# The Impact of Changes in Audits and Penalties on Tax Compliance Behaviour: Evidence from South Africa

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## Abstract

Tax revenue is a major source of public revenue in South Africa, and it plays an integral role in creating the fiscal space to provide public services and infrastructural development. Tax collection is, however, impeded by evasion. To enhance compliance, the government has made several changes to existing tax penalty structures, and introduced new ones as well. The question arises whether these deterrence measures effectively reduce evasion. International empirical evidence on the efficacy of such policies is mixed, and mainly drawn from developed country applications. Hence, evidence from developing countries is limited. This study employed a laboratory experiment to examine taxpayers' behavioural responses to changes in audit and penalty rates in South Africa. Results showed that both audits and penalties influenced salaried and non-salaried income taxpayers to increase their compliance levels. However, the effect was higher on non-salaried taxpayers. The study also established that audit and penalty rates had a negative joint effect on both salaried and non-salaried compliance rates. The impact was larger on salaried taxpayers. These findings suggest that, although audits and penalties are effective enforcement measures, the manner in which they are applied must be given careful consideration, as excessive enforcement reduces taxpayers' intrinsic motivation to comply, hence reducing voluntary compliance. The study used a novel experimental setting, whereby compliance was disaggregated into salaried and non-salaried, which gave a clearer effect of deterrence measures on compliance.

**Keywords:** audit rate; penalty rate; deterrence measures; laboratory experiments; compliance; tax evasion

UNISA university of south africa PRESS

Southern African Business Review
https://upjournals.co.za/index.php/SABR
Volume 24 | 2020 | #4824 | 22 pages

https://doi.org/10.25159/1998-8125/4824
ISSN 1998-8125 (Online)

## Introduction

Tax revenue plays an integral role in the provision of goods and services. While taxes are essential to raise government revenue, they constitute a burden to taxpayers (Tanzi and Shome 1993, 809). To reduce this burden, taxpayers may evade or avoid taxes, which limits the capacity of governments to fulfil their fiscal and economic obligations. In response, governments use deterrence instruments such as audits, financial penalties and incarceration to dissuade taxpayers from non-compliance. However, the intensiveness of these enforcement mechanisms varies across countries.

Tax evasion is treated as a serious offence in South Africa. Depending on the nature and extent of the offence, tax evaders will pay pecuniary penalties and/or serve a jail sentence (SARS 2016a, 10). The financial penalties are in three forms: administrative penalties, understatement penalties, and non-compliant interest. The administrative penalty was introduced in 2009, following an upsurge in the number of late submissions; it was intended mainly to promote compliance with the administrative provisions of the tax legislation (SARS 2016b, 406). There are two categories of administrative penalties: fixed-amount penalties, and percentage-based penalties. Fixed-amount penalties are levied on individual taxpayers who fail to meet submission deadlines. The penalty is calculated per month, at a fixed rate. Depending on the individual's taxable income, the penalty ranges between R250 and R16 000. Besides fixed-amount penalties, taxpayers are levied a percentage-based administrative penalty on the late or non-payment of taxes. Depending on the gravity of the offence, the penalty ranges between 10 and 200% (SARS 2016a, 15).

Apart from administrative and underpayment penalties, non-compliant taxpayers are liable to pay interest, fixed at 9.75% per annum. This penalty is levied for both late- and under-payment. Depending on the seriousness of the offence, failure to comply with the requirements of the tax laws may constitute a criminal offence. Examples of criminal offences include intentional evasion, claiming undue refunds, or assisting a taxpayer in such endeavours (SARS 2016b, 15). If convicted, the offender pays a fine and/or is incarcerated. For instance, over the 2014/15 fiscal year, 256 taxpayers were convicted in cases involving R196 million of evasion. The convictions involved different crimes: 73 were for income tax fraud; 32 were for VAT fraud; and eight for tobacco-related crimes, among others (SARS 2015, 1). They were fined R9.6 million and given an effective 555 years in jail (SARS 2015, 1).

In its pursuit to enforce compliance, the government also exploits high profile tax evasion cases to reinforce its strict stance against non-compliance. For instance, in 1999, Trevor Tutu (son to Archbishop Desmond Tutu, a renowned South African Anglican cleric and Nobel Peace Prize winner) was convicted of tax evasion and was sentenced to one year in prison (Cummings et al. 2009, 449).

South Africa's penalty structures are comparatively more stringent than those of other countries in the region. For instance, in Zambia negligent understatement currently

carries a penalty of 17% of the amount evaded, whilst wilful default and fraud respectively carry a penalty of 35 and 52.5% of the amount evaded (ZRA 2018). In Kenya, late payment of tax constitutes a penalty of 20% of the unpaid amount, with intentional understatement of taxes carrying a penalty of 75% of the amount evaded. In Zimbabwe, the late payment penalty constitutes $30 for each day of the first 181 days the return remains outstanding. Where the return remains outstanding beyond 181 days, prosecution may be instituted (ZIMRA 2018).

