Do Differences in the Relevant Tax Knowledge of Self-Filing Taxpayers Lead to Differences in Unintentional Underreporting of Taxable Income on Individual Income Tax Returns?

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Abstract

The tax gap has been increasing in recent years leading to an adverse effect on the finances of federal, state, and local governments that rely heavily on tax revenue to fund social programs and planned developmental projects. A reduction of the tax gap would require improvements in tax compliance rates using both enforced and voluntary compliance approaches. Poor tax knowledge can lead to the unintentional underreporting of taxable income by some taxpayers to tax authorities. The purpose of this quantitative study was to examine the association between the relevant tax knowledge of self-filing taxpayers and their sex, age, income level, and educational level in order to address the problem of how differences in the relevant tax knowledge of self-filing taxpayers could lead to differences in unintentional underreporting of taxable income on their individual income tax returns. 109 Maryland residents completed the 27-question survey assessing relevant tax knowledge. Chi-square test of independence between relevant tax knowledge and each of the following demographics factors: sex, age, income level, and educational level were performed. The results of the study show that there is no statistically significant association between taxpayers' relevant tax knowledge and each of the following demographics: sex, age, and income level. The results also showed that a small but statistically significant association exists between taxpayers' relevant tax knowledge and their educational level. It is recommended that tax education aimed at improving tax compliance by reducing underreported taxable income due to poor tax knowledge should target taxpayers at the same or similar rates irrespective of their sex, age, income level, or educational level. Further research in this area can increase the scope of this study by including more demographic factors and participants from different states, and countries to determine whether this study's findings are pervasive.

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Chapter 1: Introduction

Federal, state and local governments in the United States collect taxes to fund social programs, infrastructure development, national defense, law enforcement, and retirement benefits. The federal government generates almost half of its tax revenue from individual income tax with the remaining coming from payroll tax, corporate tax, excise tax, estate tax and profit on assets held by the Federal Reserve ("Policy Basics: Where Do Federal Tax Revenues Come From?", 2018). The Internal Revenue Service (IRS) has the responsibility of administering and collecting taxes on behalf of the federal government. Failure by taxpayers to voluntarily comply (file and pay their tax liability on time) affects the government's ability to undertake all planned operations.

The tax gap, which is the difference between the amount of tax liability owed to a tax authority and the amount paid by taxpayers, has been increasing. The most recent tax gap estimate done by the IRS in 2016 covering years 2008 to 2010 estimated the gross tax gap at $458 billion with underreporting of income, underpayment of tax liability, and nonfiling accounting for $387 billion, $39 billion, and $32 billion of the tax gap, respectively (IRS Research, Analysis & Statistics, 2016). The IRS also estimates that only $52 billion of the gross tax gap will eventually be collected from taxpayers through enforcements leaving a net tax gap of $406 billion. The gross tax gap was $345 billion and $450 billion for tax years 2001 and 2006 respectively (IRS Research, Analysis & Statistics, 2016). Tax noncompliance in the form of underreporting of taxable income, underpayment of tax liability, and nonfiling of tax returns has led to the federal government losing billions of dollars since only a small percentage of the tax gap is eventually collected through audits and enforced payments. It is evident from the above figures that underreporting of taxable income contributes the most (84.5% for 2008 to 2010 tax

years) to the tax gap prompting the need to find effective means to reduce underreporting of taxable income by taxpayers on their individual income tax return.

An essential factor to consider is taxpayers' intent. For taxpayers who underreport their taxable income unintentional due to insufficient knowledge on which types of income are taxable, it is possible to reduce underreporting by providing them with tax education. However, no to little positive results would be achieved when tax education is provided to taxpayers who intentionally decide to cheat on their individual income tax returns. Such taxpayers may be better handled by increasing the audit rate (Phillips, 2014; Tan & Yim, 2014), increasing penalties (Fochmann & Kroll, 2016; Langenmayr, 2017) or providing other forms of education in order to change taxpayers' stance on paying taxes due to mistrust of government, use of tax revenue, and unfairness of the tax system. Knowing the level of tax education needed by each category of taxpayers would allow the IRS to strategically provide tax education to certain taxpayers in order to reduce underreporting of taxable income. For example, if certain groups of taxpayers have statistically different levels of tax knowledge compared to other groups, then increasing penalties for underreporting of taxable income at the same rate for all taxpayers would be harsh on taxpayers who underreported their taxable income unintentionally due to their poor tax knowledge.

Research shows that tax compliance is influenced by the various factors some of which are sex (Dulleck et al., 2016; Kogler et al., 2016), age (Hofmann et al., 2017), income level (Grundmann & Graf Lambsdorff, 2017), and educational level (Rodriguez-Justicia & Theilen, 2018). This study will examine the existence and strength of the relationship between taxpayers' relevant tax knowledge and each of the following factors: sex, age, income level, and educational level. For the purpose of this study, relevant tax knowledge is defined as taxpayers' ability to

determine whether types of earned and unearned income that they receive or have ever received are taxable or nontaxable. The identification of differences in the relevant tax knowledge among taxpayers can help the IRS to determine the appropriate type and level of tax education to give to each group of taxpayers. This would improve voluntary tax compliance which is considered as a more permanent and cost-effective means of reducing the tax gap compared to enforced tax compliance through audits and penalties (Jimenez & Iyer, 2016).

Problem Statement

The problem addressed by this study was how differences in taxpayers' relevant tax knowledge levels can lead to different rates at which taxpayers unintentional underreport their taxable income on their individual income tax return. The three most recent gross tax gap estimates by the IRS covering tax years 2001, 2006, and 2008 to 2010 put the figure at $345 billion, $450 billion, and $458 billion, respectively (IRS Research, Analysis & Statistics, 2016). The increase in the gross tax gap is a direct result of the continual decline in the voluntary tax compliance rate, which is the amount that taxpayers pay voluntarily expressed as a percentage of the actual tax liability owed by taxpayers on their individual income return. Underreporting of taxable income on individual income tax return is the highest single component causing the gross tax gap, as it accounted for $235 billion or 52.2% of the gross tax gap attributed to all sources and 62.5% of the gross tax gap attributed to individual income tax for the 2006 tax year. Underreporting of taxable income on individual income tax return also accounted for $264 billion or 68.2% of the gross tax gap attributed to all sources and 57.6% of the gross tax gap attributed to individual income tax for the 2008 to 2010 tax years (IRS Research, Analysis & Statistics, 2016).

