Tax Compliance in India:
An Experimental Approach

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ABSTRACT

The study presents an analysis of results of a laboratory experiment, conducted in 2015 to assess compliance behaviour in India. The experiment evaluates responses of 133 participants, to changes in key policy instruments like tax rate, penalty rate and audit probability. We find that changes in policy parameters generate varied responses across taxpayers. Audit probability is the only policy instrument that generates relatively consistent response. Further, the results show that individuals can be divided into those who respond to change in audit probability and those who respond to other policy variables, suggesting that no single policy would be adequate to induce suitable behavioural changes in all taxpayers.

JEL classification codes: H26, H3, C91

Keywords: tax compliance, laboratory experiment, audit probability, tax rate, penalty, exemption threshold, stigma

1. INTRODUCTION

Over the last decade and a half, the tax-GDP ratios for the Organisation for Economic Cooperation and Development (OECD) and BRICS countries have been relatively stable or mildly increasing. With the fiscal strain imposed by the financial crises, there is renewed interest in measures to bolster tax revenues. While the BEPS action plan attempts to plug the leakages in corporate tax collections, it has been difficult to improve personal income taxes and tackle the issue of non-compliance. Governments around the world try different measures to improve compliance. One way to approach the issue of non-compliance is the use of tax rates. For example, in 2001, Russia introduced a flat tax with substantially reduced rate, and reported improved compliance.[2] Many countries, including India have undertaken a cut in tax rates to encourage voluntary compliance. Post 2004-05, the Indian government has consistently revised exemption threshold upwards.

Apart from reducing tax rates, governments can increase the rate of penalty, in order to improve compliance.[3] Countries have adopted different enforcement strategies. For example, Ireland published the names of defaulters with the corresponding under-declaration. Moreover, as per Finance Bill 2017, Irish Revenue Commissioners proposed to 'name and shame' those who do not discharge an outstanding liability within stipulated time limit.[4] Similarly, since 2016-17, India has adopted an aggressive stance on compliance which seeks to use enforcement as a means to curb evasion and increase the taxpayers base.[5] The tax department has published a list of defaulters along with the defaulted amount in an effort to 'name and shame'.[6]

In an attempt to assess the impact of such tax policy measures on compliance and revenue, an experiment was designed. In the experiment behavioural response to five policy changes was evaluated- a decrease in tax rate, reduced likelihood of audit, an increase in penalty on evasion, shaming of deviant taxpayers and an increase in exemption threshold. This study builds on existing literature by providing a comparison of responses to a range of policy instruments. Section 2 provides a context for the study in the existing literature. Section 3 describes[7] the design of the experiment and gives a brief description of participants. The results are presented in section 4 and implications for policy are discussed in section 5. To pre-empt the results, the experiment highlights the fact that there is considerable variation in the responses to policy changes. Of the instruments, change in probability of audit appears as more effective in bringing about widespread behavioural change.

2. A REVIEW OF STUDIES ON TAX COMPLIANCE

In the literature on tax compliance, there are two broad strands - one, looking at the influence of policy on reporting behaviour (Friedland et al., 1978; Beck et al., 1987 and Alm et al., 1993) and two, looking at the tax morale and public good provision on reporting behaviour Alm et al., 1992b; Wahl et

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2) https://www.imf.org/external/pubs/ft/wp/2005/wp0516.pdf

3) http://www.thesundaily.my/news/2017/04/13/irb-plans-increase-penalty-tax-evasion-100

4) https://www.irishtimes.com/business/financial-services/revenue-to-name-and-shame-those-who-fail-to-pay-agreed-tax-liability-1.3134011

5) The currency swap in November 2016 popularly referred to as demonetisation was aimed at tackling "black economy" and bringing in more individuals and groups into the formal economy and tax net. The Income tax department could then scrutinise information on deposits of bulk cash into bank accounts and crack its whip on suspicious activities or transactions.

6) http://indiatoday.intoday.in/story/income-tax-department-tax-defaulters-in-delhi-name-and-shame/1/956911.html

7) For more details see appendix.

al., 2010). In this section, we present a brief review of studies that focus on the former.

