

**THE SIZE OF THE TAX EVASION PROBLEMS ON SELF-EMPLOYMENT
INCOME: AN EXAMINATION OF EFFECTS OF TAX POLICIES ON
COMPLIANCE**

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ABSTRACT: *Income tax evasion is a significant problem faced by most of the countries around the world. The phenomenon interferes with economic efficiency, socially desirable income distribution, long term economic growth, and price stability. Therefore, a reform strategy to increase tax compliance with a concerted, long term, coordinated, and comprehensive plan is required. It is also vital that tax administrators ensure that every compliance policy instrument at their disposal is use as effectively as possible. The intent of this study was to consider the implications of the increase of tax evasion which has been a source of big concern to policymakers. Issues, such as tax compliance costs and revenue maximizing taxation have also been analyzed. This paper pulls together the various strains of research to illustrate the current state of knowledge regarding the impacts of tax evasion on the economy and to identify areas in which additional research is particularly warranted.*

KEYWORDS: Tax Evasion Problem, Self Employment Income, Sam Agbi, Underground Economy, Tax Compliance, Eniola Agbi

INTRODUCTION

The concept of the shadow economy was originally derived from the literature on problems of developing countries (Dell'Anno & Solomon, 2008; Gerxhani, 2004). Researchers in various disciplines determined that large groups of the population in developing countries were not absorbed in the modern economy. In 1963, the eminent cultural anthropologist, Clifford Geertz introduced two terms for this phenomenon: the firm-centered economy and the bazaar economy (Dell'Anno & Solomon, 2008; Geertz, 1978). Elaborating on this dualistic model, Hart (1973) in Johnson, Kaufmann, and Zoido-Lobaton (1998) introduced the terms formal and informal in his study on the employment structure in Accra, Ghana. In addition, with the International Labor Organization (ILO) report on the Kenyan economy and a series of World Bank studies in the seventies, the terms took root in the debate on economic development (Amar, 2004; Chatterjee, Chaudhury, & Schneider, 2006; Feld & Schneider, 2010). Although, in this way, the informal economy became a common sense notion, strict definitions were never agreed upon. The Dutch Board of Advice (on development questions) therefore qualified the term as *a notifying concept* (Bhattacharyya, 1999; Williams, 2004). The term *informal economy* kept its notifying function when researchers and politicians discovered that also in the developed countries of Western Europe, United States, and Canada economic activities took place outside the

scope and control of public authorities (Alexeev & Pyle, 2003; Cziraky, 2004, Williams, 2005).

The underground economy has become a topic for regular academic research (Schneider & Enste, 2003). Over the years, numerous studies have emerged, analyzing it in developing and developed countries, as well as in countries in transition from socialist to market oriented economies (Schneider & Enste, 2000). According to Kagan (1989) the term 'underground economy' refers to a broad phenomenon, including tax evasion, activities against government regulation, illegal activities, and hidden employment. Research usually focuses on any one of these in isolation, even though they are often directly or indirectly related to each other (Ahsan, 1990). This study focus on one of the phenomena related to the underground economy: tax evasion (Collins & Plumlee, 1991). According to Bruce (2002) there are two main reasons for focusing on tax evasion. First of all, it is directly linked to large budget deficits and hence to lower investments in public goods. Besides being of general interest from an economic point of view, this means that the effects may differ significantly depending on the level of development of a country. Second, studying tax evasion creates the opportunity to investigate the decision-making process related to the underground economy at the individual level (Parker, 2003).

The methods by which income is reported to the tax authority vary significantly across types of employment in the United States, Canada, and Nigeria (Kagan, 1989). One such difference is the requirement that employers must report their employees' income to the taxing authority referred to herein as a matched income arrangement while often the income of self-employed individuals is not reported by a third party referred to, correspondingly, as non-matched income (Schneider & Enste, 2000). This lack of secondary income reporting among self-employed individuals may decrease the likelihood that tax evasion among this group would be detected. Therefore, self-employed individuals would face a lower effective tax rate in a simple rational tax evasion model, all else equal, which would increase the relative return to self-employment and, perhaps inefficiently, increase the number of self-employed individuals (Alm & Michael, 1992).

Allingham and Sandmo (1972) argued that the alleged tax evasion among the self-employed provides significant motivation for an examination into the specific reasons that this group exhibits different tax compliance behavior, one of the foremost reasons being the lack of matched income reporting in this sector. The idea that the self-employed have different income tax compliance behavior is longstanding in the literature (Allingham & Sandmo, 1972). According to Andreoni and Feinstein (1998) the empirical literature has also supported the idea that evasion partially motivates the transition between self-employment and wage and salary employment. Bruce (2000) provides suggestive evidence that individuals enter into self-employment to exploit the tax evasion opportunities therewith associated.

Despite the large literature, no studies have been identified that use experimental economics methods to address the tax compliance behavior of the self-employed (Alm & Mckee, 2004). It is important to distinguish between different types of self-employed

income. Bartik (1989) states in almost every country, one can make a distinction between income that is officially registered and unregistered income. Registered income is generally observed in jobs within the public sector and in private sector employment with contracts. Typically, taxes are withheld from the regular wage payments when income is registered. Unregistered income can occur in cases where there is no job contract and in case of self-employment. In this case, income must be self-reported to the tax authorities in order to determine the income tax owed (Briscoe, Dainty & Millett, 2000).

Statement of the Problem

Income tax evasion is one of the important and highly debated topics in economic literature (Bartik, 1989). It is difficult to overstate the impacts of this phenomenon on modern economies. On the one hand, tax evasion means lower revenue generated for the government, all things being equal. On the other hand, evaded taxes might become an important source of private capital accumulation, which in turn, can be channelled into investment and might become essential for the long-run economic growth (Andreoni & Feinstein, 1998).

According to Alm & Mckee (2004), Gary Becker pioneered the analysis of illegal behaviour, which was first applied to the Problem of income tax evasion by Allingham and Sandmo (1972). Since then there have been numerous tax evasion models that frequently reach controversial conclusions. For example, Yitzhaki (1974) shown that an increase in tax rate makes people more honest in declaring their income. This result has been puzzling to many. Even though not all the empirical results contradict Yitzhaki's conclusion, some prominent authors, in analyzing the phenomenon, have proposed complete abandonment of the Benchmark portfolio choice model of tax evasion that is Allingham & Sandmo (1972) and Yitzhaki (1974) specifications and developed several new models ranging from static to dynamic ones.

Basically, income tax evasion can be divided into two categories. In the first category there are frameworks which elaborate on existing tax evasion models at the micro theory level and try to develop one leading to more consistent results from the view point of economic intuition and real world evidence (Kagan, 1989). These are mainly static models. Sometime they are tested empirically. In the second category, macro-economic implications of tax evasion are emphasized. These models are predominantly dynamic. Although analytically rich, the latter have not carefully considered many important questions, such as the level of capital accumulation, dynamic efficiency, and the consequent implications for saving and consumption in the economy (Collins & Plumlee, 1991).

As far as cross country analysis is concerned, an important point to consider is that different economies face different tax evasion gambles (Bartik, 1989). According to Kagan (1989) in modern developed economies such as United States and Canada taxpayers generally do not have control over amount of their income reported to the government. Their earning are reported to tax authorities by the third parties be it employers and other local financial intermediaries. However in many developing countries the reporting system is not that

advanced, meaning that income declaration is bilateral between a taxpayers and government. In the absence of other counter-acting incentives, the bilateral reporting opens up more possibilities for evasion and empirical studies should take into account that distinction between countries' tax systems. The main focus of this study will be to analyze the aforementioned theoretical questions by developing tax evasion models based on microeconomic decision making that have macroeconomic repercussions. Not only will the study focus on theoretical details, but also try to conduct some applied analysis.

Objective of the Study

This study will pursue four main objectives. The first objective is to critically assess Yitzhaki's finding within the benchmark tax evasion model, without abandoning the expected utility approach. The study will try to accomplish this within a static framework. The study is not targeting to resolve the theoretical contradiction of the benchmark tax evasion model, since it has already been resolved in previous studies. Further, the model may resolve a certain puzzle but fail to empirically confirm other patterns of observed economic behavior. In addition, the authors who were able to theoretically resolve the puzzle accomplished it by introducing new set of assumptions and by designing frameworks which are significantly different from the original one. Thus, the study is trying to understand whether it is possible to accomplish the same goal rather by staying very close to the original model formulation or if not, then why so. The importance of this is evident at least because some prominent studies proclaimed the benchmark tax evasion models completely useless (Briscoe et al., 2000). This study will also attempt to introduce a progressive tax rate structure, the absence of which is allegedly one of the main shortcomings of the benchmark models.