The increasing tax gap has an adverse effect on the nation's finances. Alm and Soled (2017) note that "the most obvious impact is that it contributes to larger federal government budget deficits, forcing either spending cuts or tax increases" (p. 527). Services received by the public are affected by the actions of noncomplaining taxpayers. Morgan-Thomas and Levine (2012) also note that "reducing the tax gap is an essential step in reducing ongoing federal deficits, leading to improved fiscal health and alleviating cause for future tax increase legislation" (pp. 34-35). The IRS, therefore, need specific goals and strategies to improve tax compliance (McTigue Jr., 2017). Identifying the type of tax education needed by a specific group of taxpayers can help improve voluntary tax compliance.

Statement of Purpose

The purpose of this quantitative correlational study was to examine the relationship between the dependent variable (relevant tax knowledge of self-filing taxpayers) and each of the following independent variables: sex (male = 1, or female = 2), age (in years), income level (in dollars and cents), and educational level (in years of education). For the purposes of this study, taxpayers' relevant tax knowledge is defined as their ability to determine whether the income they have ever earned or received is taxable or non-taxable. Relevant tax knowledge score for each survey participant was calculated by dividing the total number of relevant tax questions answered correctly by the total number of relevant tax questions**.** It is expected that taxpayers know whether types of income that they earn or receive are either taxable or nontaxable. Taxpayers who cannot determine whether their earned or unearned income is taxable or not can unintentional underreport their taxable income on their individual income tax return. The study focused on taxpayers' relevant knowledge on only income types they have ever earned or received since only their knowledge of these types of income as taxable or nontaxable can lead to

unintentional underreporting of taxable income. In essence, the relevant tax knowledge for some taxpayers may not be relevant tax knowledge for other taxpayers. Taxpayers' lack of knowledge on income types that they have never earned would not impact their compliance on reported taxable income. It is also possible that taxpayers would research as they earn income from new sources as to whether such income is taxable or not. Including participants' responses to questions on all types of income was therefore likely to cast doubt on the results of the study.

The study also focused on only taxpayers who file their own tax returns since including taxpayers who use the services of tax professionals in filing their taxes could have affected the validity of the study. Tax professionals are knowledgeable on taxable and nontaxable income and have less tendency to mistakenly underreport taxable income. Therefore, excluding taxpayers who use the services of tax professionals increases the validity of the result of the study. The target population for the study included Maryland state taxpayers with a minimum required sample size of 108. Survey questionnaires were emailed to participants who were selected randomly to ensure a similar representation of all demographics in the study. A correlational analysis was used for hypothesis testing to determine the existence and strength of the relationship between the dependent variable (taxpayers' relevant tax knowledge) and each of the independent variables (taxpayers' sex, age, income level, and education level). The results of the study shed more light on the relationship between taxpayers' relevant tax knowledge and underreporting of taxable income on taxpayers' individual income tax return considering taxpayers' sex, age, income level, and educational level. The findings of the study show which groups of taxpayers should be targeted more for tax education in order to reduce unintentional underreporting of taxable income and ultimately increase the tax compliance rate.

Theoretical Framework

The illegal nature of tax noncompliance makes its study challenging. The tax gap is estimated by the IRS using various methods, assumptions and data sources (IRS Research, Analysis & Statistics, 2016). Alternative methods of estimating the tax gap are necessary since no particular method can adequately estimate all components of the tax gap. Irrespective of the complementary methods used in estimating the tax gap, its true extent can never be known since the estimate is as reliable as the approach used. The fact that the tax gap is estimated by the IRS periodically with available techniques that offer various degrees of reliability demonstrates that tax noncompliance is a major issue facing the agency and other state tax agencies. A wide range of research has been done on tax noncompliance which is mainly in the form of underreporting of taxable income by taxpayers. The theories that attempt to explain the reasons behind taxpayers' noncompliance and proposed solutions that can help reduce taxpayers' noncompliance can be group into expected utility theory, prospect theory, social comparison, and equity theory.

The expected utility theory formulated by Von Neumann and Morgenstern (1944) states that people will act in a rational manner that maximizes their expected utility when the outcomes are risky with associated probabilities of occurrence. Allingham and Sandmo (1972) applied the expected utility theory to explain the tax compliance behavior of taxpayers. The expected utility theory for tax compliance developed by Allingham and Sandmo (1972) assumes that taxpayers are rational individuals would behave in a manner that maximizes their expected payoff under given parameters which are the tax rate, probability of detection, and the penalty for underreporting taxable income. Allingham and Sandmo's expected utility model is stated as:

$E[U(X)] = [1- p]U(Y_n) + pU(Y_d)$

where $Y_n = Y - tX$; and $Y_d = [1- t]Y - Ft[Y - X]$

Y_n: Taxpayers' income when underreported income is not detected

Y_d: Taxpayers' income when underreported income is detected

Y: The taxable income earned by the taxpayer

X: The portion of the income the taxpayer declares to tax authority with $X \leq Y$

F: Fine or penalty applied to unreported income

t: Tax rate which is assumed to be fixed

p: The probability of detection

A taxpayer earning a taxable income of Y can decide to report only portion X to tax authorities. Unreported taxable income that is detected by tax authorities attracts a fine (F), which is a function of the underreported income. Taxpayers declare the optimal portion of their taxable income to tax authorities so as to maximize their expected income by taking into consideration the tax rate, probability of detection and the penalty for not declaring all their taxable income. Arguments against the expected utility theory center on the model's assumptions. The assumption that taxpayers know the precise probability of detecting underreported taxable income is heavily criticized because most taxpayers do not have that level of knowledge (Phillips, 2014). Most taxpayers do not also have the ability to process all information and compute their expected utility function to make optimal decisions that serve as a form of inertia (Saez & Stantcheva, 2016).

The expected utility model also does not consider other factors such as the tax morale of taxpayers and other non-monetary costs in the form of disgrace, guilt, regret, and damage to their social status should their tax noncompliance be known by others which motivates them

intrinsically to be tax compliant (Coricelli et al., 2014; Dwenger et al., 2016; Luttmer & Singhal, 2014). The expected utility model for tax compliance developed by Allingham and Sandmo (1972) failed to provide an answer to the question as to whether the reported income would increase as the disposable income of taxpayers increases. To answer this question, Yitzhaki (1974) modified the expected utility model by considering only the penalty that is applied to the amount of evaded tax and obtained results that show tax noncompliance decrease as the tax rate increases. Yitzhaki's result, however, contradicts other studies (Appel & Orenstein, 2013; Pántya et al., 2016) that show there is a positive correlation between noncompliance and tax rate.

