Students were required to provide their opinion on the clarity of the instructions (1 being extremely unclear and 10 being extremely clear). The average response was 7.27.

Duration of Instructions: Students were required to provide the approximate time (mins) they had took to finish reading the instructions. The average response was 6.77 mins

Complexity of Experiment: Students were required to provide their opinion on the complexity of the experiment (1 being extremely complex and 10 being extremely simple). The average response was 6.41.

Overall the pilot studies suggested that our experimental protocol was appropriately calibrated and minimized the prospects that any data generated were the consequences of participant confusion.

⁶ These participants did not actually play the experiment itself. We therefore will not have any behavioural data from this sample. Any reference to a student sample in the rest of the report refers to data from Fonseca and Myles (2012).

3. Results

3.1 Introduction and Key indicators

The analysis focuses on the behaviour of self-assessed participants in the various treatments. The main unit of analysis throughout this report is the *compliance rate:*

Compliance Rate = Income Declared / Income Earned.

This is the ratio of an individuals' declared income (for taxation purposes) to income earned in a given period. This definition means that the compliance rate has a value between zero and one. This imposes constraints on our method of data analysis when we go beyond analysing average differences between treatments. We elaborate on this issue in the appropriate sub-section.

Just under 3% of our data recorded participants over-declaring their income. Unlike under-declarations, where it is impossible to distinguish between an individual's mistake and evasion, we can treat these observations as clearly errors and as such dropped those observations from the sample. While a frequent outcome is for a subject to make one mistake during the whole experiment, we found that 63% of over-declarations were made by six subjects (6% of the sample).

As such, we are confident that ruling these observations from the sample is simply excluding the small subset of subjects who, despite our best efforts, perhaps did not fully understand the instructions. Nevertheless our results would not qualitatively change if we had capped over-declarations at 100%.

We are not only able to make inferences of the compliance rate across treatments for the self-assessed participants, but are also able to compare these rates to participants in the set of experiments done by Fonseca and Myles (2012), which involved students and PAYE taxpayers.⁷

Any data from the pilot sessions reported in section 2.4 is not included in this analysis. All data concerning the student sample refers to the experimental data done by Fonseca and Myles (2012).

This section is therefore divided in two complementary sub-sections: the first deals with average treatment effects on levels of complianc e across samples (Students, PAYE and Self-Assessed); the second models participants' compliance decision using more sophisticated econometric techniques. We begin by making a number of observations regarding the data analysis.

3.2 Summary Statistics

3.2.1 Average Compliance

We start by reporting the average compliance across the three treatments. We take the average compliance rate for each participant over the course of the 15 periods as an independent observation, which is plotted in Figure 2.

⁷ In Fonseca and Myles (2012), this sample is denoted as 'workers', but given it consisted of individuals who pay taxes through third party reporting, we opted to denote them as PAYE so as to distinguish them from the new self-assessed sample. Note that none of the samples are stratified, and therefore we cannot extrapolate the results of the experiment to the UK taxpayer population.

Main observations:

Self-Assessed taxpayers' average compliance rate is above 90% and is unaffected by the audit rate.⁸

The self-assessed taxpayers display significantly higher average compliance rates than students and marginally higher compliance rates than PAYE taxpayers.⁹

The PAYE and student participants' average compliance rate is also unaffected by changes in the audit rate.¹⁰



Figure 2. Average Compliance Rate by Audit Rates and Sample

3.2.2 Distribution of Compliance Rate

Given the high level of the average compliance rate in the Self-Assessment sample, we were interested to examine the distribution of these compliance rates. We present in Figure 3 the distribution of compliance rates for the three treatments.

Main observations:

The percentage of participants who always fully declared their income is high and does not vary across treatments: Low P: 65% (20 out of 31); Medium P: 68% (21 out of 31); High P 63% (19 out of 30).

If we focus only on the participants who do not fully comply, the average compliance rate does not significantly differ across treatments. Evaders in Low P, Medium P and High P declared on average 79%, 78% and 80% of their income, respectively.¹¹

Full evasion was only observed in 2% of the data.

 $^{^{8}}$ Low P vs. Medium P: p = 0.93; Low P vs. High P: p= 0.96; Medium P vs High P: p=0.96. Mann-Whitney test.

⁹ Students vs. Self-assessed, Medium P: p<0.01; High P: p<0.01. PAYE vs Self-assessed, Medium: p =0.06; High: p=0.11. Mann-Whitney Test.

¹⁰ Self-assessed: Low = Medium: p = 0.54; Medium = High: p = 0.79; Low = High: p = 0.96. Student: Medium = High: p = 0.80. PAYE: Medium = High: p = 0.63.

¹¹ Low vs. Medium: p=0.86; Low vs. High: p = 0.97; Medium vs. High: p = 0.62, all tests using Mann-Whitney test.



Figure 3. Distribution of Compliance Rates in Self-Assessed Sample¹²

¹² We present in Appendix A1 the same distributions for the Student and PAYE sample.

3.2.3 Tax Compliance Behaviour Before and After Audits

We are interested to examine if compliance behaviour does change immediately after an audit. In particular, the literature on tax compliance (Mittone, 2006; Kastlunger et al. 2009) has identified a behavioural regularity called the 'bomb-crater effect' in which compliance rates drop in the experimental period immediately after an audit has occurred. This has important implications for the efficiency of audits since it suggests audits have a counter-productive effect.

There are two non-rival motivations for this phenomenon. The first is a pure income effect: some participants may come to an experiment with an income target. Being caught under-reporting and paying the relevant fine means those participants are further away from their income target and therefore engage in more under-reporting than before the audit.

The second effect is a behavioural regularity called the "Gambler's Fallacy", which occurs when participants do not believe the probability of being audited in a given period is independent of the history of audits. In particular, someone prone to this behavioural fallacy will believe the odds of being audited in a given period are lower if an audit happened in the previous period.