The second objective is to develop a new dynamic model of tax evasion, flexible enough to consider the Yitzhaki puzzle, and empirically assess various policy changes. Some other dynamic model will also be analyzed. In the models under consideration the study will also pay attention to the implications arising from the introduction of tax compliance costs. The third objective is to simulate the models, by relying on parameters for a number of countries. This cross-model and cross country- comparison may provide additional grounds for the criticism regarding various the critical underpinnings of the models. In the empirical section, the main focus is the United States economy but other countries will also be briefly analyzed. The study will also closely focus on international welfare comparisons. Finally, obtained qualitative and quantitative results will be used to suggest some modifications and extensions of theoretical modes.

The organization of this paper is as follows. In Part 2, the study reviews the relevant literature and discusses the models and evidence of tax evasion. Part 3 presents the experimental design and discusses the expected treatment effects. Part 4 presents the experimental results, which are discussed. And lastly, Part 5 presents summary, conclusions, and recommendations for further research.

LITERATURE REVIEW

Several studies have examined naturally occurring data to assess the different tax compliance patterns among the self-employed (Bruce, 2000). According to Joulfaian and Rider (1998) which of course is in part due to the less than perfect detestability of some self-employment income, arising from a lack of third party reporting, and are thus relevant to the current study. Since the papers by Allingham and Sandmo (1972) and Yitzhaki (1974), a large body of literature has addressed the determinants of self employed income tax compliance. In theoretical models of tax compliance, standard comparative static analysis shows that reported income varies positively with income, detection rate, and penalties; however, the tax rate effect is ambiguous (Feinstein, 1991). According to Witte and Woodbury (1985) the effects of the latter depend on attitudes toward risk and the penalty structure. If the penalty is based on the amount of taxes understated, then lower taxes may lead to more evasion (Yitzhaki, 1974), Graetz and Wilde (1985), and Pestieau and Possen (1991) extend this class of models by incorporating labor supply with nonlinear taxes and occupational choice, respectively.

A game-theoretic literature examines several aspects of tax compliance (Pencavel, 1979). Erard and Feinstein (1994) extend the work of Reinganum and Wilde (1986); formally incorporate honest taxpayers in their analysis. They find that policies designed to promote an increase in the proportion of honest taxpayers can have a beneficial impact on voluntary compliance. According to Joulfaian and Rider (1998) the resulting increase in tax revenue may be offset to a substantial extent by a decline in enforcement yield. Alm, Jackson and McKee (1992) add to a model of taxpayer compliance the provision of a public good financed with taxes subject to noncompliance. They show that policies designed to increase tax and audit rate uncertainty have a generally ambiguous effect on compliance. Using an experimental design with student subjects to simulate taxpayer responses, they find that the tax and audit rate response depends upon the presence or absence of a public good. Blau (1987) states when individuals perceive that they receive a public good in exchange for their taxes, uncertainty always lowers compliance. Lastly, Sansing (1993) examines the effect of information that helps the tax enforcement authority predict tax evasion on the strategic choices made by the taxpayer and the enforcement authority. He finds that such strategic behavior can increase tax evasion (Sansing, 1993).

In general, the theoretical literature shows that tax rates have an ambiguous effect on compliance, depending upon taxpayer attitudes toward risk, audit selection criteria (Alm, Jackson and McKee, 1992). Unfortunately, the empirical literature reports mixed results on the compliance effect of taxes as well (Erard & Feinstein, 1994). Clotfelter (1983) for instance, finds a negative correlation between marginal tax rates and income reporting compliance. While there seems to be a consensus that the self-employed have a greater propensity to underreport income, the literature does not provide much insight into why income reporting varies by source of self employed income (Sansing, 1993).

In addition, the empirical literature has found suggestive evidence that individuals enter into self-employment to take advantage of non-compliance opportunities (Parker, 2003).

More specifically, the common finding that higher tax rates lead to more self-employment is generally explained by the idea that higher tax rates drive individuals into self-employment to take advantage of the associated evasion opportunities (Blau, 1987). Bruce (2000) finds that higher tax rates, as well as the differential between the marginal tax rates on wage and salary and self-employment, both increase self-employment. Bruce (2002) asserts that a likely explanation for this result is that individuals may enter into self-employment to exploit the opportunities to evade taxes. According to Alm and Mckee (2004) despite this large literature, clear conclusions regarding the determinants and magnitude of tax evasion among the self-employed are still elusive. Of primary importance is a lack of fully reliable naturally occurring data given that evasion is difficult to capture for several reasons, especially because many taxpayers who underreport intentionally attempt to hide income so as not to be caught (Clotfelter, 1983).

The Standard Model of Taxpayer Compliance

As income tax evasion is widespread in both developing and developed countries, it is not surprising that this phenomenon attracts the attention of economists since the seminal contribution of Allingham and Sandmo (1972), where the government sets the penalty on the amount of concealed income. Allingham and Sandmo's static model of tax evasion predicts that if the government increases taxes, people can either increase or decrease tax compliance because of competing income and substitution effects brought by higher taxes (Caballe & Panades, 2007). However, in a remarkable note, Yitzhaki (1974) proved that when penalties are imposed on the amount of concealed taxes, as it is under most tax laws, a typical risk-averse taxpayer will increase income declaration in response to a higher tax rate (Ratbek & Gahramanov, 2008). This is because when taxes and penalty payments are proportional to each other; higher tax rates render substitution effect zero. The remaining income effect makes the taxpayer feel worse-off and thus increase compliance. This result sometimes is called in the literature as Yitzhaki's puzzle since it runs against most people's intuition and much of existing empirical evidence. Certainly, there is no lack of successful attempts to reverse Yitzhaki's result, but it is worth noting those attempts often significantly deviate from the original setting (Niepelt, 2005).

The formal economic analysis of income tax evasion was pioneered by Allingham and Sandmo (1972), where a rational and a moral taxpayer maximizes his expected utility, which solely depends on income (Ratbek & Gahramanov, 2008). When caught, the agent must pay penalties, imposed on the amount of evaded income. A key comparative static result is that when the tax rate goes up, competing income and substitution effects might lead to more or less tax compliance. The substitution effect encourages evasion since the marginal benefit of cheating goes up with the tax rate. On the contrary, the income effect tends to suppress evasion since higher tax rate makes the taxpayer with decreasing absolute risk aversion feel worse-off, and thus, decrease risk-taking; therefore, the net effect is ambiguous (Gahramanov, 2008).

However, Yitzhaki (1974) showed that when the penalty is imposed on the amount of evaded taxes, as it is under most current tax laws, the substitution effect vanishes. At the

original optimum, the penalty paid on concealed income increases proportionally with the tax rate, and hence, there is no substitution effect. The remaining income effect is responsible for inducing the taxpayer to cheat less. Therefore, the net effect is better compliance. Yitzhaki (1974) result is perhaps the single most important finding in the early tax evasion literature, having spurred a lot of remarkable extensions and discussions. Yitzhaki's findings often became a subject of harsh criticism and induced some authors to abandon the expected utility approach to the analysis of income tax evasion phenomenon (Gahramanov, 2008).

The standard Allingham and Sandmo (1972) and Yitzhaki (1974) models of taxpayer compliance are derived from basic microeconomic models of behavior (Gahramanov, 2008). Since the assumptions of such models are comparatively simple, one can add a fair level of institutional complexity to these models without making them cumbersome. This is one of the immense strengths of these models because of the ability to be modified to a large variety of circumstances (Gahramanov, 2008).