In view of the wide application of deterrence measures in South Africa, together with little evidence on the implications thereof, it is imperative to investigate how deterrence measures influence compliance. Considering that tax evasion may vary with the type of income, examining the efficacy of deterrence factors based on aggregated income may conceal some important evidence. It is against this backdrop that this study seeks to investigate the effect of audit and penalty rates on salaried and non-salaried taxpayers. The disaggregation of the effects of deterrence measures by type of income (salaried and non-salaried income) can provide useful information on how audits and penalties can be used to stimulate tax compliance.

The rest of this paper provides an overview of the theoretical foundations of the deterrence theory, followed by a discussion of the empirical evidence of deterrence measures and the methodological approach for this study. The ethical considerations and findings are presented, as well as the contributions of the study. The paper concludes with the policy implications drawn from the study.

## Theoretical Foundations: The Economic Deterrence Framework

The standard economic deterrence theory stems from the economics-of-crime model developed by Becker (1968), which argues that crime is an economic activity that can be countered by punishing the offender. Based on the economics-of-crime model, Allingham and Sandmo (1972) developed the deterrence model to explain taxpayer behaviour. The Allingham and Sandmo (A-S) model was later extended by Yitzhaki (1974) (hereafter the A-S & Y model).

The A-S &Y model views individuals as homogenous, egoistic and utility maximisers whose decision to pay taxes is arrived at after evaluating the gains of successful evasion vis-à-vis the risk of detection and punishment. An individual evades whenever the benefits of cheating outweighs the risk of detection and the accompanying punishment. The central argument of this model is that an individual complies due to fear of detection and punishment. As such, the more stringent the deterrent measures, the more compliant taxpayers become.

In its simplest form, the model can be illustrated as follows[1]: assume that an individual receives a fixed gross income (Y) which is supposed to be declared to the tax authority

1 The illustration follows Alm, Jackson and McKee (2009).

for tax purposes. The reported income is taxed at a rate (t). Assume again that the individual declares (X) amount of income, implying that his or her undeclared income is (Y - X). Although no taxes are paid on unreported income, the individual may be audited for under-reporting at a fixed and random probability of (p), where $0 < p < 1$. Once audited, all unreported income is detected and the delinquent individual pays a penalty (α), where $\alpha > 1$. The penalty is calculated as a multiple of the evaded tax amount. When evasion is undetected, the individual's net income (W) is the difference between gross income and the tax paid from declared income. That is:

$$W = Y - tX \quad \text{(1)}$$

In the event that the evaded amount is detected, the individual's net income (*Q*) becomes gross income *minus* paid taxes, *minus* the fine on unpaid taxes. That is:

$$Q = Y - tX - \alpha[t(Y - X)] \quad \text{(2)}$$

With the probability of detection, *p*, the individual chooses to declare *X* to maximise his/her expected utility, *E*[*U*(*Y*)], expressed as:

$$E[U(Y)] = (1 - p)U(W) + pU(Q) \quad \text{(3)}$$

Where *E* is the expectation operator and *U(Y)* is the utility function of income.

If the individual is risk-averse, his or her utility function will be concave, which implies that the first and second order conditions will be satisfied. These are expressed by equations (4) and (5) as follows:

$$pt(\alpha - 1)U'(Q) - (1 - p)tU'(W) = 0 \quad \text{(4)}$$

$$p[t(\alpha - 1)]^2U''(Q) + (1 - p)t^2U''(W) < 0 \quad \text{(5)}$$

Where $U'$and $U''$denotes the first and second derivatives of the utility function, respectively.

Equation (4) is the basic deterrent (or portfolio) model of tax compliance. Total differentiation of this equation allows us to see the effect of each parameter on compliance. The total differentiation of the first-order equation with respect to the probability of the audit rate and the penalty rate produce equations (6) and (7), respectively:

$$\frac{\partial X}{\partial p} = -\left[\frac{t(\alpha-1)U'(Q)+tU'(W)}{pt^2(\alpha-1)^2U''(Q)+(1-p)t^2U''(W)}\right] \quad \text{(6)}$$

$$\frac{\partial X}{\partial \alpha} = -\left[\frac{ptU'(Q)}{pt^2(\alpha-1)^2U''(Q)+(1-p)t^2U''(W)}\right] \quad \text{(7)}$$

Equation (6) shows that an increase in the audit rate leads taxpayers to increase their declared income. Likewise, equation (7) depicts a positive relationship between compliance and the penalty rate. Thus, higher audit rates and penalty rates discourage taxpayers from evading. Considering these theoretical arguments, the next section reviews the empirical findings on the effect of audit rates and penalty rates on compliance.