Studies on tax compliance based on experiments have broadly similar designs. The participants are given certain amount of income and are required to declare income for purposes of income tax. The experiment provides a description of the tax structure through the tax rates, rates of penalty and an audit rule. The experiment is repeated in multiple rounds to determine response to changes in the policy environment. Friedland et al. (1978) is one of the earliest studies that looked at the issue of evasion. Based on an experiment in Israel with the students of psychology, the study found that the tax evasion behaviour differed widely among individuals and higher fines were more effective than frequent audits. Spicer and Becker (1980) provide evidence that those who perceive the tax system as unfair are more likely to evade taxes. Spicer and Hero (1985) found that those who had been audited in the past perceive a higher probability of audit and therefore reported higher incomes. Collins and Plumlee (1991) found that audits that incorporated preliminary signals sent by the taxpayers are more effective in curbing under-reporting. Further, audits were found to work better with lower tax rates and higher penalty rates. Beck et al. (1991) found that tax rate did not have a significant impact on compliance. Blackwell (2007) carried out a meta-analysis of studies and found that "raising either the fine rate or the probability of audit will increase tax compliance".

Going beyond the ambit of tax policy instruments one can look at social norms to understand compliance behaviour. Cummings et al. (2005) undertook a compliance experiment in Botswana and South Africa. The study found that compliance levels vary across countries and these differences were explained by differences in the fairness of tax administration, in the perceived fiscal exchange, and in the overall attitude towards the respective governments. Blaufus et al. (2016) explore the impact of social norms by incorporating shaming of taxpayers into the experiment. The study finds that "feelings of shame diminish over the course of the experiment because subjects observed the non-compliance of other participants".[8]

Many of these studies use students as the participants in the experiments with numbers ranging from 15 to 120. Further, there are very few studies undertaken for developing countries. We build on the existing literature by exploring these issues with participants from India. The participants are a mix of students and working individuals. Finally, it explores responses to a large number of policy instruments thereby allowing us to provide a comparative assessment of the policy instruments.

3. DESIGN OF THE EXPERIMENT

3.1 Design

The design of the experiment hinges on the classic Allingham-Sandmo (A-S) model that formalises the individual's decision to comply as a choice under uncertainty. As per the model, the taxpayer decides the amount of income to reveal, given the rate of tax, the likelihood of being audited and the penalty on detection of evasion. The interplay of these factors allows the taxpayer to determine the income to be declared. We assess, in a simple laboratory experiment, the resulting changes in compliance behaviour from changes in tax rate, exemption threshold, rate of penalty imposed on being caught and probability of audit. The experiment also incorporates norms through stigma.[9]

8) http://www.arqus.info/mobile/paper/arqus_164.pdf

9) It is true that risk perceptions will play a role in how people respond however that is another experiment and we limit

While each of these policy variables could have increased or decreased, in the experiment, the direction of change incorporated was based on the trends observed over time in India. Given that tax rates have declined while the exemption threshold has been periodically revised upwards, the experiment explores the response to a decline in the tax rate and increase in the exemption threshold. Similarly, audit probability has declined over time. For example, until the year 1989,[10] it was essential for all returns to be assessed and an assessment order to be issued. In recent times Income Tax Department audits barely 2 per cent of the total taxpayers[11] [12]. Therefore, in the experiment audit probability has been reduced. For penalty we have considered the case of an increase. In addition, to assess how people respond to stigma, the experiment was organized for groups of people. In one round, stigma was introduced by announcing the names of the defaulters among the audited cases to the entire group. While responses to any policy change may be asymmetric across increase and decrease, we restrict ourselves to the relevant direction of change to infer about compliance in the existing system.

The design of the experiment is simple. Each round signifies a different time period (year) for filing. At the beginning of each round, the participant is offered an income which remains the same throughout the experiment.[13] The incomes expressed in lab currency were 95,000, 1,00,000 and 1,05,000.[14] From that income, the individual was asked to declare an amount for payment of tax. The taxpayer was told that upon audit, if it is discovered that the income declared is less than full income, a penalty will be levied in addition to tax on the amount of undeclared income. Audit conducted at the end of each round was random and did not depend on the income evaded. The computer of the 'tax department' flashed names of those to be audited based on a draw of lots with replacement. From the point of view of the tax department, a random audit may not be a true representation since the tax department uses some benchmark rules to select returns for audit. However, from the point of view of the taxpayer, the selection for audit would appear to be based on chance. Therefore, the process of audit replicates the actual conditions from the side of the taxpayer.