To investigate the potential phenomenon of the bomb-crater effect, we compare the average compliance of participants given there was no audit in the previous period to the case where there was an audit in the previous period. The comparison is shown in Figure 6.¹³



Figure 4. Average Compliance Conditional on Audit Outcome in Previous Period (Self-Assessed Sample)

¹³ We present in Appendix A1 the same distribution for the Student and PAYE sample.

Main observations:

The average compliance rate for Self-Assessed participants is almost identical before and after an audit event, across all treatments.

The evidence suggests that the compliance behaviour for self-assessed participants is consistent across audit regimes.

There is little evidence for the "Bomb Crater" effect among the self-assessed participants, as opposed to the large effect in the student sample.

Figure 5. Average Compliance Conditional on Audit Outcome in Previous Period (Student Sample)







3.2.4 Average Revenue

Having looked at the effects of audit rates and audits on compliance, we now look at the effect of different audit rates on revenue. In principle, given that there is a fine of 100% of unpaid taxes associated with under-reporting of income, increasing audit rates for a given level of evasion should increase revenue since there will be more audits and therefore more revenue from fines. In addition, increasing the number of

audits should create a deterrence effect, which should result in less evasion, thus also increasing revenue, though potentially decreasing revenue from fines.

Figure 7 displays average per capita revenue for each treatment and the three participant pools. In the self-assessed sample case, increasing the audit rate had no significant effect on revenue. In the PAYE sample case, changing the audit rate also had no statistically significant on revenues. However, we see a large and significant effect on revenues in the student sample.¹⁴

Main observation:

There is no significant effect on collected revenues from increasing the audit rate in both PAYE and Self-assessed samples. However, there is a large and significant effect of increasing the audit rate on the student sample.



Figure 7: Average per Capita Revenue

3.2.5 Average Tax Gap

We conclude the analysis of aggregated data by considering the effect of the audit rate on the tax gap, which is defined as the difference between the maximum collectable tax revenue and the actual collected revenue. In practice, the tax gap is unknown, and estimating it is an econometric exercise. In our experiment, we can calculate it exactly. We present in Figure 8 the tax gap as a percentage of nonaudited, under-declared income in the economy.

The tax gap is substantially larger in the student sample than in either PAYE or selfassessed samples. Increasing the audit rate leads to a slight decline in the tax gap in the self-assessed sample. The tax gap is equal to 7% in Low P, 6% in Medium P and 5% in High P. The tax gap in the PAYE also declines with an increase in the audit rate from 11% in Medium P to 7% in High P. Finally, the same pattern is observed in the student sample where the tax gap drops from 32% in Medium P to 22% in High P. However, none of the changes is tax gap are statistically significant.¹⁵

¹⁴ Self-assessed: Low P vs. Medium P: p=0.24; Low P vs. High P: p=0.81; Medium P vs. High P: p=0.40. PAYE: Medium P vs. High P: p=0.50. Students: Medium P vs. High P: p<0.001. Mann-Whitney test.</p>

test. ¹⁵ Self-assessed: Low P vs. Medium P: p=0.74; Low P vs. High P: p=0.59; Medium P vs. High P: p=0.87. PAYE: Medium P vs. High P: p=0.57. Students: Medium P vs. High P: p=0.20. Mann-Whitney test.

Main observation:

Increasing the audit rate leads to a non-significant drop in the tax gap in all samples.



Figure 8: Tax gap

3.3 Econometric Analysis

The summary statistics described in the previous section present an overview of the results at the aggregate level. In this section, we examine the compliance decision of the participants at the individual level. As such we can establish what factors determine our participants' decisions.

Some of these factors are unique to each participant. Examples of these factors are participants' socio-economic characteristics, like gender, age, or behavioural characteristics, such as their risk attitudes or personality characteristics. Other important factors are treatment variations and variables which vary as the experiment develops, like for instance the amount of income a participant has accumulated to date, or how many puzzles the participant can solve.

The dependent variable in our regression analysis is what percentage of income a participant has declared for tax purposes.¹⁶ The results from our regressions are in the Appendix. We shall restrict our discussion to the Self-Assessed participant sample of Table A1.

Main Observation

We find little evidence to suggest that the participants' compliance behaviour was influenced by the audit rates. In others words, participants' compliance behaviour cannot be explained by the treatments to which they were assigned.

¹⁶ The compliance variable is a ratio which has a natural lower bound of zero (complete evasion), and a theoretical upper bound of one (full compliance). Given that our experimental data set takes the form of a strongly balanced panel, and our data is bounded above and below, we estimate our model using a random effects tobit estimator.

Other Observations:

Income: There is little evidence to suggest that compliance rates were influenced by the participants' income at each period of the experiment.

Wealth: The average individual compliance rate was negatively correlated with accumulated individual income. That is, as participants accumulated wealth, they were on average declaring a smaller proportion of their income.

Post-audit behaviour: We find little evidence to suggest that being audited in a given period affects the expected compliance level in the following period, neither for compliant participants, nor for non-compliant ones.¹⁷

Age: Some evidence that compliance rate is positively correlated to age of participants.

Behavioural and socio-economic measures: We find little evidence that *gender*, *risk-preference*, *education or measure of personalities* influenced the compliance rates.

Work Effort: We find no evidence that varying the audit rate had any impact on the amount of effort (i.e. the number of puzzles solved) put in by subjects.

¹⁷ Evidence for compliant participants is the fact that the coefficient on "Honest Audited" is never significant in any regression for self-assessed in Table A1. Evidence for non-compliant participants comes from a Chi-test which failed to reject the equality of the coefficients on "Evade Not Audited_{i,t-1}" and "Evade Audited_{i,t-1} in Low P (p=0.11); Medium P (p=0.26) and High P (p= 0.34).