## Empirical Studies: The Efficacy of Deterrence Measures

Evidence on the efficacy of audits and penalties on compliance is three-pronged and hence, inconclusive: some studies show that audits and penalties have a positive effect on compliance and others established that these measures reduce compliance, while other researchers found audits and penalties to have no (or minimal) effect on compliance. For instance, Park and Hyun (2003) found that both penalty and audit rates incentivised taxpayers to increase compliance in Korea. However, penalty rates were found to be more effective than audits. Yet, Kleven et al. (2011) found audits to have no effect on third-party reported income in Denmark. Asnawi (2016) found a positive relationship between audit rates and compliance rate in Indonesia.

Gangl et al. (2014) explored the effect of stringent enforcement (close supervision[2] and frequent audits) on tax compliance in Austria and found that extreme enforcement (close supervision and frequent audits) reduced compliance, even in cases of strong and cordial taxpayer-tax authority relationships.

Wahl, Kastlunger, and Kirchler (2010) investigated the effect of audits and penalties on compliance. Results from this study were two-fold. On the one hand, it was established that increases in enforcement persuaded dishonest taxpayers (taxpayers with a high inclination towards evading) to increase their compliance levels—as dishonest taxpayers regarded increases in enforcement as a sign that the authority was committed to combat evasion. This perception triggered taxpayers to increase their compliance levels. On the other hand, the study established that honest taxpayers reduced their compliance levels when subjected to high audit and penalty rates. Wahl et al. (2010) highlighted that honest taxpayers perceived high audits and penalties as a sign of mistrust by the tax authority, a perception that reduced their intrinsic willingness to comply and, hence, a negative correlation between enforcement and voluntary compliance.

Mohdali, Isa, and Yusoff (2014) investigated the effect of threat of punishment (comprised of audits and penalties) on tax compliance behaviour in Malaysia and found that audits and penalties triggered honest taxpayers to evade. It was suggested that honest taxpayers would perceive threats of punishment as a sign of mistrust by the

2 Supervision is defined as a friendly and constant form of deterrence and interaction with the taxpayers (Gangl et al. 2014, 379).

authorities. As trust is reciprocal in nature, taxpayers' trust in the authority would decline, leading to a reduction in compliance.

Alm, Jackson, and McKee (1992) examined the effect of audit, penalty rates and changes in government expenditures on personal income taxpayers' compliance in the U.S. Although the results showed that both audits and penalties had a positive effect on compliance, the significance level of the coefficients was very low. Relatedly, Devos (2004) found that penalties had no effect on compliance in selected Anglo-Saxon countries, including the UK, New Zealand and Australia.

It is clear from the foregoing discussion that empirical evidence on the effect of deterrence measures, particularly penalties and audits, is diverse. Notwithstanding this divergence, audits and penalties constitute the main compliance-enforcement mechanisms across many countries.

## Methodological Approach

This study employed conventional laboratory experiments to investigate the effect of audits and penalties on compliance behaviour. This is because laboratory experiments allow factors suggested by theory to be tested individually and independently in a controlled environment.

### Experimental Design

The experimental setting for this study replicated the essential features of the voluntary reporting of South Africa's personal income tax system. The experimental design followed Alm, Deskins, and McKee (2009), who examined individual taxpayers' compliance responses to changes in the proportion of salaried and non-salaried income. In this study, subjects had two forms of income: endowment (non-salaried income) and earned (salaried) income.

The endowment was randomly assigned to the subjects at the beginning of the experiment and would earn some additional income by performing a simple task of counting the frequency of one (1) in a grid, in the shortest possible time. The amount earned was determined by one's performance in the task. The subject's income (endowment plus earned income) was only known by its holder. Both incomes were supposed to be reported to the tax authority for tax purposes and were taxed at the same rate, which is fixed at 30%.[3] Subjects then filled in a tax return, choosing how much of their endowment and salaried income to report. The tax liability was calculated based

3 Over the past years, the majority (over 60%) of South Africa's individual taxpayers fall within the R70 000–R350 000 taxable income band, and the majority of them are liable to a 30% tax rate (National Treasury and SARS 2017, 104). There are also a number of studies (e.g. Alm, Martinez and Wallace 2009; Alm, McKee and Beck 1990; Asnawi 2016) that used this same tax rate. The 30% tax rate, therefore, allows findings from this study to be comparable with other studies.

on the proportions of reported salaried and non-salaried income. Importantly, tax was paid only on reported income.

Participants were subjected to random audits to uncover any unreported income, and audit rates were pre-announced to the subjects. Audits were determined by a virtual bingo cage displayed on every participant's computer screen. More specifically, after every tax period, a box with red and white balls appeared on the screens. These balls would bounce for a while before one popped out of the box. If a red ball popped out, the subject would be audited. Conversely, a white ball implied no audit.