The Model:

In the Allingham-Sandmo (1972) and Yitzhaki (1974) spirits, w and x stand for the true and declared incomes, respectively. The risk-averse taxpayer's problem is to maximize his expected utility

$$E[U] = (1 - P)U(w - t(x)) + P^U(w - t(x) - F(t(w) - t(x)))$$

(1)

by optimally choosing x . Here p is the likelihood of getting caught, F is the fine rate ($F > 1$), and $t(x)$ is a general well-behaved tax function with $t'(x) > 0$ and $t''(x) > 0$.⁵ The symbols ' and '' stand for the corresponding first and second derivatives, respectively. The agent with zero income owes no taxes to the government, like in the Yitzhaki specification. It is obvious that the term $F(t(w) - t(x))$ stands for the total penalty payment when caught. Thus, the first-order condition is

$$\frac{\partial E[U]}{\partial x} = - (1 - P) U'(Y) t'(x) - P U'(Z)(1 - F) t'(x) = 0$$

(2)

$\frac{\partial}{\partial x}$

Where $Y \equiv w - t(x)$ and $Z \equiv w - F(t(w) - t(x))$. Expression (2) can be re-written as $-(1 - P)U'(Y) - P(1 - F)U'(Z) = 0$, which is consonant with Yitzhaki (1974). Problem (1) leads to the unique solution for the choice variable. Namely, observe that;

$$\frac{\partial^2 E[U]}{\partial x^2} \equiv D = (1 - P)[U''(Y)(t'(x))^2 - U'(Y)t''(x)] +$$

(3)

$\frac{\partial^2}{\partial x^2}$

$$P[U''(Z)((1 - F)t'(x))^2 + U'(Z)(F - 1)t''(x)]$$

Utilizing the first-order condition reduces (3) to

$$D = (1 - P)U''(Y)(t'(x))^2 + P U''(Z)((1 - F)t'(x))^2$$

(3') this is always negative. It is straightforward to show that the conditions for an interior solution can be simplified as

$$\frac{U'(w)}{U'(w - t(x))} < \frac{P(-1)}{1 - P}$$

(4)

$$U'(w - Ft)(w) \quad 1 - P$$

and

$$pF < 1$$

(5)

Equations (4) and (5) are identical to conditions (5)* and (6)*, respectively, in Yitzhaki (1994) with $\theta w = t(w)$.

Further, from (2) and (3') it can be established that

$$\frac{\partial x}{\partial F} = p \frac{t'(x)}{D} [U''(Z)(t(w) - x)(F - 1) - U'(Z)] > 0$$

(6)

and

$$\frac{\partial x}{\partial F} = -\frac{t'(x)}{D} [U'(Y) + U'(Z)(F - 1)] > 0$$

(7)

These are familiar results, specifically that heavier penalties and more aggressive monitoring encourage honesty. To find out the relationship between the tax rate increase and declared income, and to consider a non-uniform variation in the tax schedule, present the tax function for the initial amount of declared income and the true income level as $t(x) + f(x)$ and $t(w) + v(w)$, where $f(x)$ and $v(w)$ are the respective income-dependent shift functions (Sookram, Watson, & Schneider, 2008). Now, for the sake of illustration $f(x)$ and $v(x)$ represents τx and εw respectively, where τ is a shift parameter, augmented in the latter case by a constant $\varepsilon \leq 1$. Considering:

1. $\varepsilon = 1$ (Yitzhaki (1974) case). Differentiating (2) with respect to τ (and then evaluating the result at $\tau = 0$), recalling that $-(1 - p)U'(Y) - p(1 - F)U'(Z)$ is zero, and performing some algebra, results in

2.

$$\frac{\partial x}{\partial t/r=0} = -\frac{t'(x)}{D} U'(Y)(1 - P) [x[RA(Z) - RA(Y)] + F(w - x) RA(Z)]$$

Where $RA(\bullet) \equiv -U''(\bullet)/U'(\bullet)$. Note that $RA(Y) < RA(Z)$. It follows that (8) is positive. In the Yitzhaki (1974) formulation, $t'(x) = \theta$, which would also make (8) positive. According to Yitzhaki, when the tax liability function is presented as $t(x) + \tau x$, then the marginal tax rate automatically becomes $t'(x) + \tau$. Clearly, a change in τ translates into the change in the marginal tax rate as well. This is important because the puzzle involves an inverse relationship between the *marginal* tax rate and the amount of evaded income.

3. $\varepsilon < 1$, and is small. Consequently, equation (8) becomes

$$\frac{\partial x}{\partial t/r=0} = -\frac{t'(x)}{D} U'(Y)(1 - P) [x[RA(Z) - RA(Y)] + F(\varepsilon w - x) RA(Z)]$$

The sign of (8') is clearly ambiguous in Yitzhak's studies. Intuitively, when an increase in the tax rate at the taxpayer's optimum is associated with a smaller relative rise in the

endpoint of the tax rate bracket, then total penalty payments actually decrease at the initial amount of declared income, creating more incentives to tax evasion than before. It follows that the impact on the taxes evaded is less clear-cut (Ratbek & Gahramanov, 2008). This extra disincentive to income declaration is absent from the previous analyzes where the tax rate shift is uniform for any income level, naturally causing total penalty payments at the initial optimum to necessarily go up with the tax rate. Ratbek and Gahramanov argued that, there is no a priori reason whatsoever to believe that this is always the case in reality. Also previous studies overlook this complication, which, nevertheless, helps to restore the original ambiguity in the Allingham-Sandmo (1972) expected-utility framework in a very simple way. Yitzhaki (1974) formulation of the dishonest taxpayer's problem generated a puzzle that a higher tax rate encourages income declaration, which is contrary to most empirical evidences and economic intuition Babakus, Mitchell & Schlegelmilch, 2004).

Although various remarkable contributions predominantly deviating from the original analysis quite significantly, reconciled the puzzle within the neoclassical paradigm, Gahramanov's (2008) work was to accomplish the same goal with a minimum set of extra assumptions. Gahramanov argued that this can be done by revisiting the assumption that total penalty payments at the original optimum necessarily go up with a change in the tax policy. By allowing only a slight departure from the original framework without appealing to labor-leisure choice, honesty characteristics, prospect theory, Gahramanov concluded that the tax evasion framework of Allingham-Sandmo and Yitzhaki (1974) is legitimate. Gahramanov argued further that, it is premature to disregard Yitzhaki's earlier finding that higher taxes encourage compliance. Nevertheless, it will be interesting to know what additional light future empirical studies can shed on the validity of the analytical presumptions made in Yitzhaki's model of taxpayer compliance.

Model of Mixed Modes of Tax Evasion

Following Martinez-Vazquez's (1995) theoretical model with two modes of tax evasion, the basic research question is whether conventional results, compliance unambiguously varies positively with detection probabilities and penalties, hold when there are multiple modes of tax evasion (Martinez-Vazquez & Rider, 2005). From Martinez-Vazquez model, Cummings, Martinez-Vazquez, & Mckee (2006) approach was to extend Allingham and Sandmo's (1972) single income reporting model by introducing a second mode of tax evasion, reporting of deductions. By assuming that individuals maximize expected utility, EU , which depends on after-tax income ($Y - T$); where Y is lump-sum income and T is the true tax liability. Cummings et al. make the usual assumptions about the mono tonicity and concavity of the utility function, specifically $U' > 0$ and $U'' < 0$. In this framework, Cummings et al. assume there are two ways that an individual can avoid reporting T . Some amount of taxes, $E1$, can be avoided by underreporting income; an amount $E2$ can be avoided by over reporting deductions. Cummings et al. also assume $0 \leq E1 \leq T$, $0 \leq E2 \leq T$ and $0 \leq E1 + E2 \leq T$.⁵

According to Cummings et al. (2006), the probabilities of detection in modes 1 and 2 are assumed to be independent across modes but are determined endogenously by E within a

mode; thus, $P1 = P1(E1)$ and $P2 = P2(E2)$, respectively. Therefore, modeling detection probabilities as functions of the level of evasion undertaken in each mode allows to model alternative enforcement strategies employed by tax administration authorities, specifically, special examination initiatives and discriminate index functions (DIF) scores utilized by the tax revenue services departments to select returns for audit. From Cummings et al.'s mixed modes, a taxpayer who is detected attempting to avoid paying tax (evading) through mode 1 must pay the avoided tax ($E1$) and a penalty, or $(1+\theta1)E1$, where $\theta1$ is the penalty rate on evasion in that mode, Cummings et al assumed that penalties can be fully monetized.

Likewise, a taxpayer detected avoiding tax in the second mode must pay $(1+\theta2)E2$. To allow for portfolio behavior, Cummings et al. (2006) also assumed that $P1 < P2$ and $\theta1 > \theta2$. If both modes of evasion are used, there are four possible outcomes: (1) evasion is not detected in either mode, with probability $(1 - P1)(1 - P2)$; (2) evasion is detected in both modes, with probability $P1P2$; (3) and (4) evasion is detected in one mode but not the other, with probabilities $(1 - P1)P2$ and $(1 - P2)P1$ (Martinez-Vazquez & Rider, 2005). Accordingly, EU can be written as follows:

$$EU = (1 - P1) [(1 - P2) U(Z1) + P2U(Z2)] + P1[(1 - P2) U(Z3) + P2U(Z4)],$$

(1)

Where $Z1 = Y - T + E1 + E2$; $Z2 = Y - T + E1 - \theta2E2$; $Z3 = Y - T - \theta1E1 + E2$; and $Z4 = Y - T - \theta1E1 - \theta2E2$. Cummings et al. assumed that an interior solution ($E1 > 0$ and $E2 > 0$) always exists. To implement this basic model, Cummings et al. (2006) focus on a particular detection process that mimics the actual enforcement strategies pursued by a tax agency such as the Canadian Revenue Agency (CRA). Given that its audit budget is limited, the CRA will target for audit those for whom it expects the greatest return. Information provided in the tax return will be used to select individuals for audit. One such endogenous audit process is embodied in the discriminate index functions (DIF) used by the CRA. In its simplest form, endogenous audits are triggered by the deviance in the taxpayer's report relative to some established norms. The greater the deviance, the more likely the CRA will choose to audit. Many such rules are based on particular line items in the tax return, and an audit triggered for one item will not typically lead to an audit of other items. Since such endogenous enforcement initiatives do not affect the probability of detection on unrelated line items, special enforcement initiatives will be model as endogenous and independent detection probabilities.