3.1.1 Steps followed in the experiment

At the beginning of each round, the respondent was given some income, of which he/she could declare any amount for purpose of taxation. The participants were given five minutes[15] to declare their income after which the income filled in was considered final. At the close of the round, the 'tax department' conducted an audit. Those who were audited received a message that they had been audited and in case of evasion being detected, they were informed that it was observed that income had been evaded on which tax and penalty would have to be paid. In the round where stigma was introduced, the name of those who evaded was declared to all participants. The round-wise policy changes introduced in the experiment are summarised in the table below:

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ourselves to ascertaining the response to policy.

10) The new section 143(1) came into force on 1-4-1989 as a result of the Direct Tax Laws (Amendment) Act, 1987 -II.

11) The scrutiny assessments due for a year include cases pertaining to various assessment years and it is difficult to assign the years to each case. Taking the total stock of cases as a percentage of total (corporate and non-corporate) assessees is used to compute the rate of a

12) With computerised processing of returns, every return is issued an assessment order once again.

13) Unless the terminal had to be restarted owing to technical snags.

14) Three different incomes were selected to ensure that the participants to keep the decisions independent even with shared desks.

15) The participants were given 5 to 10 minutes depending on whether there were doubts about the game or if there were any snags.

Table 1: Changes in policy introduced in the experiment

Round	Change in Policy Rate
1	Base Scenario
2	Reduction in tax rate from 20 to 15
3	Increase in rate of penalty from 100 to 150
4	Reduction in Audit Probability from 20 per cent to 10 per cent
5	Stigma
6	Increase in the exemption threshold from 10,000 to 20,000

The experiment seeks to verify for each policy change the direction of impact on levels of compliance. The expected direction of impact is based on the theoretical findings wherein as per the deterrence approach, higher penalties and audit lead to higher compliance. Studies such as Beck, Jon, & Jung (1991) and Park & Hyun (2003) find that higher rates of penalty improve compliance. Similarly, an increase in the likelihood of an audit can deter individuals from evasion (Slemrod et al., 2001). In recent times, shaming of taxpayers has gained traction as a means to improve compliance[16] and studies such as Perez-Truglia and Troiano (2015) find that shaming has some impact on compliance. Lastly, the reduction in tax rates is often associated with an improvement in compliance[17] (Takatas and Papp, 2008). Therefore, based on these results, in this paper, the expected direction of impact is an increase in reported incomes for a reduction in tax rates, increase in exemption threshold, increase in penalty and shaming. Whereas the expected impact of a reduction in probability of audit is a decline in reported incomes.

In the experiment, the tax department was designed to mimic perceptions about an actual tax department. There was anonymity as well as lack of interface with the tax department: all information was relayed at the end of each round on a computer system kept in a separate room (henceforth, back end computer). The audit was presented as random and a notice was issued on audit. The IDs of those who were to be audited in a particular round were randomly generated and displayed on the back end computer after which the audit was conducted. There are a few differences between the tax department in the experiment and an actual tax department – in the experiment, information on the past returns was not subject to audit while a real world tax department can get access to income records for earlier years as well. On the other hand, there might exist some uncertainty on whether the real world tax department can discover all the "suppressed income", but in the experiment, we introduce this uncertainty.

3.2 Characteristics of the participants

The experiment was conducted over a period of 6 months, with a total of 133 participants comprising of students and professionals. In order to ensure that the results obtained reflected the responses of actual taxpayers, we tried to maintain a balance in the sample between tax-paying participants and others. Further, to incentivise participation, the participants were paid cash reward based on their pay-offs from the game.[18] As has been described later, there are as many student participants as non-students.

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16) http://voxeu.org/article/publicly-shaming-delinquent-taxpayers
17) Takáts, E., & Papp, T. K. (2008). Tax Rate Cuts and Tax Compliance - The Laffer Curve Revisited.
18) Note that the rewards paid ranged between approximately INR 500 and 900. These were calculated using the following formula - (income-tax-penalty)/1000.