Subjects were informed that any salaried income that was undeclared would be detected with certainty in the event of an audit. Any undeclared endowment income would be discovered in an audit, but only with some known and pre-announced probability, which was fixed at 50%. The disparity in detection rates reflected the productivity of audits on each type of income (Alm, Deskins, and McKee 2009, 128). The detection rates used in this study are hypothetical. Intuitively, the discrepancy in compliance rates could largely be attributed to the difference in detectability between these incomes. Salary payments usually leave paper and electronic trails, while non-salaried income, however, is largely transacted in cash, leaving no transactional evidence (see Ahmed and Rider 2013; Artavanis, Morse, and Tsoutsoura 2015; Paulus 2015; Schneider 2005). Thus, it is more difficult to detect misreporting on non-salaried income. Unlike salaried income, which is reported through a third party, non-salaried income is self-reported, thereby providing non-salaried income taxpayers more opportunities to misreport. Accordingly, the disparity in the detection rates captured the fundamental elements of third-party and self-reporting systems (see Alm, Deskins, and McKee 2009, 128–129). If an under-statement was detected, the delinquent taxpayer paid a penalty. The penalty was calculated as a multiple of unpaid taxes of the audited round.

In this study, the experimental exercise comprised of four sessions, each made up of ten rounds. In Session One (the control session), the audit and penalty rates were set at 10 and 150%, respectively, and retained for all rounds. The audit and penalty rates were set and retained at the Session One levels for Rounds One to Five, for all the remaining sessions. In Session Two, the penalty rate was increased to 300% from Round Six up to Round Ten. In Session Three, the audit rate was increased to 30% for Rounds Six to Ten. To examine the joint effect of high audit rates and high penalty rates, both of these parameters were increased in Session Four from Round Six to Round Ten. The audit rate was increased to 30%, while the penalty rate was increased to 300%. Importantly, subjects would take part in one session (composed of 10 rounds). Parameters for the sessions are summarised in Table 1:

**Table 1:** Parameters of the Experimental Design

| Session | Rounds | Audit rate | Probability of Detection (Salaried income) | Probability of Detection (Non-salaried income) | Penalty rate | Tax rate |
|---|---|---|---|---|---|---|
| 1 | 1–10 | 10% | 100% | 50% | 150% | 30% |
| 2 | 1–5 | 10% | 100% | 50% | 150% | 30% |
| | 6–10 | 10% | 100% | 50% | 300% | 30% |
| 3 | 1–5 | 10% | 100% | 50% | 150% | 30% |
| | 6–10 | 30% | 100% | 50% | 150% | 30% |
| 4 | 1–5 | 10% | 100% | 50% | 150% | 30% |
| | 6–10 | 30% | 100% | 50% | 300% | 30% |

The experiment used the same parameters in Rounds One to Five across all sessions to ensure that behavioural differences were controlled by allowing each subject to be their own control. At the same time, treatments were varied across sessions (from Session Six to Session Ten) to compare the behaviour of subjects across treatments, making each session a "control" for the other. All sessions were computer-aided, and programmed with z-Tree (Fischbacher 2007). Subjects' tax liabilities, tax owed and penalties (if any) were automatically calculated and displayed on the screen.

Despite subjects' participation in ten rounds, only one round counted towards earnings. This is determined by rolling a ten-sided die at the end of the exercise. Thus, all rounds had an equal chance of being selected and no one knew in advance which one would be chosen. Once the payment round was determined, subjects were paid their earnings in cash. A subject's net income (after-tax income) depended on the following: the size of the tax rate, amount of random endowment and earnings in the task performed (i.e. composition of income), penalty rate, and whether the unreported income was detected or not. The net income for a round is represented by the following equation:

$$Net\ income = Y - tY[Sr_s + (1-S)r_e] - AftY[S(1-r_s) + D(1-S)(1-r_e)] \quad \text{(8)}$$

Where:

- *Y* is the gross income (i.e. salaried plus endowment income).
- *t* is the tax rate.
- *S* is the share of salaried income in gross income.
- *rs* is the share of salaried income reported by the subject.
- *re* is the share of non-salaried income reported by the subject.
- *A* is a dummy variable, 1 if the subject is audited and 0 if otherwise.
- *f* is the penalty (fine) rate on undeclared taxes.

- *D* is a dummy variable, 1 if the subject is detected for underreporting non-salaried income, and 0 if otherwise.

At the end of the experiment, subjects completed a demographic questionnaire. This helped to capture subjects' socio-economic and demographic data, which was essential in empirical analysis (see Alm, Martinez, and Wallace 2009; Alm et al. 2016; Torgler and Schaltegger 2005).

The experiment was conducted at Stellenbosch University with students drawn from different disciplines.[4] All participants had no prior exposure to laboratory experiments. They were recruited via electronic invitations and class presentations.

**Analytical Approach**

To establish the effect of audit and penalty rates on compliance, descriptive statistics of the experimental results were examined as a first step. The second step entails regression analyses to establish specific causal inferences between compliance and audits and penalties. In this study, subjects' compliance (i.e. compliance rate) was defined as the ratio of reported income to total income.