The prospect theory developed by Kahneman and Tversky (1979) is based on the assumption that losses and gains are not viewed by taxpayers in the same way. The payoff function under prospect theory is S-shaped: convex below the reference point or in losses and concave above the reference point or in gains. The prospect theory also uses weighted probabilities in determining the payoff for evading taxes by underreporting taxable income given the tax rate, audit rate, and penalty assessed on the unreported income upon detection. Taxpayers tend to choose a situation that is framed to make it look like a gain over the one that is framed to make it look like a loss when in fact the two situations yield the same results. This is due to how losses and gains are valued differently by taxpayers (Ohlsson et al., 2015). The prospect theory yield results that are more similar to what is observed in real life than the expected utility theory (Barberis, 2013). For example, most taxpayers prefer a certain outcome with a lower payoff to an uncertain outcome with a higher expected payoff (McKee et al., 2018). Taxpayers are loss averse and they exhibit this by been more aggressive with their tax deduction and underreporting their taxable income in years when they owe a tax liability than in years when they receive a tax refund (Bhattacharjee et al., 2015).

Social comparison theory consists of "several explanations for how individuals compare their tax situation with others in an attempt to determine the degree of satisfaction" (King & Sheffrin, 2002, p. 509). A specific type of social comparison is the equity theory which is based on the premise that taxpayers would be more compliant on their tax returns if they view the tax system as fair (Thibaut et al., 1974). Taxpayers who view the tax system as unfair and that they pay more taxes than others whether, in terms of absolute amount, the marginal or effective tax rate can underreport their taxable income in order to restore equity (Grundmann & Graf Lambsdorff, 2017). Some taxpayers are influenced by the actions of other taxpayers in similar tax situations and tend to act in a similar manner (Alm et al., 2017b). Taxpayers also view equity in terms of social and psychological factors. For example, taxpayers who view the tax system as unfair redistribution of wealth are less compliant compared to those who support the use of tax revenue for social programs (Doerrenberg, 2015; Fochmann et al., 2016).

A majority of the research on tax compliance make the assumption that taxpayers intentionally decide not to comply on their taxes but other studies have also shown that some tax noncompliances are unintentional due to errors, poor tax knowledge and complexity of the tax code (Ritsatos, 2014, Yaniv, 2013). Prior studies on the relationship between tax knowledge and the level of tax compliance focused on the overall tax knowledge of taxpayers (Hassan et al., 2016; Saad, 2014). This study limited the tax knowledge to those that are relevant to taxpayers since not all taxpayers have the same sources of income. The results obtained from this study provided a more precise relationship between relevant tax knowledge and the underreporting of taxable income by taxpayers.

Nature of the Study

The main purpose of this quantitative correlational study was to examine the relationship between self-filing taxpayers' relevant tax knowledge and each of the following factors: sex, age, income level, and educational level. The problem addressed was how taxpayers' relevant tax knowledge is affected by their sex, age, income level, and educational level. Taxpayers can unintentionally underreport their taxable income due to lack of tax knowledge and this study explored the relationship between self-filing taxpayers' relevant tax knowledge and each of the following factors: sex, age, income level, and educational level.

A correlational research design was used in this study since it is most suitable for examining the existence and strength of the relationship between dependent and independent variables. Type I error, which is rejecting the null hypothesis when it is true and Type II error, which is accepting the null hypothesis when it is false work in opposite directions but both should be minimized in a study. Since decreasing one type of error increases the other, the appropriate balance should be used. The study used the conventionally beta/alpha ratio of 4:1 in order to balance the risk of committing Type I and Type II errors (Cohen, 1992). This allows the study to have enough power to detect any true relationship between the dependent and independent variables and also lower the risk of committing a Type I error (Faul et al., 2007). The study used a G*Power Software with the following specifications: Test family: χ^2 test; Statistical test: Goodness-of-fit tests: Contingency tables; Type of analysis: A prior: Compute required sample size - given α, power, and effect size; and determined the minimum sample size needed for the study at 108 where size effect w = 0.3, α = 0.05 and β = 0.2, power (1- β) = 0.80, and Df =2 (Appendix A).

The population for this study consisted of all Maryland state taxpayers who file individual income tax returns. The sample consisted of a minimum of 108 Maryland state taxpayers who filed their 2018 individual income tax returns on their own without using the services of tax professionals or help from knowledgeable family members and friends. Selection bias was a potential internal validity threat to this study and to reduce the threat, participants for the study were selected at random. This ensures that all groups of taxpayers are fairly represented in the study. The survey questions on relevant tax knowledge included only taxable earned and unearned income. It is expected that taxpayers know whether types of income that they earn or receive are taxable or not. Survey participants were asked to indicate by each question on taxable income whether they have ever earned or received the income type referenced in the question. If the participant answered "yes" to ever earning or receiving a particular type of income, that question was classified as relevant tax knowledge question for that particular participant. If a participant answered "no" to ever earning or receiving a particular type of income, that question was not considered as relevant tax knowledge question for that participant. For each participant, the total number of relevant tax knowledge questions answered correctly was divided by the total number of relevant tax knowledge questions to obtain a relevant tax knowledge score. A correlational research design was then be used to examine the existence and strength of the relationship between the dependent variable (relevant tax knowledge) and each of the independent variables (sex, age, income level, and educational level).

Research Questions

A quantitative correlation study was conducted to examine the association between taxpayers' relevant tax knowledge and their sex, age, income level, and educational level. The study was addressed by using the following research questions:

RQ1. Is there an association between self-filing taxpayers' relevant tax knowledge and their sex?

RQ2. Is there an association between self-filing taxpayers' relevant tax knowledge and their age?

RQ3. Is there an association between self-filing taxpayers' relevant tax knowledge and their income level?

RQ4. Is there an association between self-filing taxpayers' relevant tax knowledge and their educational level?

Hypotheses

$H1_0$. There is no association between self-filing taxpayers' relevant tax knowledge and their sex.

$H1_a$. There is an association between self-filing taxpayers' relevant tax knowledge and their sex.

$H2_0$. There is no association between self-filing taxpayers' relevant tax knowledge and their age.