In order to ensure that the results are free from bias, the sample was cleaned out. Firstly, those who declared full incomes throughout[19] were dropped from the sample. These are compliant taxpayers who did not respond to policy changes. They are excluded from the rest of the analysis since they do not throw light on response to policy changes. The same argument would hold for those who reported less than full incomes but did not change their response throughout the experiment. This group too was dropped from the analysis.

Further, there were individuals who declared full amount in the first round and lower amounts in all subsequent rounds. The response to policy changes is obtained by comparing with the incomes declared in the first round. For these participants, the response to all policy changes would emerge as a reduction in declared incomes. This could be because while the description of the experiment indicates that the tax department can view the actual incomes only on audit, the participants initially do not perceive this fact. The observations for these participants were, therefore, dropped. Lastly, those who declared more than their full incomes were dropped.

The observations based on the above criteria as removed and the characteristics of sample participants are reported in Table 2. Each of the reported characteristic is bifurcated on the basis of the expected difference associated with each group. For example, occupation is split into students and non-students since the former would consist of individuals earning incomes. Similarly, participants are split based on incomes below or above exemption threshold since the latter will be taxpayers. Lastly, participants are divided into those below and above thirty. Nearly 42 per cent of India's population is below 25 year of age[20] which consists of students or income earners that will or continue to be India's taxpayers' base. Their responses would therefore be indicative of prospective compliance behaviour in the economy.

Table 2: Characteristics of subjects

Groups	Number of participants
Age	
Below 30	56
Above 30	31
Income	
Below 2.5 lakhs	47
Above 2.5 lakhs	40
Occupation	
Students	43
Non-students	44
Gender	
Male	57
Female	30

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19) Responses of the individuals can be influenced by what is called the "experimenter's bias", i.e. since the incomes of the individual were on the computer wherefrom the tax-related information was relayed, they may have ended up reporting full incomes, therefore dropping observations for those reporting full incomes throughout also helps in addressing such bias

20) http://www.indexmundi.com/india/demographics_profile.html

As can be observed from the table, participants are approximately evenly distributed across groups. To briefly understand their responses we compared the responses of these categories of the participants. There are two ways of looking at the results - the number of individuals who respond with the correct sign and changes in reported income. The detailed results can be found in the appendix. To summarise, if one looks at participants classified by gender or income, there are no statistically significant differences in behaviours. On the other hand, if one considers the age profile of the participants, that those below 30 tend to report a lower decline in incomes and higher number of participants who respond in the right direction.

Experiments are often criticised (Sears, 1986) for the use of student participants who may not provide a reasonable approximation of the actual taxpayer. Alm, Bloomquist and McKee (2011) have established in another context that student and non-student responses are similar in a tax compliance experiment. In an effort to validate the conclusion, half of the sample in the present experiment is students while the other half insists of taxpaying individuals. For these two groups, we compared the average change in reported incomes. We find that while, on average, more students responded in the expected direction to changes in tax rate, penalty and audit probability, the differences are not statistically significant if one looks at change in D/Y.

From the Table it can be seen that there is significant diversity in the sample of participants. Based on this sample, in the following section, we assess the behavioural response to the various policy changes.

4. WHEN DO PEOPLE PAY MORE TAXES?

Through the experiment we seek to answer the following three questions:

i) What is the impact on compliance behaviour of each of the policy measures? This impact is assessed in terms of number of people and changes in the declared incomes as a proportion of total incomes (D/Y). We assess whether, with a policy change, more people report expected direction of change in D/Y. Further, we assess the extent of change in the average D/Y of individuals across rounds.

ii) What is the impact of a change in policy rates on tax revenues and the declared incomes of all individuals as a proportion to total incomes (i.e. overall D/Y) earned in that round?

iii) What is the impact of audits on reporting behaviour? As part of the enforcement strategy, the tax department can audit more people and/or can repeatedly audit individuals. Audit can have two kinds of effects: one relates to the likelihood of being audited and the other relates to the process of being audited. Therefore, we ask if the change in probability of audit alters reporting behaviour and if the experience of an audit corrects reporting behaviour.

In the ensuing discussion, the responses are analysed to answer these three questions.