The primary regression model for this study consisted of the following random effects panel regression model[5]:

$$C_{ist} = \beta_0 + \beta_1 Totalincome_{ist} + \beta_2 Nonsalincomeshare_{ist} + \beta_3 Auditrate_{st} + \beta_4 Penaltyrate_{st} + \beta_5 PrevAudit_{ist} + \beta_6 Auditrate_{st} * Penaltyrate_{st} + \beta_7 Round_s + \beta_8 Z_i + \lambda_{st} + \mu_i + \varepsilon_{ist} \quad (9)$$

Where:

- $C_{ist}$ is the compliance rate for individual *i* in group (session) *s* at time (round) *t*.
- *Totalincome* is the total amount of income (salaried plus non-salaried) of the subject. This is meant to examine the effect of total income on compliance.
- *Nonsalincomeshare* is the share of non-salaried income in the gross income. This is essential in establishing the relationship between compliance and the composition of income.
- *Auditrate* is the probability of an audit in a round. The variable seeks to examine how taxpayers respond to changes in the audit rate.
- *Penaltyrate* is the penalty rate levied on detected evaders, and it seeks to establish the relationship between the compliance rate and the penalty rate.

4 The sample constitutes undergraduate (excluding first years) and post-graduate students.

5 The Hausman and Breusch-Pagan Lagrange Multiplier tests were conducted to determine model specification.

- *PrevAudit* is a binary variable equal to 1 if the subject was audited in the previous round, and 0 if otherwise. The variable seeks to establish the relationship between previous audits and the compliance rate in subsequent periods.
- *Auditrate*Penaltyrate* is the interactive term for audit and penalty rates. This seeks to establish the joint effect of the probability of an audit and the penalty rate on the compliance rate.
- *Round* is round period in every session and captures round effects on the compliance rate. Round effects may include subjects' experimental experience gained in between rounds. The round variable therefore controls for the effect of previous rounds on subsequent rounds. As such, it is a control variable.
- *Z* is a vector of demographic variables, which include age, ethnicity, religion, work experience, current level of study, family annual income level, and marital status. These variables control for the effect of subjects' idiosyncrasies in the regression model.
- $\lambda$ is a set of T-1 variables that capture the potential of non-linear period effects.
- $\mu$ are random effects that control for unobservable individual characteristics.
- $\varepsilon$ is the error term with a zero mean and constant variance.

**Data Composition**

The experiment was conducted with a panel of 184 subjects, of whom 56% were male. The average age of the participants was 22 years old. The racial composition for the population sample was as follows: 43% white; 35% black; 15% coloured; and 7% other races. Of the total subjects, 11% were Catholics; 21% Protestants; 3% Baptists; while 21% had no religion. 11% of the participants had filed a tax return before. Each subject participated in only one session (where each session constituted 10 rounds), producing up to 1 840 individual observations.

## Ethical Consideration

Participants in this study were recruited via electronic invitations and class presentations and were presented with invitation and consent forms. Those who decided to participate would be asked to make a series of choices about income tax reporting on a computer. After making all the choices, they would be asked to complete a questionnaire about their demographics and experience with filing taxes. Participants were informed that they would not have any more risks than they would in a normal day of life; and that participation in this study may not benefit them personally. Participation in this research was voluntary. If the participants were to decide to be in the study and change their mind, they had the right to drop out at any time. Whatever their decision, they would not lose any benefits to which they were otherwise entitled. They were informed that their records would be kept private to the extent allowed by law. The participants would only take part in this study upon having signed the consent forms.

## Results and Discussion

As previously discussed, this study employed two analytical approaches: descriptive statistical and regression analyses.

### Descriptive Statistics

In Session One (where audit and penalty rates were kept constant across rounds), subjects reported 51% of their non-salaried income and 61% of salaried income. The average compliance rate on total income (salaried plus non-salaried income) was 56%. In Session Two, the penalty rate increased from 150 to 300%. Compared to Session One (the baseline session), the average compliance rates increased to 55% for non-salaried and decreased to 67% for salaried income. These results seem to suggest that the effect of penalties varies with the type of income held by taxpayers. The average compliance rate on total income increased to 61%. These findings suggested that there was a positive relationship between penalty rate and compliance. The average compliance rates per session are depicted in Table 2.

**Table 2:** Average compliance rates per session

| Session | Treatment | Non-salaried income | Salaried income | Total income |
|---|---|---|---|---|
| 1 | No treatment | 0.51 | 0.61 | 0.56 |
| 2 | Higher penalty rate | 0.55 | 0.67 | 0.61 |
| 3 | Higher audit rate | 0.56 | 0.76 | 0.65 |
| 4 | Higher audit and penalty rates | 0.48 | 0.59 | 0.53 |

**Source:** Author's own calculations.

In Session Three, the audit rate increased from 10 to 30%. Subsequently, compliance on non-salaried, salaried and total income respectively increased to 56, 76 and 65%, compared to Session One. These results suggested that there was a positive relation between audits and compliance rates. The results further suggested that audits were more effective in enforcing compliance than penalty rates.