4. Post-Experiment Survey

The programme of experimental research on tax compliance done in collaboration with the University of Exeter Business School and HMRC encompassed a series of follow-up experiments. However, the high compliance rates in the treatments documented in this report led the experimental team to pause data collection in order to understand the primary drivers behind their tax compliance decisions of this group.

To investigate the three potential explanations, we followed up our experiment with a post experimental survey. Participants were invited via ICM to fill out a 15-minute survey in July 2013 (see Appendix A4 for the full set of questions). It is impossible to correlate any survey responses to a specific individual in the experiment since the respondents in the survey were anonymous to the researchers. Of the 92 participants who completed the experiments, 72 (85%) responded to the survey invitations.

4.1 Participants' Understanding of Experimental Rules and Payoff

We first examine if the participants had understood the experimental design and more specifically, if they recognized the monetary consequences resulting from their compliance decisions.

In the second question of the survey, respondents were presented with a set of statements to which they could reply with the numbers 1 (strongly agree) to 7 (strongly disagree). We present in table A2 the summary statistics from question 2. We start by analysing the questions aimed at participants' understanding of the rules. We pool participant who replied 1-3 under 'Agree or Strongly Agree', and we pool participants who replied 5-7 under 'Disagree or Strongly Disagree'. Replies equal to 4 are categorised as 'Neither Agree Nor Disagree'.





The large majority of respondents (79%) declared they understood they could declare a different amount to that earned. However, a non-trivial minority (21%) declared they did not understand this at the time of doing the experiment.



Figure 10: Distribution of responses to survey question 2f

Again, a large majority of survey respondents declared they understood the financial consequences of misreporting their income, while a small minority either did not understand this or did not express certainty in their knowledge (or lack thereof) about the payoff structure.

Given these observations, complimentary to the other replies observed in the second question, the data suggest that the majority of participants fully understood the experimental rules, design and payoffs. While there may have been some individuals who did not understand the instructions, it is unlikely that our results are compromised by misunderstandings or ignorance.

4.2 Participants perception of Audit Rates

In addition, we questioned respondents on their perceptions of the likelihood of being audited. In question 7, respondents were tasked to reflect on their perceptive likelihood of being audited during the experiment, given the stated audit rate.





The large majority of respondents reported they believed the audit rate was as stated.

In question 8, we were interested in examining whether or not the respondents perceived the likelihood of being audited was independent of their behaviour during the course of the experiment.



Figure 12: Distribution of responses to survey question 8

The large majority of respondents believed the likelihood of being audited was independent of their compliance behaviour. However, a significant proportion of participants did not believe so, although the beliefs are quite fragmented as shown in Figure 12. Some believed the likelihood of being audited increased if they reported a low income or under-declared their income, while others thought the audit likelihood was history-dependent. These may be due to individuals' perceptions of the actual audit strategy taken by HMRC, or due to a lack of trust in the experiment. We cannot distinguish between the two.

In general the majority of respondents did not seem to have subjectively distorted the probability or likelihood of being audited. Hence it is again unlikely that the observed insensitivity of average compliance to changes in the audit rates is due to some subjective notion of audit likelihood.

4.3 Compliance Rates and Social Norms of Compliance

Given the high compliance rates observed, we were keen to investigate if such behaviour was driven by some social 'norms'. In question 3 we presented respondents with the set of following statements and invited them to choose one that best described their behaviour during the experiments.



Figure 13: Distribution of responses to survey question 3

The large majority of respondents stated they always tried to declare their income correctly. About 17 percent of respondents stated that either occasionally or mostly under-declared their income.

Respondents who stated always declaring their income were directed to question 5 where we queried more about their motivations. The remaining participants were directed to question 6. Both questions aimed to find out more about the participants' motivations for their specific behaviour in the experiment. We now break down the analysis of survey responses for each sub-group of participants.

4.3.1. Participants who always tried to accurately reported their income

Participants who stated always trying to accurately report their income were presented with a series of statements to which they could reply with 1 (Strongly agree) to 7 (Strongly disagree). In the following we present the percentage of subjects who had agreed (selected 1-3) with the selected statements, and we illustrate the data with comments made by participants when asked in an open-ended question to explain their approach to the experiment:

(90%): I declared all my income because it is the right thing to do.

"In real life I would be too concerned that I would be caught if I cheated on my tax return. I reflected this attitude in the experiment."

"It would not cross my mind to be intentionally dishonest."

"It's just the way I run my business. It's the easiest way"

(78%): I declared all my income because evasion is unfair on others.

"People moan about the state of the economy, but then do not declare all income. They have no right too, everybody pays we all have a better standard." "I think I am an honest person, so only put down my earnings and I think everyone (individual and business) should pay their tax. If everyone paid the full amount we would all pay less. Too many big companies are riding on the backs of the UK public."

(73%): I declared all my income because that was the rules

"It's just natural for me; even though I knew it wasn't 'real', I still found it very difficult to try to 'beat' the system."

(40%): I didn't see how I could cheat as the computer would know how much I earned in the task

(52%): I was worried about being audited so I declared all my income.

"I prefer to get what I have earned rather than risk being caught cheating and losing more money than I could potentially make."

The responses suggest the majority of compliance decision was driven by the desire to adhere to some social 'norms' or some socially established rules on behaviour towards tax declarations.

4.3.2. Participants who not always tried to accurately reported their income

Participants who stated not always trying to accurately report their income were presented with a series of statements to which they could reply with 1 (Strongly agree) to 7 (Strongly disagree). In the following we present the percentage of subjects who had agreed (selected 1-3) with the selected statements, and we illustrate the data with comments made by participants when asked in an open-ended question to explain their approach to the experiment:

(71%) I took a calculated risk to not declare all my income

"I thought it was the most profitable approach overall. Though I understood that I might incur penalties for understating the income earned, the scope for much greater justified (I think) the risk."