$H2_a$. There is an association between self-filing taxpayers' relevant tax knowledge and their age.

$H3_0$. There is no association between self-filing taxpayers' relevant tax knowledge and their income level.

$H3_a$. There is an association between self-filing taxpayers' relevant tax knowledge and their income level.

$H4_0$. There is no association between self-filing taxpayers' relevant tax knowledge and their educational level.

$H4_a$. There is an association between self-filing taxpayers' relevant tax knowledge and their educational level.

Significance of the Study

The problem of federal, state, and local governments losing billions of dollars through taxpayers' tax noncompliance mainly in the form of underreporting of taxable income is well documented in previous studies (Bhattacharjee et al., 2015; IRS Research, Analysis & Statistics, 2016). The literature on tax compliance has identified the following factors as determinants of tax compliance: age and gender (Hofmann et al., 2017), education (Rodriguez-Justicia & Theilen, 2018), income level (Grundmann & Graf Lambsdorff, 2017), income source (Hurst et al., 2016), audit rates and probability of detection (Langenmayr, 2017; Hashimzade et al., 2013; Phillips, 2014). Other determinants of tax compliance are penalties (Choo et al., 2016, Gangl et al., 2014; Hallsworth, 2015; Litina & Palivos, 2016), complexity of the tax code (Yaniv, 2013), tax rate and fairness of tax system (Pántya et al., 2016; Hennighausen & Heinemann, 2015), trust in revenue authority (Litina & Palivos, 2016; Mas'ud et al., 2014), use of tax revenue (Doerrenberg, 2015; Fochmann & Kroll, 2016), and tax morale (Alm et al., 2017a; Kapranova et al., 2016).

A majority of the research on tax noncompliance through underreporting of taxable income assumes that taxpayers make a conscious decision to either comply or not comply on their tax return but other studies (Ritsatos, 2014; Stack, 2015) have shown that unintentional tax noncompliance occurs due to calculation errors and inadequate tax knowledge. Lack of tax knowledge has been identified as one of the factors that lead to taxpayers unintentionally

underreporting their taxable income to tax authorities and that taxpayers generally respond positively and are more compliant after providing them with tax education (Hassan et al., 2016; Saad, 2014). Those studies on taxpayers' tax knowledge did not make any distinction between their tax knowledge on income sources that are relevant and those that are not relevant to taxpayers. This study concentrated on only taxpayers' tax knowledge on income sources that are relevant to them. Focusing on only taxpayers' relevant tax knowledge on income sources yield results that are more precise than considering taxpayers' general knowledge on all sources of income whether they have ever earned a particular type of income or not. The research contributed to the literature by examining the association between taxpayer's relevant tax knowledge and their sex, age, income level, and educational. The results obtained from this study could assist tax authorities to determine the type of tax education to offer to each group of taxpayers in order to reduce unintentional underreporting of income due to lack of tax knowledge. The results may also assist tax authorities in determining the optimal level of education to provide to each group since beyond the optimal level, "additional knowledge and education will not proportionately decrease the intention by the taxpayers to comply" (Hassan et al., 2016, p. 247).

Definition of Key Terms

Earned Income. Earned income is money received for working for an employer, or by owning or running a business. Taxable earned income includes wages, salaries, tips, union strike benefits; net earnings from self-employment, and long-term disability benefits received before reaching the minimum retirement age ("IRS: What is earned income?", n.d.).

Relevant Tax Knowledge. Relevant tax knowledge is defined as taxpayers' ability to determine whether types of earned and unearned income that they receive or have ever received

are taxable or nontaxable. Unintentional underreporting of taxable income cannot be affected by taxpayers' lack of knowledge on certain types of income that they have never earned or received.

Self-filing Taxpayers. This refers to taxpayers who file their own tax individual income tax return without assistance from tax professionals or other knowledgeable family members and friends. The study focuses on taxpayers who file their own taxes because their lack of tax knowledge is more likely to lead to unintentional underreporting of taxable income on their income tax return compared to those who use the services of tax professionals. Therefore, only survey participants who filed their own taxes in the most recent tax year were included in the study.

Tax Compliance. Tax compliance is taxpayers complying with the tax rules of a tax agency. This comprises filing a tax return, declaring all taxable income, claiming only deductions and credits for which taxpayers qualify, and paying any tax obligation in a timely manner. Taxpayers can do this voluntarily without the intervention of tax agencies or can be forced to do so by tax agencies through audits and fines (Mendoza et al., 2017; Phillips, 2014).

Underreporting of Taxable Income. This refers to a situation where taxpayers declare an amount that is less than all the taxable income they earned or received in a tax year to tax authorities. Taxpayers have an obligation to report all taxable income on their tax return whether earned, unearned, or received from foreign investments.

Unearned Income. These are income types that are not classified as earned income. Examples of unearned income are interest and dividends, capital gains and capital gain distributions, social security benefits, unemployment benefits, alimony, child support payments, and retirement income. Some unearned income types are not taxable while others are taxable at different rates from earned income.

Summary

Tax noncompliance of which underreporting of taxable income accounted for 84.5% for the 2008 to 2010 tax years (IRS Research, Analysis & Statistics, 2016) is a complex issue that cannot be fully explained by a single factor or few factors. Factors such audit levels (Mendoza et al., 2017; Tan & Yim 2014), prior audits (Ratto et al., 2014), penalties (Hallsworth, 2015; Litina & Palivos, 2016, Phillips, 2014), trust in government (Litina & Palivos, 2016; Mas'ud et al., 2014), use of tax revenue (Doerrenberg, 2015; Fochmann et al., 2016), and the tax system (Appel & Orenstein, 2013; Pántya et al., 2016) all influence taxpayers' compliance attitude. Other factors that also impact tax compliance are errors and complexity of the tax code (Yaniv, 2013), educational level (Rodriguez-Justicia & Theilen, 2018), demographics (Hofmann et al., 2017), religious belief and the tax morale of taxpayers (Alm et al., 2017a; Calvet Christian & Alm, 2014), and social norms (Brizi, et al., 2015).

Prior research involving the unintentional underreporting of taxable income due to lack of tax knowledge focused on the overall tax knowledge of taxpayers (Hassan et al., 2016; Saad, 2014). This study focused on only the relevant tax knowledge of taxpayers and how it relates to the unintentional underreporting of taxable income by taxpayers. Data were collected from self-filing taxpayers from Maryland State through a survey. The study required a minimum sample size of 108 in order to achieve an 80% power at a 0.05 significance level. A correlational research design was used to examine the relationship between the dependent variable (relevant tax knowledge) and each of the independent variables (sex, age, income level, and educational level). The results of the study were then interpreted and discussed.