In Session Four, audit and penalty rates increased from 10 to 30% and 150 to 300%, respectively. Compared to Session One, the average compliance rate decreased to 48, 59 and 53% for non-salaried, salaried and total income, respectively. These results suggested that individual taxpayers decreased their compliance rate when subjected to a combination of high audits and high penalty rates.

Importantly, Table 2 shows that individual taxpayers evaded more on non-salaried income than on salaried income; it applied across all sessions. This is further depicted in Table 3, which shows the overall mean compliance rates (i.e. compliance over all sessions).

**Table 3:** Descriptive statistics for overall compliance rates

| | Observations | Mean | Standard Deviation | Min | Max |
|---|---|---|---|---|---|
| Compliance rate on non-salaried income | 1 840 | 0.52 | 0.38 | 0 | 1 |
| Compliance rate on salaried income | 1 840 | 0.66 | 0.37 | 0 | 1 |
| Compliance rate on total income | 1 840 | 0.59 | 0.34 | 0 | 1 |

**Source:** Author's own calculations.

The overall mean compliance rate for non-salaried income was 0.52. This was lower than the compliance rate for salaried income, which was 0.66. The discrepancy in the compliance rates supported the notion that evading on salaried income yielded less value than evading on non-salaried income. Thus, a rational individual would evade more on non-salaried income than on salaried income. The discrepancy between these compliance values could be attributed to the disparity of detection rates between these two types of incomes.

As previously discussed, the second stage of the analysis entailed conducting some regression analyses. This sought to establish detailed causal relationships between compliance and the treatment variables. The regression analysis is discussed in the next section.

**Regression Analysis**

A panel regression model was run for each type of income (salaried and non-salaried), to establish treatment effects at an individual level. For robustness checks, a variety of regression specifications were conducted. Model 1 was the principal regression model, from which other models were derived. In the second model specification (Model 2), total income and the ratio of non-salaried to total income were excluded. This analysed the robustness of the model, which was mainly constituted of deterrence measures and control variables (the key variables). Model 3 further excluded previous audits and round effects. This was to examine the robustness of the model when it was mainly constituted of the key research variables (audit and penalty rates).

In regression analyses, compliance can also be defined as a binary that takes the value of 1 if the subject fully complies and 0 if otherwise, making it possible to employ a binary regression model to validate findings from the primary regression model. Considering that results from logistic and probit models are generally similar (Park 2010; Torres-Reyna 2017), this study employed a logistic model as its fourth model specification (Model 4). The regression results are depicted in Table 4 and are mostly robust across all model specifications.

The results showed that higher audit rates increased compliance rates. This applied to both salaried and non-salaried taxpayers. When exposed to a 30% audit rate, non-salaried taxpayers increased their compliance rate by 0.42 percentage points higher than when they were subjected to an audit rate of 10%. Similarly, when the audit rate was 30%, salaried income taxpayers increased their compliance rate by 0.35 percentage points higher than when the audit rate was 10%. These findings strengthen the position by Dubin Graetz, and Wilde (1990), Park and Hyun (2003), Alm, Jackson, and McKee (2004) and Asnawi (2016), who found a positive relationship between audit rates and compliance rates.

The results also showed a positive relationship between penalties and compliance. Taxpayers respectively increased their salaried and non-salaried income compliance levels by 0.20 and 0.21 percentage points, when subjected to a 300% penalty rate (as opposed to being subjected to a 150% penalty rate). These findings suggested that penalties were an effective instrument to stimulate compliance. However, penalties had a lower impact than audits.

Findings from this study also showed that audit and penalty rates had a negative joint effect on both salaried and non-salaried compliance rates. This implied that taxpayers reduced their salaried and non-salaried compliance levels when subjected to a combination of higher audit and higher penalty rates. The regression results showed that non-salaried income compliance rates declined by 0.19 percentage points, while salaried income compliance rates declined by 0.39 percentage points (when subjected to a combination of a 30% audit rate and 300% penalty rate), compared to when they were subjected to a combination of low audits and penalties.