"I guess that it was weighing the probabilities in that after I had earned so much (c half way through) I reasoned that I could afford a few fines based on the income earned so far. Each time thereafter that i was not fined, I under-declared to the point that I was accurate up to halfway and not thereafter. It was a balance of probabilities call."

(78%) I wanted to earn as much from the experiment as possible

"The potential fine was insufficient to counter the advantage of underdeclaring. Underdeclaring gave me a positive long run expectation."

(55%) I started to take more risks as the game wore on

"got away with it the 1st time so I continued to declare less amounts"

"got a reasonable income from being truthful and then decided to see if I could boost it slightly by being dishonest."

"I was a bit slow off the mark. Once I worked out the actual penalties involved and the likely hood of being audited, I took the opinion that it was well worth the risk to under declare."

Some participants had the view that some evasion is not socially harmful: "the odd under declaration does no harm"

5. Conclusion

Recent HMRC estimates (HMRC 2013) put the tax gap in 2010-11 for evasion at £35 billion. This amounts to approximately 7% of total liabilities. It is therefore important to understand the behavioural processes that lead individuals and, by extension, businesses to evade.

Experimental economics has become an important tool to understand taxpayer behaviour. HMRC, in its role as tax collector and administrator of the United Kingdom's tax system has become increasingly committed to research in the behavioural economics of tax evasion. The present report is a part of that commitment.

The primary focus of the experiment recorded in the present report is to understand the role of audit strategies on deterring tax evasion. The experiment employed a random audit rule, and the main treatment variable was the probability of a particular taxpayer being audited. While potentially unrealistic, this type of strategy is a useful benchmark to measure the performance of more realistic, non-random audit strategies in future experimental work.

Increasing audit rates did increase total revenue, but that result was only significant for the student sample. Furthermore, increasing the audit rate led to very small and not statistically significant drops in the tax gap in all samples. Increasing the audit rate had no effect on the proportion of participants who always fully complied, which remained constant around 60% of the total sample. It also had no significant impact on the behaviour of those not fully complying: the proportion of declared income among evaders was also constant and close to 80% across all treatments.

In other words, increasing the audit rate had no significant effect on the number of people attempting to evade, and no significant effect on the amount of evasion among those who did evade.

The main finding of our experiment is that the compliance levels by self-assessed taxpayer participants are extremely high and non-responsive to changes in audit rates. This is in contrast to the evidence from student participants who were less compliant on average. We also found our self-assessed sample was less prone than a student sample who completed the same experiment to the behavioural bias known as the 'bomb-crater effect', which consists of lower levels of compliance in periods following an audit.

We found most participants were fully compliant, never under-declaring their income. In an anonymous post-experimental survey, we found a similar proportion of respondents declared they never under-declared due to a preference for honesty. This is consistent with recent survey evidence of small and medium enterprises (TNS-BMRB, 2012), where evasion was described by interviewees as atypical behaviour and morally wrong. A subset of participants did under-declare, and in the post-experimental survey, the respondents who stated they under-declared, did so out of profit maximisation.

Another interesting finding from our study was the unresponsiveness of participants' compliance behaviour to actual audits. The literature on tax compliance experiments finds average compliance drops in the period following an audit (the 'bomb crater effect'). The literature argues this drop in compliance is due to the erroneous belief that the likelihood of an audit is not independent across periods; instead, it decreases

after an audit, akin to the idea that "lightning cannot strike twice in the same spot", also known in behavioural economics as the "Gambler's Fallacy".

We do not find evidence of this behaviour among the self-assessed sample in our experiment. The effect of an audit on subsequent compliance behaviour is statistically indistinguishable from zero. In other words, participants who are audited are no more likely to evade than participants who were not audited, irrespective of being compliant or non-compliant. Our statistical analysis was confirmed by responses to our post-experimental survey, in which a large proportion of respondents confirmed their understanding that the audit probability did not change as a function of past audit outcomes.

This is in direct contrast to tax compliance experiments ran with student participants (e.g. Mittone, 2006; Kastlunger et al. 2009; Fonseca and Myles 2012), which had found strong evidence of this effect. In this sense, we find additional evidence supporting the finding by Fonseca and Myles (2012) of strong sample effects in taxation experiments.

The post-experimental survey also confirmed that the majority of participants understood the rules of the experiment, and found the experiment a reasonable approximation of their tax paying experience. The post-experimental questionnaire shows the large majority of participants understood the rules of the experiment, but simply did not wish to under-declare.

An important feature of the experiment was the high degree of transparency in the decision whether or not to comply. This is inextricably related to the very design of the experiment: our participants earned income by performing a single task, and therefore only had one field to fill in when declaring their taxable income. In reality, taxpayers earn income from a variety of sources, and they can legally offset their liabilities in a variety of ways.

The complexity of the tax filing procedure in reality may provide wiggle-room to those taxpayers who are able but unwilling to pay their full taxes, in the sense that non-compliance can be masked as error. In other words, it is possible that some individuals, if given an opportunity to justify their non-compliance to the tax authority as error, will be more likely to evade than in situations in that opportunity is absent. This effect is compounded by the fact that errors are punished with lower fines than evasion. In other words, while some participants may gain utility from behaving honesty, others may have a preference for being seen as honest.

Our conjecture is consistent with laboratory evidence on gift giving in Dictator Games.¹⁸ Dana et al. (2007) show that if the Recipient cannot know whether the unfair amount he received was purposefully sent by the Dictator, or the result of a random draw, then Dictators give less than the case where the Recipient knows who was responsible for the amount sent.