According to the studies of Martinez-Vazquez and Rider (2005), it is assume that the detection probability in a particular mode increases with the level of evasion undertaken in that mode, but is independent of the level of evasion in the other mode. The rule can be expressed as $\partial P1/\partial E1 > 0$ and $\partial P2/\partial E2 > 0$, while $\partial P1/\partial E2 = \partial P2/\partial E1 = 0$. In this enforcement mechanism, endogenous enforcement implies the detection probability for any one mode is given by $Pi = \epsilon_i + g_i(E_i)$, ($i=1, 2$), where ϵ_i is a shift parameter and $\partial P_i/\partial E_i > 0$ and $\partial P_i/\partial E_j = 0$ for $i \neq j$. Cummings et al. (2006) investigated this audit program experimentally. The program contains sufficient realism to be a reasonable approximation

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of a class of CRA rules, while it is also simple enough to permit analysis of individual behavior. It is assumed that individuals attempt to maximize EU by selecting a portfolio of evasion. Therefore, the first-order conditions for an interior maximum of (1) are given by

$$\frac{\partial EU}{\partial E_1} = (1 - P_2)[(1 - P_1)U'(Z_1) - P_1' U(Z_1) - P_1 \theta_1 U'(Z_3) + P_1' U'(Z_3)]$$

(1)

$$+ P_2[(1 - P_1) U'(Z_2) - P_1' U(Z_2) - P_1 \theta_1 U'(Z_4) + P_1' U(Z_4)] = 0$$

$$\frac{\partial EU}{\partial E_2} = (1 - P_1)[(1 - P_2)U'(Z_1) - P_2' U(Z_1) - P_2 \theta_2 U'(Z_2) + P_2' U'(Z_2)]$$

(2)

$$+ P_1[(1 - P_2) U'(Z_3) - P_2' U(Z_3) - P_2 \theta_2 U'(Z_4) + P_2' U(Z_4)] = 0$$

In addition to the effect of detection probabilities and penalties on compliance in the targeted mode, it would be important to know whether Cummings et al. (2006) multiple modes of evasion are substitutes or complements to the standard Allingham and Sandmo (1972) and Yitzhaki (1974) models of taxpayer compliance. In fact, Cummings et al. (2006) were not able to determine a priori whether the multiple modes are substitutes or complements to Allingham and Sandmo (1972) and Yitzhaki (1974) single model. The comparative-static analysis was performed for all four policy parameters (penalty rates θ_1 and θ_2 and probabilities shift parameters ε_1 and ε_2 for modes 1 and 2, respectively. Cummings et al. first, allow only θ_1 to change; after solving the first-order conditions and applying the implicit function theorem, the comparative-static results of Cummings et al.'s theorem took the following general form:

$$A = (1 - P_2)[E_1 P_1' U'(Z_3) + P_1 U'(Z_3) - E_1 \theta_1 P_1 U''(Z_3)] \\ + P_2[E_1 P_1' U'(Z_4) + P_1 U'(Z_4) - E_1 \theta_1 P_1 U''(Z_4)] > 0,$$

and

$$B = P_1[-P_2' E_1 U'(Z_3) + (1 - P_2)E_1 U'(Z_3) + P_2' E_1 U'(Z_4) \\ - P_2 E_2 \theta_2 U'(Z_4)] \geq 0.$$

<

In conclusion, the simplest extension of the Allingham and Sandmo's (1972) model to multiple modes of evasion under risk aversion by Cummings et al. (2006) yields uncertain results with respect to the change in either mode of evasion in response to an increase in enforcement (increase audit probability or penalty). Importantly, Cummings et al. could not determine the sign of total evasion, Cummings et al. assumed risk neutrality, and then the model implies an increase in compliance in the targeted mode and no change in the untargeted mode in response to any of the tools of tax enforcement. Given the generally ambiguous results in the theoretical model for evasion with multiple modes of evasion, Cummings et al. turn to empirical work in an effort to resolve these ambiguities. It therefore appears that the conventional wisdom that increasing detection probabilities and penalties have an ameliorative effect on compliance is quite fragile when allow for multiple modes of tax evasion using Cummings et al. approach.

Importance of Tax Administration and Compliance

Tax administration dictates tax policy. Indeed, tax administration and compliance issues determine the broad evolution of tax systems. Sansing (1993) states the shift in industrialized countries over a century ago from reliance on excise, customs, and property taxes to corporate income and progressive income taxes can be explained, in large part, by the relative decline in the rural sector, the concentration of employment in large corporations and the growing literacy of the population.

In recent years, the shift away from these taxes toward tax systems that rely more on broad-based consumption taxes such as the value-added tax, flatter rate structures, and the adoption of “dual income taxes,” in which a progressive tax on labour income is accompanied with a low flat-rate tax on capital income, as adopted in certain Scandinavian countries, can be explained, in large part, by the forces of globalization and developments in financial innovation and the inability of tax administrators to develop technologies to cope with these forces and developments (Clotfelter, 1983).

Over the past century, changes in the size of governments themselves, and differences in the relative size of governments around the world, can be explained by changes and differences in the environment, resources and technologies available to the country’s tax administrators (Blau, 1987). According to Alm and Mckee (2004) aside from the role of tax compliance and administrative issues on the evolution and general features of the tax system, there is no question that administrative considerations influence, and often impose decisive limits, on particular tax laws. Bruce (2000) states the failure to tax all sources of economic power, such as the imputed rental value of homes or accruing capital gains are often justified by reference to practical concerns of administerability. According to Blau (1987) it is futile to design a complex and sophisticated response to a tax policy problem if the rules to implement the regime cannot be administered. Ensuring that taxes are collected from those who owed them has always been an elusive challenge for tax departments.

Kagan (1989) argued that it has never been easy to collect taxes from lawyers who take cash for a Saturday office visit; waiters who receive most of their income as tips; landlords who collect rent in cash; small business people who skim part of their profits or hire people off-the books; cash-only window cleaners, roofers and painters; or large corporations that contract out to sweat shops. It has been even more difficult to collect taxes from crack cocaine dealers, smugglers, hit-men and hit-women, and those who make their living defrauding and extorting their clients. According to Joulfaian and Rider (1998) the underground economy has always been diverse and even vaster than these examples suggest. But as if these traditional forms of tax evasion were not challenge enough, the combined effects of information technology and globalization is now alleged to allow those who have been able to hide in the shadow economy to evade paying their fair share of tax to disappear altogether (Bruce, 2000).

Many individuals are no longer tied to one national jurisdiction; those that are increasingly receive payments from work and investment abroad; anyone can have access to an overseas

bank; anyone with access to a computer can transact business anywhere in the world; property is becoming increasingly intangible and consumption difficult to locate; and, capital is becoming increasingly fungible and can be shifted relatively easily between jurisdictions. Schneider and Enste (2000) states these and other developments are said to call into question governments' continued ability to levy taxes in a world in which companies, assets and people are infinitely mobile. Blau (1987) states tax administrators face a formidable number of challenges in every country. In many developing countries tax administration reforms are needed simply to achieve macroeconomic stability. In countries with economies in transition there is a need to establish a tax administration that can respond to the demands of a growing market economy and the resulting increase in the number of taxpayers. In Russia, for example, it has been estimated that 90 percent of self-employment income is not reported to tax authorities. And the costs of collecting tax on the reported 10 percent were enormous: In 1996, 26 tax collectors were killed, 74 were injured in the course of their work, 6 were kidnapped, and 41 had their homes burnt down. In all countries tax administrators face the challenge of modernizing the tax administration so that it can operate effectively in an increasingly global economy (Alm & Mckee, 2004).