4.1 Policy changes and Compliance

Table 3 summarises the direction and extent of change in D/Y for each policy change. Note that

the change in each round is estimated by comparing the reported incomes to that in round 1, which is the benchmark.

Table 3: Direction of response and change in reported income

Change in policy variable	Direction of response	Responded in the expected direction	Did not respond at all	Did not respond in the expected direction
Tax rate	Number of people	35	26	33
	%Change in declared incomes	12.6		-16.5
Penalty Rate	Number of people	41	26	27
	%Change in declared incomes	18.1		-23.6
Audit Probability	Number of people	54	13	27
	%Change in declared incomes	-25.7		14.8
Stigma	Number of people	44	24	26
	%Change in declared incomes	16.7		-28.7
Exemption Threshold	Number of people	41	16	37
	%Change in declared incomes	16.4		-20

Note: "%Change in declared incomes" provides the average change in ratio of declared income to total income for each group.

From Table 3, it is observed that the number of people who responded in the expected manner to policy changes was the least in the case of a reduction in tax rate whereas a larger number of people responded in the expected direction to reduction in audit probability. On the other hand, for those who responded in the opposite direction, the numbers were maximum for an increase in exemption threshold. Expressed a little differently, a change in audit probability produces a relatively more consistent response from participants. In all other cases, there are almost as many people responding perversely as those who respond in the expected direction. These cross responses would mean that policy changes may not produce unambiguous results.

To explore whether the dimension of response to policy changes is different among people who respond in the expected direction and those who respond perversely in Table 4, we present the average responses for both these groups. Results suggest that the first group on average has milder responses than the second group for most policy changes. The only exception to this trend is the response to audit: here average change in D/Y is higher for people who responded as expected.

In table 4, we present the responses to each of the policy changes in isolation. An important question to ask is if there is an identifiable combination of policy changes to which individuals respond. Table 5 presents statistics on pairs of policy instruments.

Table 4: Change in D/Y with change in policy

Change in Policy	Average change in D/Y for those responding in the right direction	Average change in D/Y for those responding in the opposite direction	t-value
Tax Rate	0.12	-0.166	7.563
Penalty	0.179	-0.24	9.843
Audit Probability	-0.257	0.144	-8.523
Stigma	0.164	-0.285	11.21
Exemption threshold	0.16	-0.196	9.27

Table 5: Interaction in 'yes' to policy changes (%)

	Tax Rate	Penalty	Audit	Stigma	Exemption threshold
Tax Rate		66	31	68	63
Penalty	77		39	75	68
Audit	49	51		39	34
Stigma	86	80	31		88
Exemption threshold	74	68	26	82	
'Yes' response (number)	35	41	54	44	41

Note: 'yes' denotes response in the expected direction. The number in each cell captures the overlap between the policy change in column and policy change in the row. They're expressed as a percentage of column variable.

In Table 5, it is seen that the overlap between 'yes' in audit probability and ''yes' in other policy changes is relatively small. For example, less than forty per cent of these respondents also responded in the expected direction to any of the other policy changes. . On the other hand, those who responded to other changes did so across policy changes. That is, most of those who responded to an increase in penalty rate also responded to stigma, an increase in exemption threshold and a reduced tax rate.
Another way of looking at this is to examine the number of changes to which people are responding. In the experiment, a total of 5 policy changes were introduced. In the first column is a count of the number of changes to which an individual could have responded. In the adjoining columns is the count of individuals who responded to a particular instrument for the total number of instruments he/she responded to. The results in table 6 corroborate the earlier results: the individuals who respond to one instrument are concentrated in audit probability whereas for those who responded to more than two policy changes, few respond to audit.

Table 6: Number of policy changes and policy changes to which responded

Number of policy changes to which responded	Responded as expected to tax rate	Responded as expected to penalty rate	Responded as expected to audit	Responded expected to Stigma	Responded expected to exemption threshold	Total
1	0	1	26	0	1	28
2	3	6	10	7	8	17
3	6	6	2	9	7	10
4	19	21	9	21	18	22
5	7	7	7	7	7	7
Total	35	41	54	44	41	

Two results emerge from the discussion in this section: no policy change can be expected to achieve a uniform outcome that is there will always be divergences in the response of individuals to a policy change. For example, as is shown in the results reported in Table 3, there are as many people who respond to a reduction in tax rate with an increase in the declared income as there are those who respond with a decrease in declared incomes.