In our transparent setup, these individuals may be deterred from evading, despite the fact that the experiment was fully anonymous – the research team did not have access to the identities of the participants.

As such, we can interpret the non-compliant behaviour in the current experiment as a measure of the fraction of the taxpaying population who will not comply, irrespective

¹⁸ The dictator game is a two-player game in which one player (the Dictator) decides the split of an amount of cash. The Recipient is a passive player, who must accept any split.

of the moral or social pressures to comply. There is some interview evidence from Sole Traders that Potential Rule Breakers may be able to exploit this moral wriggle room (Quadrangle, 2010). This is a promising avenue for future research building on the work of the present report.

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Appendix A1: Auxiliary Statistics



Figure A1. Distributions of Compliance Rates in Student Sample



Figure A2. Distribution of Compliance Rates in PAYE Sample



Figure A3. Participant Demographics: By Education

Figure A4. Participant Demographics: By Industry



TREATMENTS	LOW P	MEDIUM P			HIGH P		
Sample	Self-ass	Student	PAYE	Self-ass	Student	РАҮЕ	Self-ass
Dependent Variable	: compliance rate _{i,t}						
Income _{i,t}	0.013	0.017	-0.014	0.038	0.017**	-0.009	0.031
	(0.017)	(0.011)	(0.013)	(0.040)	(0.007)	(0.006)	(0.027)
Accumulated	-0.001	-0.002***	-0.0003	-0.005**	-0.003***	-0.0001	-0.003
Payoff _{i,t-1}	(0.001)	(0.001)	(0.001)	(0.002)	(0.0005)	(0.0005)	(0.002)
Evade Not	-0.633***	-0.635***	-0.433***	0.119	-0.249**	-0.457***	-0.579**
Audited _{i,t-1}	(0.148)	(0.129)	(0.111)	(0.325)	(0.108)	(0.103)	(0.282)
Evade Audited _{i,t-1}	-0.152	-1.150***	-0.510***	-0.414	-0.669***	-0.580***	-0.814***
	(0.318)	(0.195)	(0.127)	(0.475)	(0.118)	(0.103)	(0.291)
Honest Audited _{i,t-1}	2.134	-1.103***	-0.122	0.125	-0.402***	-0.106	-0.112
	(321.695)	(0.199)	(0.154)	(0.316)	(0.119)	(0.101)	(0.207)
Risk _i	0.013	-0.010	0.059	0.120	-0.145	-0.059	0.031
	(0.068)	(0.082)	(0.065)	(0.102)	(0.123)	(0.044)	(0.074)
Malei	-0.045	-1.048**	0.196	0.297	-0.264	-0.030	-0.023
	(0.402)	(0.515)	(0.436)	(0.607)	(0.479)	(0.154)	(0.469)
Agei	0.024	0.162	-0.013	0.057*	-0.320	0.019**	0.022
	(0.020)	(0.197)	(0.015)	(0:030)	(0.314)	(0.009)	(0.016)
Extraversion	0.115	0.240*	0.053	-0.112	-0.031	0.021	-0.126
	(0.091)	(0.145)	(0.099)	(0.130)	(0.107)	(0.041)	(0.093)
Agreeableness _i	0.107	-0.254	0.018	-0.174	0.059	0.110**	0.020
	(0.074)	(0.157)	(0.080)	(0.125)	(0.128)	(0.044)	(0.091)
Emotion Stability _i	0.030	-0.158	-0.260***	0.037	-0.178	0.059	0.038
	(0.108)	(0.110)	(0.088)	(0.128)	(0.132)	(0.041)	(0.095)
Conscientious _i	0.027	-0.118	-0.011	0.301**	-0.052	-0.084**	-0.054
	(0.082)	(0.091)	(0.067)	(0.144)	(0.144)	(0.042)	(0.095)
Opennessi	-0.053	0.052	0.090	-0.137	-0.084	0.013	0.042
	(0.074)	(0.106)	(0.079)	(0.163)	(0.123)	(0.036)	(0.105)
Constant	-0.262	0.306	2.484***	-0.318	9.575	0.737	1.444
	(1.556)	(3.502)	(0.935)	(1.957)	(6.453)	(0.518)	(1.401)
Rho	0.621	0.692	0.608	0.577	0.810	0.347	0.510
N(i; i,t)	31, 408	34, 397	31, 433	31, 419	34, 467	29, 386	30, 411
***, **, *: statistica	Ily significant coef	ficient at 1%	, 5%, 10% l€	evel respectively			
Table A1: Panel	Tobit Regression						