The Size of the Tax Compliance Problem

It seems appropriate to begin by examining one measure of the size of the problem faced by tax administrators, namely the tax gap or the size of the Tax evasion. Somewhat surprisingly, this basic and important piece of information is not known with any certainty in some countries. Upon reflection, it should be no surprise that reliable estimates of tax evasion are hard to come by; by their very nature these transactions are not reported. Kagan (1989) state tax evasion exists for the sole purpose of avoiding detection. There are no direct methods for measuring its size. Therefore, researchers have had to be creative and rely upon indirect methods of measuring it. Aside the need to draw inferences about the size of the unreported income based upon improvable assumptions, the data used for the various methods are subject to measurement errors and misrepresentations. Joulfaian and Rider (1998) states an initial difficulty is even specifying what it is that needs to be measured. The popular term, "the underground economy," is inexact, encompassing a wide range of economic activities. In part, this is reflected in the fact that there are so many adjectives used to describe this aspect of the economy: black, cash, covert, dual, grey, hidden, illegal, informal, invisible, irregular, marginal, moonlight, parallel, second, shadow, subterranean, twilight, under-the-table, unobserved, unofficial, unrecorded, unreported, are only a sample.

Investigators have developed complicated taxonomy's of "underground economies." Some of the more important distinctions are drawn between legal and illegal income, market and self performed services, income that should be taxable and income that should be recorded in government statistical accounts and income that should be taxable and income that is derived from activities that do not meet other government regulatory requirements. (Clotfelter, 1983) states the term the underground economy is used to refer to the value of economic activity that would be taxable was it reported to the tax authorities. But, of course, even this does not represent the amount of additional revenue that would be

collected by stricter enforcement. No one suggests that it should be possible to tax all of the income generated in an economy.

According to Schneider and Enste (2000) stricter enforcement would significantly affect the economic response of individuals in the underground economy some firms would go bankrupt, taxpayers would modify their labour supply, prices and income would change, and so on. The tax base would clearly be altered because of stricter enforcement. Thus, even the imperfect measures of tax gaps must be interpreted cautiously. They are only roughly suggestive of the possible effects of improvements in enforcement (Erard & Feinstein, 1994).

DESIGN AND RESEARCH METHODOLOGY

This paper pulls together the various strains of research to illustrate the current state of knowledge regarding the impacts of tax evasion on the economy and to identify areas in which additional research is particularly warranted. The experimental structure created in this study attempts to replicate the fundamental elements of the income tax in the United States and Canada that include the following steps (Alm, Jackson, & McKee, 2004). First, subjects earn income by performing a simple task. Then they report some or all of it to the taxing authority and pay taxes on the amount reported. Next, an audit is randomly determined with some known probability. If a subject is audited, whether unreported income is detected is randomly determined, also with a known probability. Finally, if an individual is not in compliance and is detected, he or she pays additional taxes owed plus a penalty. The success of this study hinges on whether this setting provides for the necessary degree of “parallelism” to the naturally occurring world that is crucial to the applicability of any policy oriented experimental result (Smith, 1982). More specifically, while the experimental setting need not attempt to capture all of the variation in the naturally occurring environment, it should sufficiently recreate the fundamental elements of the naturally occurring world if the results are to be worthy of consideration in policy debates. It should be noted that this experimental design uses non-neutral language (tax language) to better capture the naturally occurring environment (Ahsan, 1990). The experimental setting of this paper allows for an examination of five behavioral hypotheses. They are as below in Table 1

H1	Individuals are more likely to evade taxes when a larger share of their income is of the type that is not perfectly detectable by the tax authority
H2	Higher tax rates lead to lower levels of tax compliance.
H3	Higher audit rates lead to higher levels of tax compliance
H4	Higher wealth leads to lower levels of tax compliance.
H5	An audit in the previous round leads to higher levels of tax compliance in a subsequent round.

Table 1: *Behavioral Hypotheses*

The first hypothesis is the focal point of this study. No other studies have been identified that address this issue using experimental methods (Bruce, 2002). The detestability of income doubtless affects the expected value of compliance versus evasion and, accordingly, would affect compliance in a rational tax evasion model (Joulfaian & Rider, 1998). However, this issue remains an empirical question for several reasons. The first is, as with numerous experiments, individuals may not act in accordance with a rational tax evasion model. Second, these experimental results will provide information as to the relative magnitude of the effects of various parameters on tax compliance behavior (Alm, Jackson, & McKee, 2004).

Third, in a controlled experimental environment, the exact probability at which certain income types are detected can be analyzed. If it is determined that less than perfectly detectable income increases tax evasion, an examination of the specific probability of detection provides valuable information that can be used in determining the merits of designing policies to increase the likelihood that certain income types could be detected upon audit (Alm & McKee, 2004). The remaining hypotheses have been examined before in the literature. Feinstein (1991) states re-examination, while done mainly to complement the matched/non-matched income component of the study, is beneficial in and of itself for a two reasons. First, is that many of the earlier studies used only small sampling sizes and replication enhances the reliability of these studies. Second, the overall experimental design will be validated to some degree if results here match those of earlier studies.

The second hypothesis that evasion increases with higher tax rates contributes to the rather large literature on the topic in which theoretical predictions are ambiguous and empirical assessments are difficult to obtain (Andreoni, Erard & Feinstein, 1998). Similarly, audit rates certainly change the expected value of reporting income versus not reporting and would likely affect tax compliance (Briscoe, Dainty & Millett, 2000).

Participants

The population of this study included financial advisors, tax accountants, financial analysts, lawyers, and financial accountants, small business owners, and public, and private corporate employees from the three provinces of Alberta, Ontario, and Quebec indicated that the total population for this study was 1500 individuals (Alberta, 254; Ontario, 898; and Quebec, 348). A stratified sample design was used to randomly select a proportional number of respondents from each province. The survey was distributed electronically to randomly selected financial advisors, tax accountants, financial analysts, lawyers, and financial accountants, small business owners, and public, and private corporate employees. Participants received an invitation to participate, an informed consent form, two reminder emails, and a final email that indicated the last day that participants could access the survey.

Response rate. The study was conducted during a three-week period during June and July. The sample size for the survey was 333. The survey was successfully distributed to 309 participants (24 or 7.2%, were undeliverable), and 273 surveys were returned for an overall response rate of 82%. The adjusted response rate was 67% because out of 273 returned surveys, 224 surveys were complete, and the rest (49 or 14.7% surveys) were determined

to be incomplete and unusable. There is no universal agreement on response rate for electronic surveys; electronic survey response rate on a study like underground economy can range from 16% to 85% depending on the nature of the environment where the survey study is being conducted and the targeted population (Fowler, 2009; Schneider, 2007; Tedds, 2005; Tunyan, 2005). According to Schneider (2007), for underground economy surveying, a response rate of 60 to 85% is considered a high response rate.

Comparison of Expected Value of Compliance and Non-compliance

An important consideration is the expected value of reporting income versus not reporting. Table 3 reports the difference in the expected value of reporting 100 dollars of income versus not reporting any income for matched and non-matched income for each tax rate, audit rate, and non-matched income detection probability combination used in this study. If individuals followed simple mathematical models perfectly and were risk neutral, these expected value calculations would predict behavior without error, and an experimental test would be unnecessary. However, individuals are probably not perfectly risk neutral and also may not follow a simple model of income maximization (Plott, 1987).

In part, this study tests the perceptions of individuals. The individuals may have other reasons to comply or not, such as a moral values associated with compliance or “cheating.” They also may focus on certain parameters more than others simply due to their priors derived from the media or other sources. For example, an individual may overweight the tax rate simply because he or she is familiar with it from prior experience. Aside from these reasons, the expected value is still important because a simple rational tax evasion model likely explains a significant portion of individual behavior. The parameters are structured such that, for a risk neutral individual, it is rational to evade in most cases. Thus, the difference between the expected value of compliance and the expected value of non-compliance is negative in all but one case – with a low tax rate and a high audit rate on matched income. The design leans on the negative side because it is assumed that most individuals are risk neutral. Evading non-matched income always carries a larger expected gain relative to matched income, all else equal.

DATA ANALYSIS

In this study, an experiment is designed to test the effect of income that cannot be detected with certainty by the tax authority on tax compliance behavior (Madeo, Schepanski & Uecker, 1987). The results shed light on the issue of why the self-employed exhibit different tax compliance patterns relative to those in wage and salary employment if self-employment is often difficult to detect. Bruce (2002) states they also provide evidence that can inform policy debate surrounding the design of optimal audit mechanisms and other tax policies. According to Plott (1987) experimental methods provide several advantages in examining this issue. Most of all, an appropriately designed experiment allows for a better isolation of the fundamental influences of income detection rates on compliance. In addition, accurate tax compliance data are difficult to obtain in the naturally occurring environment because many individuals intentionally attempt to hide evasion (Smith, 1982).