Chapter 2: Literature Review

Benjamin Franklin, one of the founding fathers of the United States of America, made the famous quotation comparing the nation's constitution to taxes in a November 13, 1789 letter written to French scientist Jean-Baptiste Leroy: "Our new Constitution is now established, and has an appearance that promises permanency; but in this world nothing can be said to be certain, except death and taxes" ("Nothing is certain except death and taxes," 2015). Death and taxes are common and permanent subjects but very few people want to embrace these facts of life. The permanency of taxes would indicate that all taxpayers would adapt to paying taxes. Unfortunately, this is not the case leading to an increase in the tax gap (IRS Research, Analysis & Statistics, 2016).

Governments provide public goods and services to its citizens and residents. The federal government's budget includes mandatory spending (Social Security, Medicare, and Medicaid), discretionary spending (National Defense, Veterans, Foreign Affairs, Health and Human Services, Education, and Housing and Urban Development), and interest on the national debt. The constitution gives Congress the power to assess and collect taxes. Specifically, "The Congress shall have power to lay and collect taxes, duties, imposts and excises, to pay the debts and provide for the common defense and general welfare of the United States; but all duties, imports and excises shall be uniform throughout the United States" (U. S. Const. Art. I, § 8). The federal government's revenue sources include personal income taxes, corporate taxes, Social Security, Medicare and unemployment taxes, borrowing to cover deficit, excise, custom, estate, and gift taxes.

Personal income tax is the largest revenue source for the federal government ranging from 41.3% to 49.9% for tax years 1951 to 2017 ("Office of Management and Budget-Historical

Tables", n.d.). The IRS advocates for voluntary tax compliance which involves taxpayers following all applicable tax laws, filing taxes on time, and paying all tax liabilities. Voluntary compliance is better than enforced compliance since it avoids all the costs associated with enforced compliance (Langenmayr, 2017). However, in reality, it is impossible to achieve full voluntary compliance with all taxpayers due to many factors. Some of the factors hindering full voluntary compliance are some taxpayers' opposition to paying taxes, low audit rates (Phillips, 2014), lenient punishment (Litina & Palivos, 2016), complexity of the tax code (Hassan et al., 2016), inadequate tax knowledge (Rodriguez-Justicia & Theilen, 2018), and taxpayers' tax morale (Alm et al., 2017b). These factors contribute to tax noncompliance which the IRS categorizes into the following three groups: underreporting of taxable income, underpayment of tax liability, and nonfiling of a tax return.

Recent research by the IRS covering tax years 2001, 2006, and 2008 to 2010 estimated the gross tax gap at $345 billion, $450 billion, and $458 billion, respectively (IRS Research, Analysis & Statistics, 2016). The compliance rate for all types of tax return was 83.7%, 83.1%, and 81% for tax years 2001, 2006, 2008 to 2010, respectively whiles the compliance rate on individual income tax return only were 79%, 77%, and 74% for tax years 2001, 2006, 2008 to 2010 respectively (IRS Research, Analysis & Statistics, 2016). Underreporting of taxable income accounted for $376 (83.6%) of the $450 billion gross tax gap for the 2006 tax year; and $387(84.5%) of the $458 billion gross tax gap for the 2008 to 2010 tax years whiles for individual income tax return only, underreporting of tax income accounted for 62.5% and 57.6% for tax years 2006, and 2008 to 2010 respectively (IRS Research, Analysis & Statistics, 2016).

This study focuses on the underreporting of taxable income on individual income tax returns since it is the single highest contributor to the tax gap. The reason behind underreporting

of taxable income as the main form of tax noncompliance compared to the underpayment of tax liability and non-filing is that it is more difficult for the IRS to detect unreported taxable income than unpaid tax liability and nonfiling of tax returns (McTigue Jr., 2017). Taxable income sources vary. Some taxable income sources are salary and wages, self-employment income, interest and dividends, capital gains on the sale of property, alimony, plan retirement distributions, and rental income. Other taxable income sources are unemployment compensation, sick pay, gambling winnings, life insurance proceeds, jury duty compensation, bartering of goods and services, and income from illegal activities. Income from illegal activities seems to be an odd taxable income but the "income from illegal activities, such as money from dealing illegal drugs, must be included in your income on Form 1040, line 21, or on Schedule C or Schedule C-EZ (Form 1040) if from your self-employment activity" (IRS pub 17, 2017, p. 97). The varying sources of taxable income make it very challenging for the IRS to determine how much taxable income some taxpayers make (Hurst et al., 2016). Unsurprisingly, underreporting of taxable income is the greatest form of tax noncompliance accounting for 84.5% and 83.6% for tax years 2006 and 2008 to 2010 respectively (IRS Research, Analysis & Statistics, 2016).

The IRS has limited resources to conduct extensive audits and make accurate determinations of how much each taxpayer earns (Vossler & McKee, 2017). The agency has therefore resorted to using various methods in selecting which taxpayers to audit. Some of the methods are random selection, averaging, and related audits (IRS Audits, n.d.). Random selection involves using computer software to randomly select taxpayers. This ensures that at least each taxpayer has a chance of being selected for a tax audit. The probability of selecting a taxpayer for an audit is extremely small but it increases for taxpayers who file complex tax returns or report very high income (McTigue Jr., 2017). For example, for all individual income

tax returns filed in the 2016 calendar year only 0.6% were audited in the 2017 fiscal year (October 1, 2016, to September 30, 2017) ("IRS Enforcement: Examinations", n.d.). The averaging method compares the tax return of a taxpayer to the average tax return of other taxpayers in the same income bracket, profession, or have other similar characteristics. It is perfectly alright to file an accurate tax return and still differ from the average tax return. The IRS uses the average method to increase the probability of selecting taxpayers who underreport taxable income for audit. Taxpayers who are related to other taxpayers found to have underreported their taxable income can also be audited by the IRS. Related taxpayers for audit purposes include spouses filing separately, business partners, a taxpayer's personal income return and business return, an estate and a beneficiary of that estate, and trustees, grantors, and beneficiaries of trusts ("IRS Audits", n.d.; IRS Pub. 544).