Q2a. I found it easy to remember my income when declaring how many sliders I'd completed. 77 2.73 32% 31% 10% 9% 4% 6% 6% 1% declaring how many sliders I'd completed. 77 (1.93) 32% 31% 10% 9% 4% 6% 6% 2% Q2b. I understood that I could declare an income different to the amount actually earned. 77 2.73 32% 31% 10% 9% 4% 6% 6% 0% Q2c. I understood that my declaration could be audited. 77 2.73 32% 31% 10% 9% 4% 6% 6% 0% Q2c. I understood that fil was to be audited. 77 2.73 32% 31% 10% 9% 4% 6% 6% 0% Q2d. I understood that if I was audited and 'caught' under-declaring my income, I would be fined. 77 2.73 32% 31% 10% 9% 4% 6% 6% 0% Q2d. I understood that if I was audited and 'caught' 77 2.73 32% 31% 10%		z	Mean Score	-	2	ო	4	Ŋ	9	7	Don't Know
Q2b. I understood that I could declare an income different to the amount actually earned. 77 2.73 32% 31% 10% 9% 4% 6% 6% 2% different to the amount actually earned. 77 (1.93) 32% 31% 10% 9% 4% 6% 6% 2% Q2c. I understood that my declaration could be audited. 77 (1.93) 32% 31% 10% 9% 4% 6% 6% 0% Q2d. I understood how likely I was to be audited. 77 (1.93) 32% 31% 10% 9% 4% 6% 6% 0% Q2d. I understood that if I was audited and 'caught' 77 2.73 32% 31% 10% 9% 4% 6% 6% 0% Q2e. I understood that if I was audited and 'caught' 77 2.73 32% 31% 10% 9% 4% 6% 6% 0% Q2f. I understood that I could potentially take more 77 2.73 2.0% 2.0% 2.0% 2.0% 2.0% 2.0%	Q2a. I found it easy to remember my income when declaring how many sliders I'd completed.	17	2.73 (1.93)	32%	31%	10%	%6	4%	%9	%9	1%
Q2c. I understood that my declaration could be audited. 77 2.73 32% 31% 10% 9% 4% 6% 0% audited. 77 (1.93) 32% 31% 10% 9% 4% 6% 6% 0% Q2d. I understood how likely I was to be audited. 77 2.73 32% 31% 10% 9% 4% 6% 6% 0% Q2d. I understood that if I was audited and 'caught' underdeclaring my income, I would be fined. 77 2.73 32% 31% 10% 9% 4% 6% 6% 0% Q2e. I understood that if I was audited and 'caught' underdeclaring my income, I would be fined. 77 2.73 32% 31% 10% 9% 4% 6% 6% 0% Q2f. I understood that I could potentially take more 77 2.73 32% 31% 10% 9% 4% 6% 6% 0%	Q2b. I understood that I could declare an income different to the amount actually earned.	77	2.73 (1.93)	32%	31%	10%	%6	4%	%9	%9	2%
Q2d. I understood how likely I was to be audited. 77 2.73 32% 31% 10% 9% 4% 6% 0% Q2e. I understood that if I was audited and 'caught' under-declaring my income, I would be fined. 77 2.73 32% 31% 10% 9% 4% 6% 6% 0% Q2f. I understood that I could potentially take more 77 2.73 32% 31% 10% 9% 4% 6% 6% 0%	Q2c. I understood that my declaration could be audited.	77	2.73 (1.93)	32%	31%	10%	%6	4%	%9	%9	%0
Q2e. I understood that if I was audited and 'caught' 2.73 under-declaring my income, I would be fined. 77 2.73 Q2f. I understood that I could potentially take more 77 2.73 2.73 2.73 2.70 0%	Q2d. I understood how likely I was to be audited.	17	2.73 (1.93)	32%	31%	10%	%6	4%	%9	%9	%0
Q2f. I understood that I could potentially take more 2.73 2.73 3.0% 3.1% 1.0% 0.0% 4.0% 6.0% 6.0% 3.0%	Q2e. I understood that if I was audited and 'caught' under-declaring my income, I would be fined.	17	2.73 (1.93)	32%	31%	10%	%6	4%	%9	%9	%0
money home by under-declaring my income. (1.93) 32.70 31.70 10.70 370 470 070 070 2.70	Q2f. I understood that I could potentially take more money home by under-declaring my income.	77	2.73 (1.93)	32%	31%	10%	%6	4%	%9	%9	2%

	Mean	٢	2	3	4	5	9	7	Don't
	Score								Know
Q5a. I declared all my income because it is the right thing to do	1.87 (1.85)	73%	15%	2%	%0	2%	5%	5%	1%
	(222)								
Q5b. I declared all my income because evasion is unfair on others	2.44 (1 81)	46%	15%	2%	%0	2%	5%	5%	1%
	(10.1)								
Q5c. I declared all mv income because that was the rules.	2.48	52%	15%	2%	%0	2%	5%	5%	1%
	(2.03)								
Q5d. I didn't even think of not declaring all my income.	2.32	51%	15%	2%	%0	2%	5%	5%	1%
	(1.79)								
Q5e. I didn't put a lot of thought into the amount I declared,	2.56	52%	15%	2%	%0	2%	5%	5%	1%
I just put what I'd earned.	(2.11)								
Q5f. Not declaring all my income on the experiment would	2.68	46%	15%	2%	%0	2%	5%	5%	1%
make me feel guilty.	(1.87)								
Q5g. I was worried about being audited so I declared all my	3.67	31%	15%	2%	%0	2%	5%	5%	1%
income.	(2.39)								
Q5h. I was worried about being fined so I declared all my	3.65	35%	15%	2%	%0	2%	5%	5%	1%
income.	(2.46)								
Q5i. I treated the experiment like a on-line questionnaire	1.92	%02	15%	2%	%0	2%	5%	5%	1%
and wanted to provide honest answers.	(1.74)								
Q5j. I didn't see how I could cheat as the computer would	3.86	27%	15%	2%	%0	2%	5%	5%	1%
know how much I earned from the task.	(2.26)								
Table A3: Summary statistics on responses on motivations for be	ehaviour i	n experir	nent						

Appendix A2: Recruitment and Experimental Materials

A2-1 Recruitment Script

Dear panellist,

ICM Research is currently recruiting people to take part in a research study which will be conducted by the University of Exeter. The project is a different method of market research to that which you are used to and involves taking part in an online exercise about financial and economic decision-making.

You would be required to take part in an online activity between <<DATE>> and <<DATE>> which will take no more than 60 minutes to complete. You will be required to log in to a website in order to take part in the session. You can access the online activity from wherever is easiest for you, and at any time on the specified time frame. However, once you start, you must complete the exercise in one sitting. If you agree to participate ICM will send you a website address, username and password to access the research activity which is being hosted by the University of Exeter.

If you agree to take part, you will receive a cheque for £30 following completion of the online activity to say thank you for your time. There's also the possibility of earning more throughout the activity itself. The online activity will consist of interactive decision-making. You will be faced with a particular scenario, and you will be asked to make a series of decisions.