There are two categories of individuals - those who respond primarily to the changes in audit probability and those who respond to other policy changes. From this, it would appear that the government could choose a combination of audit and one other variable in order to induce an improvement in reported incomes.

4.2 Revenue implication

Policy changes are expected to have an impact on revenue. We explore if, in terms of revenue, any specific measure stands out as superior, that is, the revenue collected is the same or higher while stepping up compliance. We calculate impact of policy changes in terms of change in tax revenue and change in the overall D/Y. These results are presented as direction of change in revenue and partial elasticity of revenue with respect to each of these instruments.

Table 7 presents the revenue impact of these measures. Firstly, the average D/Y responds dramatically to only one policy change i.e. audit, where there is a sharp decline. In all other cases, there is a marginal change in D/Y. Tax rate and exemption threshold result in decline in revenues. Even with the approximately unchanged levels of declared incomes, change in exemption threshold reduces tax revenues. Similarly, reduction in the audit probability leads to a decline in the revenues. As for stigma and penalty, there are marginal improvements in revenue for relatively unchanged declared incomes. Therefore, in terms of improvement in revenue collection, higher rates of penalty and shaming of those who evaded may be a better strategy. The elasticity of revenues is higher for a decline in tax rate or in exemption threshold. For other policy variables, the elasticity is very low. This suggest that if the government wants to improve the levels of compliance, it should desist from reducing the tax rates since the revenues are more adversely affected while declared incomes do not improve significantly.

Table 7: Revenue collected and average incomes declared across policy changes

Change in Policy	Revenue collected (in lakhs)	Declared income in proportion of actual (%)	% change in revenue by % change in policy rate
Base Scenario	17.66	85	
Decline in Tax rate	13.24	83.8	-1
Increase in Penalty Rate	17.69	86	0.003
Reduction in Audit Probability	17.34	74.6	-0.036
Increase in Stigma	17.69	84.9	
Increase in exemption threshold	15.34	85.3	-0.13

4.3 Are audits corrective measures?

Audits can affect an agent's behaviour in two ways - one, when there is a change in the probability of audit the agent's assessment of appropriate income to report could undergo a change and two, when an agent is actually audited, the experience of audit could encourage better compliance in subsequent periods. In the previous sections, it was shown that the change in the declared probability of audit can have a pronounced impact on reporting behaviour. In this section, we analyse whether being audited has a corrective impact on the reporting behaviour. The corrective impact of an audit can be immediate, that is, the individual could increase the declared income in the period subsequent to an audit. Alternatively, the individual could increase reported incomes in response to repeated audits. Table 8 considers the effect of being audited in the previous round by looking at the percentage of people who respond in the expected direction. It is observed that only in the case of tax rate and exemption threshold, those who were audited in the preceding round are more likely to respond in expected manner. As for the other policy changes, there is no difference.[21]

Table 8: Impact of past audits on reporting behaviour

Round	Responded as expected (% of those audited/not audited)		t-value for difference in average change in D/Y for the two groups
	Audited in previous round	Not audited in previous round	
Tax rate	48.1	32.8	-0.813
Penalty rate	45.2	42.8	0.659
Audit probability	56	57.9	-1.04
Stigma	46.2	46.9	0.159
Exemption threshold	48.3	41.5	-0.439

21) Note that in order to deal with the fact that individuals may be responding to change in policy rate and audit simultaneously, we split the sample into those who responded to as expected and otherwise to a policy change. Then we regressed their response to an audit in previous rounds. Even such splitting of the sample does not yield any response.

Further, in order to examine whether repeated audits tend to alter the reporting behaviour of the individuals, the change in the proportion of declared incomes between the last and first round is taken and the average change in D/Y is compared for those who were audited less than twice with those who were audited more than twice. We carry out a t-test to establish if there was any difference in the change in the D/Y. From the t-value it can be said that the difference observed is not statistically significant.