The long-term solution is for the IRS to seek high voluntary tax compliance among taxpayers since enforced compliance lowers the net tax revenue eventually collected due to associated cost (Phillips, 2014). A number of reasons have been ascribed to tax noncompliance which is mainly in the form of underreporting of taxable income by some taxpayers. These determinants can be categorized into three groups: demographic, economic, and behavioral determinants (Pickhardt & Prinz, 2014). Demographic determinants of tax compliance include age and gender (Hofmann et al., 2017), education (Rodriguez-Justicia & Theilen, 2018), and occupation (Russo, 2014). Economic determinants of tax compliance include income source (Hurst et al., 2016), income level (Grundmann & Graf Lambsdorff, 2017), marginal tax rate (Pántya et al., 2016), audit rate and probability of detection (Langenmayr, 2017; Hashimzade et al., 2013; Phillips, 2014), and penalty for noncompliance (Gangl et al., 2014; Hallsworth, 2015; Litina & Palivos, 2016). Behavioral determinants of tax compliance comprises complexity of the

tax code, tax knowledge and errors (Hassan et al., 2016; Saad, 2014, Yaniv, 2013), fairness of the tax system (Hennighausen & Heinemann, 2015; Pántya et al., 2016), social norms (Brizi, et al., 2015), and ethics or tax morale (Alm et al., 2017b; Calvet Christian & Alm, 2014; Kapranova et al, 2016). Other behavioral determinants of tax compliance are trust in government or revenue authority (Litina & Palivos, 2016; Mas'ud et al., 2014), use of tax revenue (Doerrenberg, 2015; Fochmann et al., 2016), revenue authority communication strategies (Chirico et al., 2016; Haynes et al., 2013), and risk attitude (Lee, 2016). Studies show that "behavioral and demographic variables have the strongest influence on tax compliance as compared to economic variables" (Pickhardt & Prinz, 2014, p. 83).

Tax Compliance Frameworks

Broad concepts on why taxpayers evade tax and proposed solutions have been developed by several studies (Barberis, 2013, Santos-Pinto et al., 2015). The expected utility theory has been used in various fields of studies. Expected utility theory deals with how people behave in situations in which they face an uncertain outcome that is dependent on known variables. Some of the variables are the probability of winning and associated expected payoff. In summary, expected utility theory states that when people have to make decisions with an uncertain outcome, they will opt for the decision that maximizes their expected payoff. Ultimately, how people behave when faced with uncertain outcome largely depends on their risk aversion.

Allingham and Sandmo (1972) were the first to apply the expected utility theory to explain tax compliance behavior of taxpayers. Taxpayers can either declare all their taxable income which has a certain payoff or declare a portion of their taxable income which has an uncertain payoff. When only part of the taxable income is declared the expected payoff depends on the probability of audit and detection by tax authorities and imposed fines. Under expected

utility theory, if taxpayers are assessed a constant or regular tax rate then a ”taxpayer will declare less than his actual income if the expected tax payment on undeclared income is less than the regular rate” (Allingham & Sandmo, 1972, p. 326). Therefore the decision to declare only part of the taxable income to tax authorities is affected by the expected tax rate on the undeclared amount, the probability of audit and detection, and additional fines. It must also be noted that there are other factors that impact taxpayer’s compliance decision but these factors are not included in the expected utility theory. Some of the factors are intrinsic motivation of taxpayers, guilt, shame, religiosity, tax morale, and collateral noncompliance penalties.

The expected utility theory predicts that tax evasion will decrease as penalties, the probability of audit and detection, and tax rate increases (Gangl et al., 2014; Hallsworth, 2015; Hashimzade et al., 2013; Langenmayr, 2017; Litina & Palivos, 2016; Phillips, 2014). The problem with the prediction of the expected utility theory is that if fines are imposed and taxpayers’ risk satisfy the declining absolute assumption of risk aversion, then it results in a negative relationship between tax rate and tax compliance (Yitzhaki, 1974). However, results obtained from empirical studies show that tax evasion increase as the tax rate increases. This discrepancy is usually referred to as the “Yitzhaki’s puzzle”.

Kahneman and Tversky (1974) developed the prospect theory of tax compliance which yield results similar to what is observed in reality. The prospect theory is based on the following four factors:

Reference dependence - Taxpayers view and judge outcome which is relative to a reference level of income.

Diminishing sensitivity - This refers to the diminishing marginal utility from the reference income level.

Loss aversion - The utility of gains is less than the disutility of loss of the same amount. Thus, losses and gains are viewed differently by taxpayers. This explains why the value function is convex for losses but concave for gains.

Weighted probabilities - Objective probability of events are weighted.

Dhami and al-Nowaihi (2007) also report that "the prospect theory provides a much more satisfactory account of tax evasion including an explanation of the Yitzhaki's puzzle" (p. 171).

Hashimzade, Myles, and Tran-Nam (2013) note that even though the prospect theory yield results that are more closer to reality than expected utility theory, the "prospect theory does not necessarily reverse the direction of the tax effect: our example shows that certain choices of the reference level can affect the direction of the tax effect in some situations but none of the examples is compelling" (p. 16). Piolatto and Rablen (2017) developed a modified version of the prospect theory to show that "there are a set of specifications of the reference level that are insufficiently sensitive to the tax rate for the reference dependence alone to reverse the Yitzhaki's puzzle, but are too sensitive for the tax rate for the reference dependence combined with the diminishing sensitivity to reverse the Yitzhaki's puzzle" (p. 544). Piolatto and Rablen (2017) explain that if the reference level is sufficiently sensitive to the tax rate, then simply the assumption of the reference dependence is sufficient to reverse Yitzhaki's puzzle. On the order hand, if the reference dependence and diminishing sensitivity are assumed, Yitzhaki's puzzle is reversed only if the reference level is sufficiently insensitive to the tax rate.

The prospect theory has generally been accepted as better at explaining tax compliance behavior of taxpayers than the expected utility theory because of the flexibility of the prospect theory and also yielding results that are closer to reality. For example, under prospect theory factors such as shame, guilt, religiosity, perceived fairness of the tax system, and tax morale can

be incorporated into the model. The flexibility of the prospect theory makes is very difficult to use since ambiguous results can be obtained if factors of the model are not chosen and weighted properly (Barberis, 2013).