**Table 4:** Regression results: deterrence measures

| Variables | Non-salaried compliance | | | | Salaried compliance | | | | Overall compliance | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | **Model 1** | **Model 2** | **Model 3** | **Model 4** | **Model 1** | **Model 2** | **Model 3** | **Model 4** | **Model 1** | **Model 2** | **Model 3** | **Model 4** |
| Total income | -0.001*** (0.000) | | | -0.009** (0.004) | 0.000** (0.000) | | | -0.004 (0.005) | 0.000*** (0.000) | | | -0.008 (0.005) |
| High audit rate | 0.419*** (0.023) | 0.420*** (0.024) | 0.302*** (0.017) | 12.514*** (2.341) | 0.348*** (0.026) | 0.355*** (0.026) | 0.249*** (0.019) | 14.564*** (3.190) | 0.386*** (0.021) | 0.386*** (0.021) | 0.261*** (0.015) | 16.173*** (4.243) |
| High penalty rate | 0.207*** (0.024) | 0.207*** (0.025) | 0.068*** (0.019) | 4.962*** (0.879) | 0.201*** (0.027) | 0.194*** (0.027) | 0.069*** (0.021) | 5.801*** (1.001) | 0.204*** (0.022) | 0.205*** (0.022) | 0.080*** (0.016) | 5.476*** (1.146) |
| High audit rate*High penalty rate | -0.190*** (0.035) | -0.189*** (0.035) | -0.051 (0.032) | -13.365*** (2.479) | -0.388*** (0.038) | -0.394*** (0.038) | -0.269*** (0.035) | -16.365*** (3.345) | -0.279*** (0.031) | -0.277*** (0.031) | -0.153*** (0.028) | -17.874*** (4.356) |
| Share of non-salaried income | -0.168*** (0.065) | | | -0.591 (1.868) | 0.156** (0.071) | | | -3.322 (2.155) | -0.169*** (0.057) | | | -1.193 (2.499) |
| Previously audited | 0.123*** (0.013) | 0.124*** (0.013) | | 1.894*** (0.464) | 0.113*** (0.015) | 0.111*** (0.015) | | 2.689*** (0.565) | 0.118*** (0.012) | 0.119*** (0.012) | 0.123*** (0.012) | 2.618*** (0.594) |
| Female taxpayer | 0.050 (0.059) | 0.050 (0.059) | 0.051 (0.059) | 2.214 (1.395) | 0.059 (0.057) | 0.060 (0.057) | 0.060 (0.057) | 2.818** (1.425) | 0.056 (0.055) | 0.057 (0.054) | 0.059 (0.054) | 4.839*** (1.830) |
| Non-tax filer | 0.106 (0.087) | 0.103 (0.087) | 0.099 (0.087) | 3.855* (1.976) | 0.074 (0.085) | 0.068 (0.085) | 0.064 (0.085) | 0.096 (2.353) | 0.098 (0.081) | 0.097 (0.080) | 0.09 (0.080) | 2.496 (2.521) |
| Constant | 0.503 (0.307) | 0.265 (0.302) | 0.254 (0.303) | 3.716 (6.746) | 0.345 (0.301) | 0.346 (0.294) | 0.341 (0.294) | 2.792 (6.739) | 0.492* (0.284) | 0.293 (0.279) | 0.279 (0.279) | 2.517 (7.547) |
| lnsig2u | | | | 4.087*** (0.252) | | | | 3.818*** (0.250) | | | | 4.276*** (0.275) |
| N | 1839 | 1839 | 1840 | 1769 | 1839 | 1839 | 1840 | 1679 | 1839 | 1839 | 1839 | 1569 |
| R-squared | 0.294 | 0.291 | 0.270 | | 0.259 | 0.252 | 0.227 | | 0.300 | 0.294 | 0.287 | |
| Log Likelihood | | | | -341.596 | | | | -268.700 | | | | -215.572 |
| p-value | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.004 | 0.000 | 0.000 | 0.000 | 0.000 |

Standard errors in parentheses * p<0.1, ** p<0.05, *** p<0.01.
**Source:** Author's own calculations

The negative joint effect of higher audit and penalty rates on compliance rates can be attributed to several factors. For instance, taxpayers may construe a combination of higher audit and penalty rates as a confirmation by authorities that non-compliance is widespread, which is a sign of a lack of capacity and ability to enforce compliance. Such a perception motivates taxpayers to reduce their compliance levels (see Alm and Martinez 2003, 150–151). Wahl et al. (2010, 386) highlighted that taxpayers may construe an increase in the audits and penalty rates as a sign of distrust by the tax authority. As trust is inherently reciprocal in nature, taxpayers will in turn lose trust in the authority, leading them to reduce their compliance levels; hence, the negative joint effect of higher audit and penalty rates on compliance (see also Gangl et al. 2014; Mohdali et al. 2014).

The results also showed that the overall compliance declined by 0.17 percentage points, following a 1 percentage point increase in the ratio of non-salaried income to total income. This implied that the composition of income had a significant effect on compliance. These findings indicated that, as the share of non-salaried income increased, taxpayers tended to evade more on the hard-to-detect income (non-salaried income) at the expense of the easy-to-detect income (salaried income), implying that individual taxpayers were risk averse—as postulated by Becker (1968), Allingham and Sandmo (1972), and Yitzhaki (1974).

In addition to the parameters discussed above, the study also investigated the effect of previous audits on compliance in subsequent periods. As pointed out by Alm, Deskins, and McKee (2009), the traditional deterrence theory argues that previous tax periods do not influence subsequent periods, suggesting that tax periods are independent of each other. Contrary to this notion, this study established that taxpayers increased their compliance levels in the period subsequent to the one in which they were audited.