Each decision has a direct bearing on the payment you will receive for participating. As such, depending on what you decide during the 60 minutes, **your earnings could rise up to £60 from your guaranteed £30.** You will be told what the decisions will be before the activity starts.

ICM would like to assure you that all the **information we collect will be kept in the strictest confidence**. The University of Exeter will not be given your name or address and your decisions you make during the activity will be strictly anonymous. It will not be possible to identify any particular individual or address in the results.

We hope that you will agree to take part.

Kind regards,

ICM Research University of Exeter

(SINGLE CODE)

- Yes, I would like to take part in the research.
- No, I would not like to take part in the research

PROFILE QUESTIONS

Thank you for agreeing to take part. We just need to check a few details with you first.

- Gender
- Age
- Government Office Region

Q. Are you eligible to pay Income tax in the UK? SINGLE CODE

- Yes*
- No
- Don't know

Q. Which of the following best describes your work status? SINGLE CODE

- Employee full-time (30> hours per week)
- Employee part-time (<30 hours per week)
- Self-employed, full or part-time*
- On a government supported training scheme (e.g. Modern Apprenticeship/ Training for Work)
- Full-time education at school, college or university
- Unemployed and available for work
- Permanently sick/disabled
- Wholly retired from work
- Looking after the home
- Doing something else

Note: Participants who answered options marked with an * were subsequently invited to participate in the experiment.

A2-2 Debrief Document

Dear Participant,

Thank you for participating in the Feele study. We would also like to briefly explain the purpose of this study to you.

This study was designed to understand some of the factors that effect taxpayers' decisions on paying tax. This was accomplished by asking participants to perform the slider task, which determined your pre-tax 'earnings'. We then measured tax compliance by calculating the fraction of your pre-tax 'earnings' you declared.

The purpose of this study was to see what effect changing audit rates has on tax compliance. To do this we varied the rules of the experiment from session to session: some had consistent audit rates in others the rates changes, in some sessions audits were random in others they depended on what 'earnings' were declared. By doing this, we hope to gain a better understanding of taxpayer behaviour.

This research is funded by HMRC, the government department responsible for collecting and administering taxes in the UK. We did not state this when we invited you to participate because we did not want to bias your expectations about the study before you participated. HMRC often commissions independent organisations like Exeter University to undertake studies like this one. This study is part of a broader programme of research that HMRC undertakes to better understand the needs of its customers, its operational performance and how to make improvements to its service.

We would like to reassure you that your data is fully anonymous, which means it is impossible to link your responses in the experiment with your identity. Researchers at the University of Exeter follow strict ethics standards, which include protecting the privacy of our participants. As you know, you were recruited by ICM research, who referred you on to a website designed by Exeter University. The study has been designed in such a way that Exeter University or HMRC cannot know who has taken part, and ICM research cannot know how a particular participant behaved during the study.

HMRC does not have access to any of your personal data associated with this study; they will only be given the anonymous data from the experiment, which will not have any names or other identifying information. It is not possible for HMRC to know who has taken part in the study at all.

We will publish the results from the study in reports and scientific journal articles. The results in these reports will be presented in aggregated form – for example the average compliance rate across all participants in our study. We will never report the results of individual participants. You can see the results from other research commissioned by HMRC on their website: http://www.hmrc.gov.uk/research/reports.htm

If you nevertheless wish to opt out from this study, we will delete your data from the project. Opting out will not affect your payment from the experiment. To opt out from the study, please print and sign your name below and post this document to the following address: FEELE Lab, University of Exeter, Streatham Court Room 0.37, Rennes Drive, Exeter EX4 4PU.

FULL NAME: ADDRESS: SIGNATURE:

Appendix A3: Instruction Sets

Note: to economise on space, we will present only one version of the instruction sets. The instructions were identical across treatments, except for the description of the audit rate. We present the three versions of the sentence describing the audit rate, which we emphasise from the rest of the document by underlining them. We remind the reader that participants only saw one version.

Instruction Set

Welcome to our experiment. You will have **10 minutes** to read these instructions; please read them carefully because you will **NOT** be able to refer back to them once the 10 minutes are up. Your cash earnings in this experiment will depend on the decisions you take. It is therefore important that you understand the rules of the experiment.

This experiment will be divided into 2 parts: Part A and Part B. We will now explain how Part A will work. Once Part A is over, we will show instructions for Part B.

In this experiment, your earnings will be denoted in Experimental Currency Units (ECU). **15 ECU are worth £1**. After the experiment is over, we will convert the total of your earnings for the whole session into pounds and pay you through a bank transfer. In addition to your earnings during the session, you will receive £30 for participating.

Please click Next to see the next page of instructions.

PART A

This part of the experiment is divided into **15 rounds**. In each round, you will have the opportunity to earn ECU by solving as many sliders as possible within **100** seconds.

You will be presented with a screen with 48 sliders, and your task in each experimental round is simply to solve as many sliders as you can within the time limit.

Each slider is initially positioned at 0 (the far left of the line) and can be moved as far as 100 (the far right of the line). Each slider has a number on the top, which tells you its current position. You use the mouse to move the slider. You do this by dragging the slider along the line. You can change the position of each slider as many times as you wish.

You solve each slider by placing it at 50. You will earn 1 ECU for each slider you solve.

Please click Next to see a screen shot of the slider task.

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After 100 seconds, the task ends and the computer will inform you of the total number of sliders you had successfully solved as well as your total earnings from the task. This is your income from your task.

Your income is taxable and you will be required to fill in a tax return. **The tax rate on your income is 25%.** This means that for every 10 ECU you earn, you must pay 2.5 ECU in tax.

To fill in the tax return, you have simply to declare your earnings. Given the amount of earnings that you declare, the computer will automatically compute the total amount of tax you will be required to pay.