Results indicate that individuals who earn a larger share of income that is difficult to detect exhibit significantly lower rates of tax compliance (Witte & Woodbury, 1985). In addition, results indicate that compliance increases when income that is not perfectly detectable carries higher rates of detection. In addition, results here can only be attributable to cheating since all relevant information is provided to the subjects (Scheutze & Bruce, 1982). Other results confirm the findings of earlier studies with the finding that lower tax rates and higher audit rates lead to significantly higher tax compliance rates. Alm et al. (2004) states this experiment suggests that individuals who prepare their own tax returns and wealthier individuals tend to evade significantly more. The question is still not completely resolved as to why the self-employed (whose income is presumably more difficult to detect) exhibit differing rates of compliance relative to those who are in wage and salary employment (Parker, 2003).

Descriptive Statistics

The Table 2 below is a summary of the overall tax compliance rate and compliance rates for matched and non-matched income separately.

Income Type	Compliance Rates
Overall	47.6 percent
Matched income	54.2 percent
Matched income	41.4 percent

Table 2: *Overall Tax compliance*

Results indicate that individuals report a much lower percentage of their non-matched income relative to matched income, providing evidence in support of the primary hypothesis. Figure 1 (see appendix) presents the distribution of average tax compliance rates for individuals, over 30 rounds, for matched and non-matched income. Average compliance rates are grouped into five ranges, 0-20 percent, 21-40 percent, and so on. Here, as always, tax compliance is measured as the percentage of a subject's gross income that he or she reports. Most individuals posted average compliance rates at the extremes, close to either 100 percent compliance or zero compliance. This dichotomy is expected if risk preferences do not change over the income range of this study. Regarding compliance patterns for matched and non-matched income, a fairly strong picture emerges from this figure. Specifically, a noticeably larger portion of the non-matched sample falls into the 0-20 average compliance rate range while a larger percentage of the matched sample falls into the 81-100 range. Indeed, 49.9 percent of subjects exhibited compliance rates that fall into the 81-100 percent range on their matched income while only 32.8 percent of individuals exhibited compliance rates this is high for their non-matched income.

Figure 2 (see appendix) presents overall compliance rates by the percentage of income that is non-matched, which alludes to the primary hypothesis that compliance decreases as more of an individual's income is non-matched. These simple results fail to provide evidence that a strong relationship between non-matched income share and tax compliance behavior exists. These descriptive statistics indicate that compliance rates are similar when subjects' non-matched income share is zero percent and 25 percent. However, overall compliance

rises slightly when income is evenly divided between matched and non-matched and then falls significantly as subjects receive 75 percent non-matched income before rising slightly again with 100 percent non-matched income. Of course, these simple statistics do not control for other factors that may influence tax compliance behavior.

Figure 3 (see appendix) continues this strand of analysis by presenting average tax compliance rates by the tax rate. As previously stated, it is theoretically unclear how compliance should respond to the tax rate. Here, results indicate that tax compliance decreases with higher tax rates, contrary to the hypothesis above. However, the drop is much larger moving between the 20 and 35 percent rate than between the 35 and 50 percent rate. Figure 4 (see appendix) presents compliance rates by income. While compliance increases between 60 and 70 labor dollars of income, average compliance rates decline fairly steadily as income rises above 70 labor dollars.

Regression Analysis

Results from several generalized least squares regression models are presented in Table 6 as previously stated, this mode of analysis allows for a more precise understanding of the relationships between the variables of interest. In this framework, coefficient estimates isolate the effects of the tax variables on compliance from every other factor included in the model, including subject-specific effects.

Baseline Model

Results from the baseline model are presented in the first column of Table 6, Model 1. Results support the primary hypothesis that tax evasion increases as individuals earn larger shares of non-matched income. Estimates indicate that tax compliance rates decline by 1.6 percentage points as the non-matched share increases by 25 percentage points. Relative to an average tax compliance rate of 47.6 percent, this indicates a fairly small elasticity. As previously stated, the probability that an individual's non-matched income is detected upon audit is also varied (Scheutze & Bruce, 1982). As expected, results indicate that a higher audit success rate leads to higher rates of tax compliance. More specifically, estimates indicate that tax compliance rates increase by 3.8 percentage points following an increase in the probability of detection of 25 percentage points.

Several of the other variables included in this regression are deserving of attention. Results indicate that higher income is associated with significantly lower levels of tax compliance. More specifically, an increase from 90 to 100 labor dollars would lower the percentage of income reported by 6.6 percentage points. In addition, results indicate that the tax rate is a statistically significant determinant of compliance. According to this model, a rate increase from 35 percent to 50 percent would lower compliance by 11.6 percentage points, a large change when considering average compliance rates. Results also indicate that higher audit rates lead to significantly higher rates of compliance. More specifically, increasing the audit probability from 10 to 30 percent would increase compliance by 4.9 percentage points, all else equal. The tax rate and audit rate results are consistent with the earlier findings of Alm, Jackson, and McKee (1992).

Robustness Checks

The second column of Table 6 (see appendix) presents a similar model with the inclusion of a dummy variable to denote whether an individual prepares his or her own tax return. These individuals may exhibit differing compliance behavior because they understand the tax system better due to their experiences with taxes. Alternatively, since most of the subjects are college students, many of those who have not filed their own tax return may simply have never been employed. Among those who have filed their own return, many may have worked as servers at restaurants and earned a significant portion of their income as tips.

Furthermore, the convention in many restaurants may be that individuals do not report a large portion of their tip income. Therefore, the individuals who have filed their own return may have simply grown accustomed to evasion. Results indicate that individuals who do prepare their own return are much less likely to fully comply. Estimates show that income reporting rates are 20.7 percentage points lower for individuals who file their own tax return relative to those who do not. Other results from this model are largely unchanged (Briscoe, Dainty, & Millett, 2000).

Model 3 of Table 6 (see appendix) modifies the baseline by adding subjects' total earnings up to a given point in the experiment (wealth). Here, individuals may attempt to enhance their earnings if they have performed poorly in previous rounds, resulting in a negative relationship between wealth and non-compliance. Alternatively, wealthier individuals could have different risk preferences or they may be better able to afford gambling. Results indicate that higher wealth is associated with less tax compliance behavior. The last robustness check, Model 4, involves the inclusion of a variable to denote whether an individual was audited in the previous round. As would be predicted in a rational tax evasion model, an audit in the previous round is not a statistically significant determinant of compliance.

SUMMARY, CONCLUSIONS, AND RECOMMENDATIONS

In most countries a small number of taxpayers account for most of the tax collections. For many types of taxes, five percent of taxpayers may account for 75 percent or more of total tax collections (Alm & Mckee, 2004). A consideration of income tax compliance behavior among self-employed individuals is warranted due to the costly distortions that could arise from asymmetric tax compliance patterns across groups. According to Parker (2003) a good system of sanction and penalties is an indispensable tool for enforcing compliance. As part of the assessment of the tax administration, the effectiveness of the sanctions and penalty systems in encouraging taxpayers to voluntarily comply with their tax obligations should be evaluated.

There is a considerable discussion in the economic literature of the role of sanctions and penalties in creating incentives for individuals to engage or not engage in tax evasion. Research has shown that lower penalties which are applied more consistently are more

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effective in deterring evasion than high penalties applied fairly infrequently (Alm & Mckee, 2004). An effective compliance program requires that the tax administration has sufficient powers to enable it to enforce compliance effectively. This includes powers to summon documents and witnesses, investigate financial transactions, collect information from third parties, search for and seize evidence of tax evasion and prosecute tax evaders. Obviously, adequate safeguards must be designed to prevent harassment of honest taxpayers and corruption (Briscoe, Dainty & Millett, 2000).

According to Parker (2003) the general penalties in most income tax systems can be divided broadly into four categories. (a) Penalties to ensure that the information required administering a self-assessment system and that individual must submit to the tax department are timely and complete. (b) Penalties to ensure that the information submitted to the tax department is accurate. (c) Penalties to ensure that tax is collected when required. (d) Penalties to ensure that tax preparers and others involved indirectly in the tax collection process meet some minimum level of ethical behaviour.

CONCLUSIONS

In this study, an experiment is designed to test the effect of income that cannot be detected with certainty by the tax authority on tax compliance behavior. The results shed light on the issue of why the self-employed exhibit different tax compliance patterns relative to those in wage and salary employment if self-employment is often difficult to detect. The results also provide evidence that can inform policy debate surrounding the design of optimal audit mechanisms and other tax policies. Experimental methods provide several advantages in examining this issue. Most of all, an appropriately designed experiment allows for a better isolation of the fundamental influences of income detection rates on compliance (Madeo, Schepanski, & Uecker, 1987).