Table 9: T-test for difference in change in declared incomes post audit

	Audited more than twice	Audited less than twice
Average	0.0009	-0.017
t-value	-0.3936	

It is seemingly paradoxical that while change in audit probability is the policy tool to which individuals respond most strongly, the audit itself does not correct reporting behaviour. An explanation for this apparent paradox lies in the fact the individual incorporates the possible loss from audit while taking a decision on how much income to report. Therefore, the actual audit does not change behaviour in subsequent periods. The obvious question to ask then is why an audit is used as a corrective measure. In the absence of audit, the probability of audit loses its significance. In other words, the probability of audit induces compliance and the actual act of audit potentially brings out undeclared incomes, perhaps not just in the year for which the audit is being initiated but for earlier years as well. That is the limited benefit of audit. From the experiment it appears that the process of audit itself does not induce better compliance in subsequent periods.

5. CONCLUSION

The results from the experiment highlight the fact that changes in a policy parameter generate different responses from taxpayers, for every policy change there are participants whose response was counter-intuitive. One possible way of explaining divergences in response to policy changes is through the use of a theoretical framework like that of prospect theory (see Rao and Tandon, 2016) for a model on decision to pay taxes. Differences in perceptions of risk and in risk aversion could generate such varying responses.

The second notable feature is that under no configuration of the policy parameters did a noticeable number of people report zero taxes. Through the entire experiment, only one participant reported zero income. This feature needs to be explored further, theoretically.

Third, among the policy variables, audit probability stands out as the most effective tool. However, there are some differences in responses. Some people responded mainly to changes in audit probability and relatively less to changes in other policy variables. In contrast, there emerged another group which responded more to the other variables and less to audit. This classification suggests that some of the policy instruments might be substitutes in terms of the response they induce, for example, tax rate and penalty. While the probability of audit emerges as a very important tool to influence behaviour, the actual audit does not appear to correct reporting behaviour in subsequent periods.

On the flip side of the effects of policy instruments on compliance is the goal of increased rev-

enue generation. The results suggest that if the objective is to generate revenues, then change in penalty rate and introduction of stigma could be more useful than mere changes in tax rate of the exemption threshold. The results also suggest that, in order to improve compliance and revenue generation simultaneously, increase in audit probability along with the introduction of stigma can be an effective combination of policies.

The government may find enforcement, through higher number of audits, an attractive strategy even though it is expensive to conduct and sustain. These results are based on an experiment which does not deal with possible benefits people get from government and with issues of tax morale which are also considered important elements for influencing taxpayer behaviour. As the literature suggests, compliance is not just an outcome of risk perceptions, but also of tax morale. The reasons for non-compliance are also rooted in the taxpayers' perception regarding utilization of tax revenues for provision of public goods and/or services.

For instance, in an online survey of taxpayers, in a response to a question on reasons for paying taxes nearly seventy per cent reported that the taxes should be paid to finance public services and public goods. This response dominates even when the respondents were offered the choice that "taxes are paid to avoid penalties". Improvements in the quality of goods and services provided might, therefore, provide an alternative mechanism through which to influence the compliance behaviour of taxpayers. While the experiment has thrown up some interesting results, it would be useful to extend the experiment to incorporate issues of service provided. Future work can focus on this dimension.

APPENDIX

A.1: t-test for change in D/Y student vs. non-student

Change in declared income in response to	Student	Non-student	t-statistic (d.f. =92)
Tax Rate	-0.02	-0.006	0.3291
Penalty Rate	0.021	-0.005	-0.5645
Audit Probability	-0.1	-0.1108663	-0.1575
Stigma	-0.0135393	0.011164	0.5083
Exemption Threshold	0.0004539	-0.016558	-0.365

A.2: t-test for numbers who responded as expected student vs. non-student

Average numbers who responded as expected	Student	Non-student	t-statistic (df=92)
Tax Rate	0.44	0.29	-1.4472*
Penalty Rate	0.52	0.34	-1.7572**
Audit Probability	0.68	0.45	-2.2412**
Stigma	0.5	0.43	-0.6555
Exemption Threshold	0.46	0.41	-0.492

A.3: t-test for change in D/Y Male vs. Female

Change in policy	Male	Female	t-statistic
Tax rate	-0.026	0.013	-0.9957
Penalty	0.069	0.013	-0.1162
Audit Probability	-0.094	-0.129	0.6157
Stigma	-0.0113	0.0162	-0.5043
Exemption Threshold	-0.0124	0.0019	-0.2914