Please click Next to see a picture of the tax return you must fill in.

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Once you complete your tax form, the tax authority may choose to audit it.

There is a 1 in 20 chance (or 5% probability) your tax form will be audited. There is a 1 in 5 chance (or 20% probability) your tax form will be audited. There is a 2 in 5 chance (or 40% probability) your tax form will be audited.

If you are NOT selected for tax audit:

• Your final earnings for the experimental round will be equal to the amount of earnings you had made from the task minus the tax you had paid on the earnings you reported on your tax form.

If you ARE selected for tax audit:

- If you are audited and if you reported your income accurately, then nothing further will happen; your final earnings for the round will be the same as if you had not been audited.
- If you are audited and if you reported less income than you actually earned, then you will be required to pay the extra amount of tax due to the authority. In addition you will pay a fine of 1 ECU for each ECU of underpaid tax.
- If you are audited and if you reported more income than you actually earned, then you will receive a refund of the tax you over-paid.

Now let's go through a few hypothetical examples.

Example 1	
Your Details	ECU
Your Income:	10.00 ECU
Your Declared Income:	10.00 ECU
(-) Tax Paid on Declared Income:	2.50 ECU
Selected by Tax Authorities for Audit?	Yes
(-) Additional Tax Payable (if any)	0 ECU
(-) Fine (if any)	0 ECU
(+) Tax refunded (if any)	0 ECU
END OF ROUND INCOME	7.50 ECU
Example 2	
Your Details	ECU
Your Income:	20.00 ECU
Your Declared Income:	16.00 ECU
(-) Tax Paid on Declared Income:	4.00 ECU
Selected by Tax Authorities for Audit?	Yes
(-) Additional Tax Payable (if any)	1.00 ECU
(-) Fine (if any)	1.00 ECU
(+) Tax refunded (if any)	0 ECU
END OF ROUND INCOME	14.00 ECU
Example 3	
Your Details	ECU
Your Income:	16.00 ECU
Your Declared Income:	10.00 ECU
(-) Your tax liabilities:	2.50 ECU
Selected by Tax Authorities for Audit?	No
(-) Additional Tax Payable (if any)	0.00 ECU
(-) Fine (if any)	0.00 ECU
(+) Tax refunded (if any)	0 ECU
END OF ROUND INCOME	13.50 ECU

After the audit is completed, you will be presented with a screen that summarises the following:

- How much income you earned by solving sliders
- The amount of income you reported to the tax authority
- Whether you were audited or not by the tax authority
- Your final income for the round.

You will have an OK button on the bottom right-hand corner of the screen. Clicking that button takes you to the following round.

Summary

In short, each round in this part of the experiment will consist of three stages:

STAGE 1: You earn income by solving sliders.

STAGE 2: You declare your income to the tax authority.

STAGE 3: You get your final earnings, which depend on how your report your income and whether you were audited or not.

This completes the description of Part A. The experiment will start automatically after 10 minutes, when the 'Remaining time [sec]' hits zero.

Appendix A4: Post-Experimental Survey Questionnaire

Q1. Where did you do the online experiment?

- Home
- Office
- Café or similar public space

Q2. Understanding the experiment. Please think about your understanding of the experiment when you were playing it. On a scale of 1 to 7, please tell us how much you agree or disagree with the following statements. Where 1 is 'strongly agree' and 7 is 'strongly disagree':

- a. I found it easy to remember my income when declaring how many sliders I'd completed.
- b. I understood that I could declare an income different to the amount actually earned.
- c. I understood that my declaration could be audited.
- d. I understood how likely I was to be audited.
- e. I understood that if I was audited and 'caught' under-declaring my income, I would be fined.
- f. I understood that I could potentially take more money home by underdeclaring my income.

Q3. Motivation and behaviour during the experiment. Thinking about your general approach to the experiment, which of the following statements best describes how you behaved:

- I tried to always declare my income accurately.
- I occasionally declared less income than I had earned
- I mostly declared less income than I had earned
- I always declared less income than I had earned

Q4. Please explain in a few sentences why you took this approach to the experiment.

Q5. Please think about how you approached the experiment. On a scale of 1 to 7, please tell us how much you agree or disagree with the following statements. Where 1 is 'strongly agree' and 7 is 'strongly disagree':

- a. I declared all my income because it is the right thing to do.
- b. I declared all my income because evasion is unfair on others.
- c. I declared all my income because that was the rules.
- d. I didn't even think of not declaring all my income.
- e. I didn't put a lot of thought into the amount I declared, I just put what I'd earned.
- f. Not declaring all my income on the experiment would make me feel guilty.
- g. I was worried about being audited so I declared all my income.
- h. I was worried about being fined so I declared all my income.
- i. I treated the experiment like a on-line questionnaire and wanted to provide honest answers.
- j. I didn't see how I could cheat as the computer would know how much I earned from the task.

Q6. Please think about how you approached the experiment. On a scale of 1 to 7, please tell us how much you agree or disagree with the following statements. Where 1 is 'strongly agree' and 7 is 'strongly disagree':

- a. I took a calculated risk to not declare all my income.
- b. I wanted to earn as much from the experiment as possible.
- c. I had a target income to reach and under-declared to get to it.
- d. I under declared because I didn't think I would be audited.
- e. I under declared because I didn't think the fine was very high.
- f. I started to take more risks as the game wore on.
- g. I started to take less risks as the game wore on for fear of getting caught.

Q7. During the experiment I thought the likelihood of being audited was

- Lower than stated
- The same as stated
- Higher than stated

Q8. During the experiment I thought the likelihood of being audited was

- The same regardless of what I reported
- Higher if I did not report all my income
- Higher if I reported a low income
- Depended on when I was last audited
- Depended on the outcome of previous audits
- Other
- Don't Know