A number of factors affect the compliance decisions of taxpayers. The role of tax authorities in improving tax compliance cannot be overemphasized. An effective way to increase tax compliance is to increase audit rates and penalties (Langenmayr, 2017; Litina & Palivos, 2016; Mendoza et al., 2017). The issue with such an approach is that it will lead to taxpayers mistrusting tax authorities, creating a negative effect of increased audits and penalties. Also, tax authorities have limited resources that prevent them from increasing audit rates to reasonable levels to deter tax noncompliance and also retain the trust taxpayers have in tax authorities (Kuchumova, 2017). For example, the IRS spent $110 million between 2009 and 2012 in developing a program that would match the information reported to the IRS with tax returns (GAO, 2012). Since it is extremely expensive to improve tax compliance through deterrence approaches such as increasing audits and penalties, some are of the opinion that tax authorities should concentrate more on non-deterrence approaches since they are less costly (Chirico, et al., 2016).

Kirchler, Hoelzl, and Wahl (2008) developed the slippery slope framework to examine how deterrence and non-deterrence factors influence tax compliance. The framework is used as a conceptual tool to examine how deterrence and non-deterrence variables affect tax compliance with reference to power and trust dimensions. Taxpayers' trust in tax authorities means that taxpayers will behave in a manner that benefits the general public. High trust means that taxpayers will be more tax compliant. Power of tax authorities refers to the capability of tax authorities to detect tax noncompliance and also impose penalties. Tax compliance can either be

enforced when tax authorities have high power or voluntary when taxpayers have a high level of trust in tax authorities. Under the slippery slope framework, tax compliance can be explained by one of the following scenarios:

High Power and Low Trust: Tax compliance improves when tax authorities have high power to increase audit rates and also impose severe fines on non-complying taxpayers. This is true even when there is low trust in tax authorities and can be considered as enforced compliance.

High Trust and Low Power: High level of trust in tax authorities promote voluntary tax compliance even when the power of tax authorities is low.

High Power and High Trust: Tax compliance increase when both the power of tax authorities and trust in tax authorities are high. Complying taxpayers consists of those who comply through enforcement and those who comply voluntarily.

Power and Trust Moderate Each Other: Varying trust is most relevant when power is low and least relevant when the power of tax authorities is high since tax authorities can enforce tax compliance. On the other hand, varying power is most relevant when trust is low and least relevant when trust is high since taxpayers comply voluntarily.

Kastlunger, Lozza, Kirchler, and Schabmann (2013) tested the slippery slope framework and report that tax compliance is dependent on the following factors: enforced tax compliance, voluntary tax compliance, coercive power, legitimate power, and trust. Trust in tax authorities improve voluntary tax compliance (Kastlunger, 2013; Kessler & Leider, 2016; Mas'ud et al., 2014). Tax authorities should, therefore, seek more voluntary compliance since it is less costly than enforced compliance.

Demographic Determinants of Tax Compliance

Age and Gender

Tax compliance varies across different age groups (Dennis Barber, 2016; Hokamp, 2014; Pickhardt & Prinz, 2014). Hofmann, Voracek, Bock, and Kirchler (2017) found that "there is a rather small but significant relationship between the age of taxpayers and their tax compliance" (p. 66). Thus, older taxpayers tend to be more compliant with tax laws than younger taxpayers. The rate of tax compliance tends to improve with age (Al-Mamun et al., 2014; Hofmann et al., 2017). Younger taxpayers are more likely to evade taxes and also commit crimes than older taxpayers (Russo, 2014). However, Hurst et al. (2014) found that age does not cause any difference in the level of underreporting of taxable income to tax authorities by younger and older self-employed taxpayers. The higher noncompliance rate among younger taxpayers compared to older taxpayers is partly due to their risk preference and psychological difference (McGee, 2012). Younger taxpayers have lower risk aversion and are also less sensitive to penalties. Taxpayers of different generations have psychological differences. Another explanation for older taxpayers being more compliant is that taxpayers accumulate tax knowledge and experience with tax authorities over time which improves their compliance rate as they grow (Khafidhoh & Suryarini, 2017).

Gender is the most studied demographic determinant of tax compliance among taxpayers (Pickhardt & Prinz, 2014). A majority of the research on tax compliance rates among men and women arrive at similar results that indicate that women are generally more tax compliant than men (Dulleck et al., 2016; Kogler et al., 2016; Pickhardt & Prinz, 2014; Reese & McDougal, 2018). This is true even after controlling for environmental factors. D'Attoma, Volintiru, and Steinmo (2017) found that women are significantly more tax compliant than men in all countries

(United States, United Kingdom, Sweden, and Italy) in their study. It is expected that in more gender-neutral societies, gender differences would be insignificant but on the contrary, D'Attoma et al. (2017) showed that there is no significant difference in how men and women comply with their taxes in more gender-neutral countries and more traditional societies. Hofman et al. (2017) researched tax compliance in 111 countries and found that even though there is a small but positive correlation between the sex of taxpayers and their tax compliance rate, the association varies by region. There is a stronger relationship between the sex of the taxpayer and tax compliance in Western Europe and North America than in East Asia, Pacific Asia, Sub-Saharan Africa, Latin America, and the Caribbean (Hofman et al., 2017). Women are more willing to pay taxes compared to men but men contribute more to public good than women (Bruner et al., 2017). Women are more averse to risk than men which partly accounts for the higher compliance rates among women (Casal et al., 2016; Tan & Yim, 2014).

Taxpayers who are more honest are less likely to cheat or lie on their tax returns. Women are generally more honest and less likely to cheat compared to men (Conrads et al., 2014; Kocher et al., 2016; Rosenbaum et al., 2014). Similarly, Grosch and Rau (2017) found women to be significantly more honest than men and also have higher levels of social value orientation (concern for others). The propensity for both men and women to lie decreases significantly with age (Glätzle-Rützler & Lergetporer, 2015). In general, most people are loss-averse and have a greater tendency to cheat in order to avoid a loss (Grolleau et al, 2016). Taxpayers are also more likely to cheat on their tax returns when faced with a tax liability than when they are due a refund (Bhattacharjee et al., 2015). In summary, women's higher honesty, risk aversion, and social value orientation help explain their higher tax compliance rate compared to men.