In addition, accurate tax compliance data are difficult to obtain in the naturally occurring environment because many individuals intentionally attempt to hide evasion. Results indicate that individuals who earn a larger share of income that is difficult to detect exhibit significantly lower rates of tax compliance (Alm & Mckee, 2004). In addition, results indicate that compliance increases when income that is not perfectly detectable carries higher rates of detection. In addition, results here can only be attributable to cheating since all relevant information is provided to the subjects. Other results confirm the findings of earlier studies with the finding that lower tax rates and higher audit rates lead to significantly higher tax compliance rates. Furthermore, this experiment suggests that individuals who prepare their own tax returns and wealthier individuals tend to evade significantly more (Kagan, 1989).

The question is still not completely resolved as to why the self-employed (whose income is presumably more difficult to detect) exhibit differing rates of compliance relative to those who are in wage and salary employment (Parker, 2003). This research provides evidence that one reason for higher rates of non-compliance among this group is lower rates of detection associated with their income. However, other reasons may lead to the

overall level of non-compliance among the self-employed, such as the lack of income withholding for this group. Also, they simply may make more mistakes because their tax returns are usually more complicated than those of individuals who earn wage and salary income.

RECOMMENDATION

This research provides evidence that one reason for higher rates of non-compliance among self-employed is lower rates of detection associated with their income (Bruce, 2002). However, other reasons may lead to the overall level of non-compliance among the self-employed, such as the lack of income withholding for this group. Briscoe, Dainty, and Millett (2000) states they simply may make more mistakes because their tax returns are usually more complicated than those of individuals who earn wage and salary income. The paper makes two main, general points. First, there is no magic or quick solution to increasing tax compliance. A reform strategy to increase compliance requires a concerted, long term, coordinated and comprehensive plan. It is vital that tax administrators ensure that every compliance policy instrument at their disposal is being used as effectively as possible. Alm and Mckee (2004) states the uses of these instruments complement one another. In the light of changing social and economic conditions, tax departments must take a comprehensive look at their tax administration in order to assess how they can increase compliance.

A second general point meant to be made in the paper is that although the organization, personal, and operation of a tax department are obviously all important in increasing effective administration and compliance, the legal structure for tax administration is an often neglected but crucial foundation for implementing a comprehensive reform strategy (Kagan, 1989). Obviously the paper cannot contain a complete blueprint for a legal structure upon which the optimal use of the various instruments of compliance can be based. Indeed, the paper is not much more than an outline of the relevant points. Further research is required to verify the effects of these other factors and to measure their magnitude.