Considering that the experimental setting for this study was context-rich (used explicit tax terms), it was possible that subjects who had been involved in tax filing before produced different cognitive responses from those of non-tax filers. Participants' filing experiences had therefore been controlled for in the regression model. However, the results showed no significant differences in compliance levels between these two groups of participants. This finding confirmed the results of Plott (1987), Alm and Jacobson (2007) and Alm, Bloomquist, and McKee (2015), who found no significant differences in behavioural responses between real taxpayers and non-taxpayers in an experimental setting.

The results of this study showed that female taxpayers complied more than males. This finding was contrary to Richardson (2006), who suggested that gender had no significant impact on compliance. A higher compliance rate by the females confirmed the findings of Engida and Baisa (2014), who found that women were more honest than men. These findings may also suggest that women were more risk averse than men. Other demographic variables that were controlled for included age, ethnicity, religion,

work experiences, academic discipline and level, family annual income level, and marital status. However, these control variables were found to be largely insignificant in explaining the differences between individuals' compliance levels.

## Contribution of the Study

This study contributes to the tax knowledge by establishing how salaried and non-salaried taxpayers respond to changes in audit and penalty rates. Existing studies have largely been focused on the effect of deterrence measures (audits and penalties) on tax compliance in its aggregated form. However, considering that the personal income tax system is constituted of primarily two types of taxpayers (salaried and non-salaried), it is imperative to examine how these two groups of taxpayers respond to the tax instruments. Using a novel experimental setting, this study showed that salaried and non-salaried taxpayers respond differently to changes in audit rates and penalty rates. Put differently, the key insight from this study is that personal income taxpayers' responses to audit and penalties differ with their source of income. This research therefore contributes to the existing literature on how audits and penalties may impact tax compliance.

## Conclusion and Policy Implications

Results from this study indicated that individual taxpayers evaded more on non-salaried than on salaried income. The study also established a positive relationship between the audit rate and compliance. Similarly, taxpayers increased compliance when subjected to higher penalty rates. These findings seem to confirm the propositions of the economics-of-crime theory (see Becker 1968). However, taxpayers reduced their compliance levels when subjected to a combination of higher audit and penalty rates.

Contrary to the traditional deterrence theory, this study found that taxpayers increased their compliance levels in the period subsequent to the one in which they are audited. The results also showed that taxpayers increased (reduced) their compliance on salaried income (non-salaried income), as the ratio of non-salaried income to total income increased. It has also been found that female taxpayers complied more than male taxpayers do.

The findings discussed above have some implications for both tax policy and tax administration. Firstly, audits and penalties are effective compliance-enhancement mechanisms, although audits are more effective than penalties. Considering that taxpayers increase compliance in subsequent periods to the one in which they are audited, it is imperative that the tax authority increases its audit sample, in addition to increasing the frequency of audits. The audit mechanism has to be comprehensive enough to make it difficult for holders of the "hard-to-detect income" to evade. However, considering that audits are a costly enforcement mechanism, it is imperative for the tax authority to ensure that the costs of carrying out an audit are less than the amount of evaded taxes.

Despite the fact that audits and penalties are powerful instruments to stimulate compliance, these measures should be applied with some caution. For instance, taxpayers may interpret threats of a combination of high audits and penalties as a confirmation by authorities that non-compliance is widespread, suggesting that the authorities lack the capacity and ability to detect it. As highlighted by Alm and Martinez (2003), such a perception by taxpayers reduces their intrinsic motivation to comply, resulting in a decline in voluntary compliance. More so, the decline in compliance rates following an increase in both audits and penalty rates confirms the proposition of the slippery model by Kirchler, Hoelzl, and Wahl (2008) that excessive enforcement reduces taxpayers' intrinsic motivation to comply, hence reducing voluntary compliance.

Considering that there is a negative relationship between compliance and the share of non-salaried income to total income, it is imperative that the authority pays more attention to high-net worth self-reporting taxpayers. Lastly, it is recommended that the authority pays more attention to male taxpayers, as they exhibit higher levels of non-compliance than their female counterparts.

## Limitation of the Study and Suggestions for further Study

This study was conducted with student subjects in the laboratory experiment. Although there is some overwhelming evidence that student subjects and real-taxpayer subjects produce similar cognitive responses in laboratory experiments, it would be important to replicate this study with non-student subjects to examine the robustness of the findings from this study. To further improve the external validity of this study, it would be recommended to replicate this study in a natural field experiment.

## Acknowledgements

I would like to thank Prof. Sophia du Plessis, Prof. Ada Jansen, Prof. Sally Wallace, Dr Andre Hofmeyr and Dr Prithvijit Mukherjee for their considerable input in this study. My thanks also go to the National Research Fund for the research funds, without which it would have been difficult to conduct the experiments.

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