A.4: t-test for numbers who responded as expected male vs. female

Change in policy	Male	Female	t-statistic
Tax rate	0.338	0.437	-0.9332
Penalty	0.435	0.437	-0.018
Audit Probability	0.564	0.594	-0.2681
Stigma	0.435	0.531	-0.8759
Exemption Threshold	0.4032	0.5	-0.8908

A.5: t-test for change in D/Y income below threshold vs. income above threshold

Change in policy	Income below threshold	Income above threshold	t-statistic
Tax rate	-0.009	-0.02	0.1702
Penalty	0.025	-0.012	0.7861
Audit Probability	-0.099	-0.115	0.2815
Stigma	-0.008	0.005	-0.2788
Exemption Threshold	-0.011	-0.003	-0.1757

A.6: t-test for numbers who responded as expected income below threshold vs. income above threshold

Change in policy	Income below threshold	Income above threshold	t-statistic
Tax rate	0.46	0.22	2.012**
Penalty	0.52	0.33	1.8194**
Audit Probability	0.625	0.537	0.847
Stigma	0.5	0.428	0.6844
Exemption Threshold	0.461	0.405	0.5468

A.7: t-test for change in D/Y below 30 vs. above 30

Change in policy	Above 30	Below 30	t-statistic
Tax rate	-0.026	-0.006	-0.5064
Penalty	-0.057	-0.041	-2.005**
Audit Probability	-0.165	-0.077	1.53*
Stigma	-0.046	-0.198	-1.292*
Exemption Threshold	-0.078	0.027	-2.18**

A.8: t-test for numbers who responded as expected 30 vs. above 30

Change in policy	Above 30	Below 30	t-statistic
Tax rate	0.193	0.46	-2.576***
Penalty	0.194	0.55	-3.504***
Audit Probability	0.516	0.6	-0.7966
Stigma	0.29	0.55	-2.475***
Exemption Threshold	0.29	0.5	-2.022***

Variable	Responded as expected		Not responded as expected		All	
Audit Dummy	-0.004	0.004	-0.1	-1.68	-0.017	0.21
Constant	-0.1372	-4.88	0.173	8.26	-0.006	-0.24
R square	-0.0196		0.044		-0.0104	

DETAILS OF THE EXPERIMENT

Round 1

You have earned an annual income of   105000

The income earned is not observed by the Tax Department, except in the case of Audit. The taxpayer can declare any income . The prevailing tax rate is **20 per cent**. Tax department allows a deduction of **10000** from the declared income and tax liability is calculated on the remaining income.

The tax department will audit **20 per cent** of the people filing returns. If on selection it is discovered that declared income is less than earned income, a penalty of **100 per cent of the tax evaded** will be charged. The penalty along with tax evaded will be deducted from total income.

Click here for example/help

What amount do you want to declare ?   [   ]   Calculator

Tax payable   [   ]   Save

Continue to   Round 2

Round 2

You have earned an annual income of   100000

The government has decided to reduce the tax rate to   **15 per cent.**
Exemption threshold, penalty rate and audit probability are the same as Round 1-
1. Exemption threshold: 10,000
2. Penalty Rate: 100 per cent of tax evaded
3. Audit Probability : 20 per cent

Click here for example/help

What amount do you want to declare ? [   ]   Calculator

Tax Payable   [   ]   Save

Continue to   Round 3

Round 3

You have earned an annual income of   95000

The government has decided to increase the penalty rate to **150 per cent.**
Exemption threshold, tax rate and audit probability are the same as Round 1
1) Exemption threshold: 10,000
2) Tax Rate: 20 per cent
3) Audit Probability : 20 per cent

Click here for example/help

What amount do you want to declare ? [   ]   Calculator

Total Payable   [   ]   Save

Continue to   Round 4

Round 4

Round 5

Round 6

Note: The income is the same for all rounds. Once the individual declared the income and all incomes were reported, the round was closed and an audit was conducted. A message was relayed to those who were audited of whether any discrepancy was found or not. The individuals were selected on the basis of random draw of IDs.

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