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Appendix

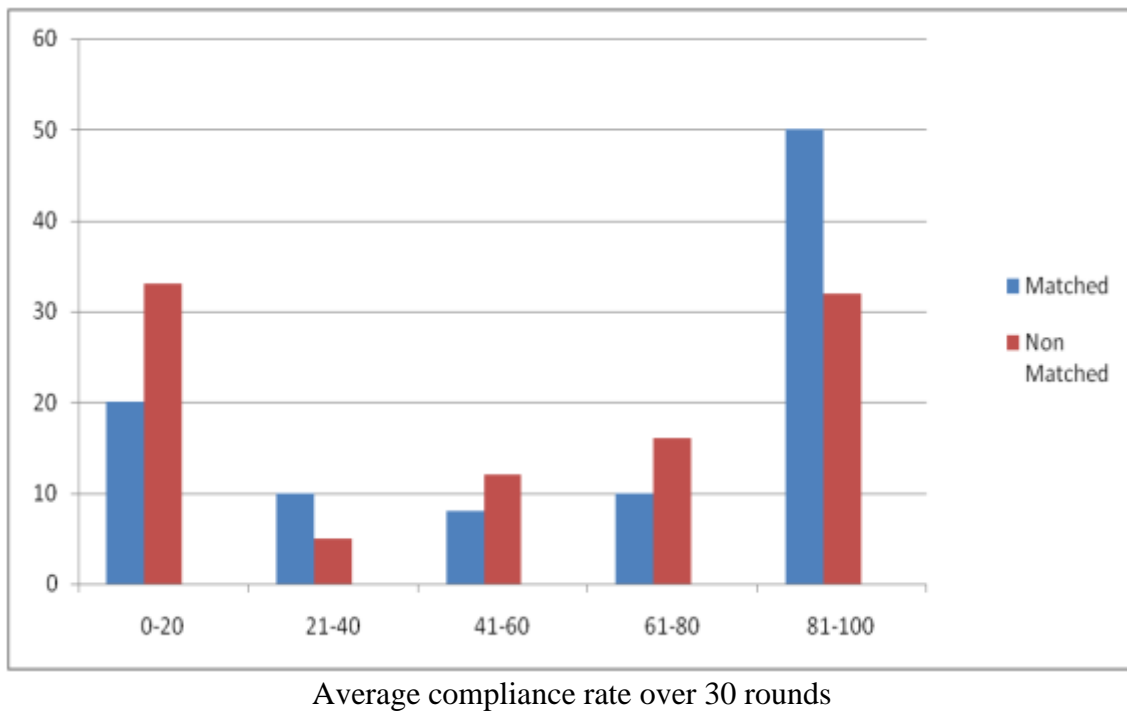


Figure 1 Distribution of average compliance rates

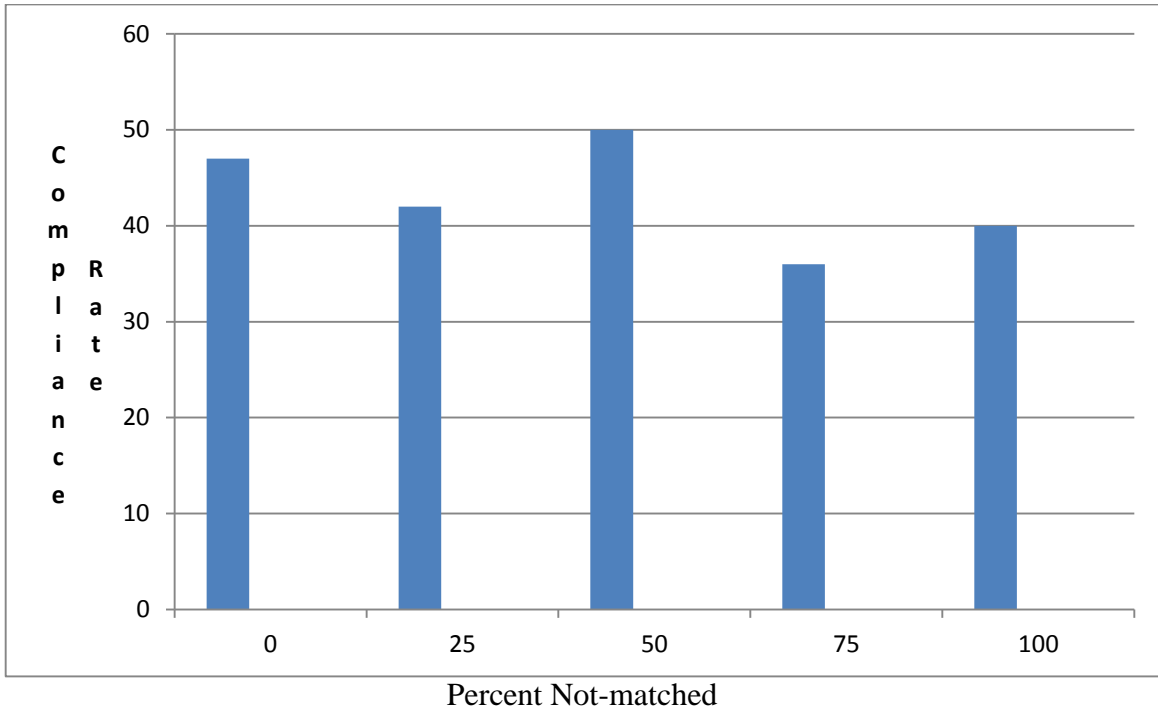


Figure 2: Compliance Rates by Non-Matched Share

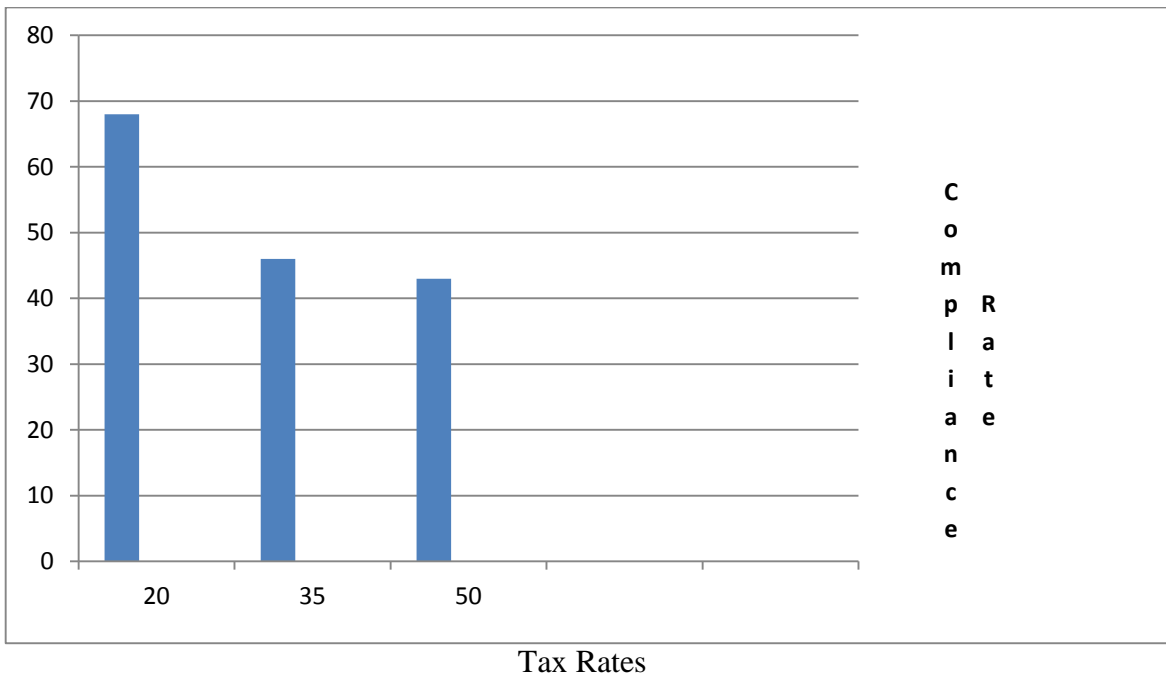


Figure 3: Compliance Rate by Tax Rate

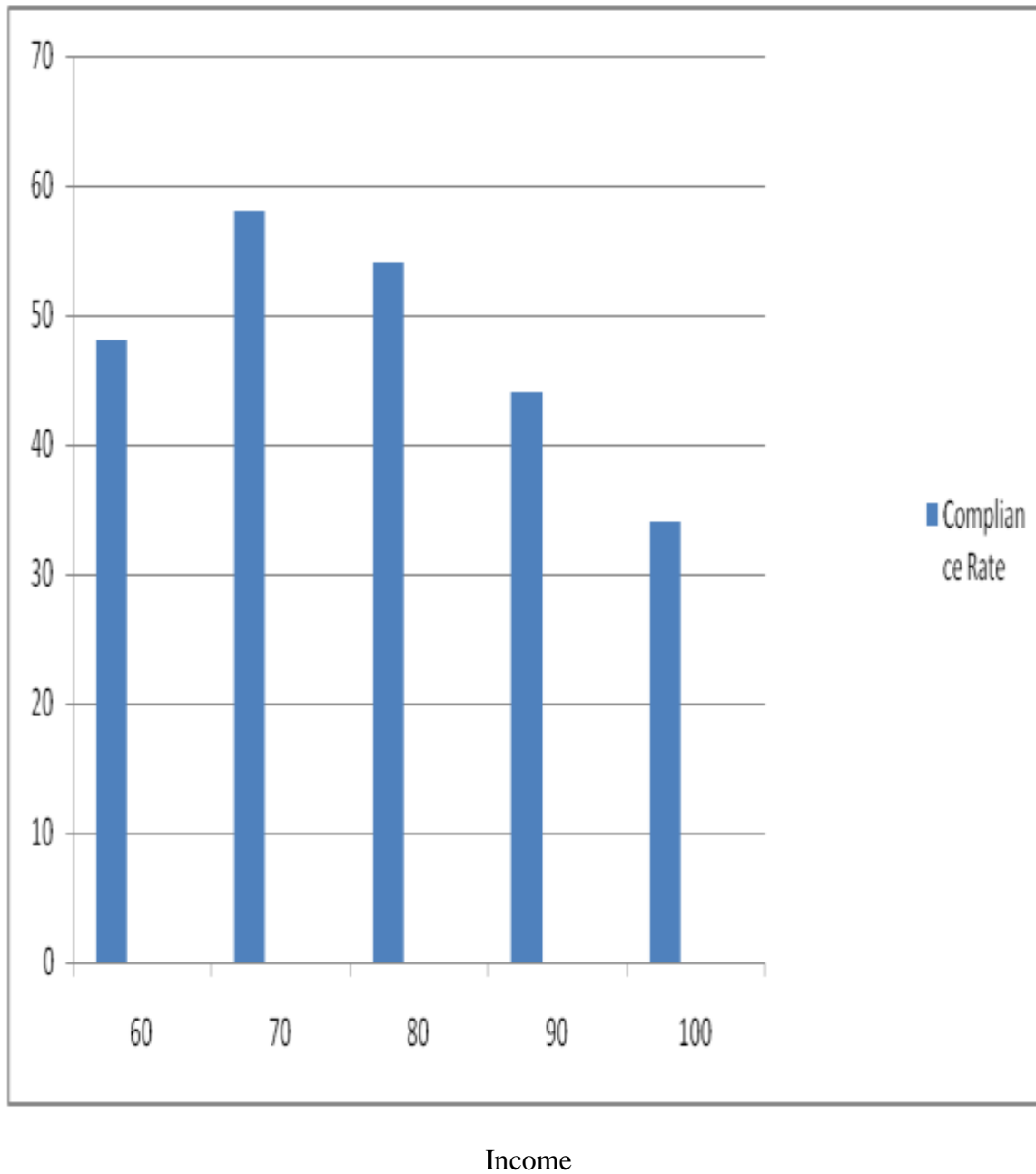


Figure 4: Compliance Rate by Income

Treatment	Percentage Non-Matched	Tax Rate	Audit Probability	Prob. of Detection
1	0	35	10 and 30	-
2	25	35	10 and 30	50
3	50	35	10 and 30	50
3	50	35	10 and 30	50
4	75	35	10 and 30	50
5	50	35	10 and 30	75
6	50	35	10 and 30	25
7	50	20	10 and 30	50
8	50	50	10 and 30	50
9	100	35	10 and 30	50

Table 3: *Experimental Design***Matched Income**

Tax Rate	Audit Rate	Expected Value of Compliance - Expected Value of Non-compliance
35	10	-26.5
20	10	-13
50	10	-14.0
35	30	-9.50
20	30	1.0
20	30	-20.0

Table 4: *Risk Neutral Individual Comply for Matched Income*

Non-matched Income

Tax Rate	Probability of Audit Detection Rate	Expected Value of Compliance - Expected Value of Non- compliance
35	50	-28.2
35	75	-29.8
35	25	-26.6
20	50	-14.00
50	50	-42.5
35	50	-14.7
35	75	-19.5
35	25	- 9.8
20	50	-1.9
50	50	-27.4

Table 5: Risk Neutral Individual Comply for Non-matched Income

These figures are based upon an income of 100 labor dollars and a penalty rate of 50 percent of unreported income.

Dependent Variables: Percent of Total Income Reported

variables	Model 1	Model 2	Model 3	Model 4
Percent Non-Matched	-0.062** (0.027)	-0.054** (0.026)	0.021 (0.026)	0.053*
Audit Success Rate	0.150*** (0.057)	0.104* (0.056)	0.106* (0.055)	(0.058)
Gross Income	-0.660*** (0.065)	-0.693*** (0.064)	-0.482*** (0.064)	(0.067)
Tax Rate	-0.776*** (0.098)	-1.023*** (0.098)	-0.882*** (0.095)	(0.100)
Audit Probability	0.245*** (0.070)	0.245*** (0.068)	2.087*** (0.126)	(0.074)
Prepare Taxes	- -	-20744*** (1.524)	- -	- -
Wealth	- -	- -	-0.034*** (0.002)	- -
Audit Last Round	-	-	-	-1.645 1.865
Constant	119.88*** (7.35)	139.43*** (7.31)	108.93*** (7.09)	119.48*** (7.49)

Table 6: Generalized Least Squares Regression Results

Entries are generalized least squares panel regression coefficient with standard errors in parentheses.

*, **, and *** denote statistical significance at the 10%, 5% and 1% levels

All percentages are on a 0-100 scale.