Education

Taxpayers who are highly educated are expected to have a greater understanding of the importance of tax revenue in sustaining projects and programs offered by local, state, and federal governments to their residents compared to other taxpayers who are less educated and may not have full knowledge of the use of tax revenue. It is therefore anticipated that highly educated taxpayers will be more tax compliant than less educated taxpayers but the findings are mixed. Rodriguez-Justicia and Theilen (2018) found that highly educated taxpayers are more tax compliant than less educated taxpayers and explained that this is "evidence for the fact that the more highly educated are more conscious of the benefits they receive from general tax compliance" (p.9). Using student surveys from six countries (Brazil, Russia, India, China, USA, and Germany), Ross and McGee (2012) obtained mixed results on the association between education and tax compliance. In general, some of the countries are significantly more opposed to tax evasion than others. The order of strongest to least opposition to tax evasion are China, United States, Germany, Russia, India, and Brazil. In the United States and India, the highly educated are more tax compliant whereas in Brazil, Russia, and China those with a lower level of education are more tax compliant. For Germany, those with a medium level of education are more tax compliant.

Ho, Ho, and Young (2013) found that " primary group norm affects Chinese taxpayers' compliance intention significantly, while their perceived tax fairness influences compliance intention to a lesser degree and demographic variables have no direct effect at all" (p. 35). Hofman et al. (2017) using meta-analyses of survey studies in 111 countries found a statistically significant negative relationship between education and tax compliance, thus less educated

people tend to be more tax compliant than highly educated people. Sociodemographic factors "although correlate significantly with tax compliance their predictive power is limited for age and sex, and negligible for education and income" (Hofman et al., p. 68). This finding could explain why mixed results are obtained on the relationship between the level of education and tax compliance. The relation between education and tax compliance still remains unclear. Whiles some studies (Rodriguez-Justicia and Theilen, 2018; Wenzel, 2007) show a significant relationship between tax compliance and demographic factors (age, sex, and education), other studies (Al-Mamun et al., 2014; Hofmann et al., 2017) show that demographic factors do not have any effect on tax compliance.

Occupation

Taxpayers can typically be classified as either employees or self-employed. Research shows that the rate at which self-employed taxpayers underreport their taxable income is much higher than that of employee taxpayers (Grundmann & Graf, 2017; Hurst et al., 2014; Russo, 2014). The main reason why employee taxpayers have a lower underreporting rate is that almost all the wages and salaries earned by employee taxpayers are reported by a third party (such as the employer) to the IRS. Employee taxpayers have less incentive to underreport their taxable income since they know that the IRS can easily adjust their declared taxable income on their tax return to match the amount reported by third parties. In such instances, the IRS issues a CP2000 Notice alerting taxpayers that their reported income has been adjusted to match their income information the IRS has on file (IRS: Notice CP2000, n.d). Estimates by the IRS put the noncompliance which is mainly in the form of underreported income at 56 percent in situations where there is little to no income information reported to the IRS, and at 1 percent where there is

substantial reporting of income information to the IRS ("IRS: Tax Gap Estimates", n.d.). Third-party reporting of taxable income improve compliance (Duncan & Li, 2018).

Mohd Rizal, Marlin Marissa, and Abdul Rahim (2016) explain that self-employed taxpayers underreport their taxable income because "they have greater opportunity to evade than other groups, especially in light of the low probability of audits that they faced, coupled with less third-party withholding of their income tax liabilities" (p. 191). This agrees with the findings of Engström and Hagen (2017) who explain that self-employed taxpayers tend to underreport their taxable income more than wage earners because "they have much better opportunities to evade taxes than wage earners do" (p.92). Since self-employed taxpayers tend to underreport their taxable income more than other taxpayers, it would suggest that the IRS should focus more on self-employed taxpayers. This can be done by increasing the audit rate for self-employed taxpayers. The issue with such an approach is that the IRS has a limited budget and there is an audit rate beyond which any further increase would not yield a net positive benefit (Kuchumova, 2017).

Taxpayers' occupation can also determine their tax compliance rate (Pickhardt & Prinz, 2014; Myles et al., 2014). Among self-employed taxpayers with different professions, some underreport their taxable income more than others. Using post-audit tax return data for 34 different professions to study non-filing and misreporting of taxable income and ranking in average dollar level of noncompliance, Erard and Ho (2003) list the following as the five worst culprits at underreporting their taxable income to the IRS: vehicle salespersons; investors; informal suppliers; lawyers and judges; and doctors and dentists. Some self-employed taxpayers believe they are not likely to be audited as long as they declare revenue that is close to the average revenue declared by other self-employed taxpayers in similar situations. Some self-

employed taxpayers also believe that those are audited reported revenues and taxable income that are significantly lower than amounts reported by those who are not audited (D'Agosto et al., 2018).

Attempts to directly estimate the extent of underreporting by self-employed taxpayers through a survey is a futile exercise since due to the illegal nature of underreporting taxable income, most survey participants are less likely, to tell the truth (Preisendörfer & Wolter, 2014). For surveys involving wrongdoing on the part of participants, it is difficult for them to be truthful since they believe the researcher may relay the survey results to the appropriate authority for them to be apprehended (John et al., 2018; Kirchner, 2015; Rosenfeld et al., 2015). For example, Hurst et al. (2014) report that participants in household surveys substantially understate their income intentionally since they do not incur any cost and also, there is the possibility it would be checked against the amount they declared on their tax return.

Pissarides and Weber (1989) were the first to perform extensive research investigating the extent of underreporting by taxpayers using an indirect method. The method involves using the Engel curve to find the relationship between expenditures and current income in order to determine actual income. Similar studies (Kukk & Staehr, 2014; Kukk & Staehr, 2017) used current income and expenditures to estimate the degree of underreporting by self-employed taxpayers. The problem with using current or transitory income data is that "transitory income fluctuations attenuate the estimate of the income elasticity of food consumption which in turn may lead to overestimation of underreporting among the self-employed" (Engström & Hagen, 2017, p.93).

Using more permanent income data gives better results on the relationship between income and consumption leading to a more accurate estimation of the degree of underreported

taxable income by taxpayers. Engström and Hagen (2017) decreased the bias in estimating underreported income by using a more permanent data by averaging household income both forward and backward in time and found that the average underreporting by self-employed taxpayers is about 25 percent of their actual income. Hurst et al. (2014) also estimate that self-employed taxpayers underreport their income by 25 percent in household surveys and that it is "naive to assume that individuals who are willing to misconstrue their behavior to administrative sources would otherwise automatically provide accurate responses when participating in household surveys" (p. 20). This shows that using an indirect method to estimate underreported income is better than using a direct method such as a household survey. Whether using models, household surveys or administrative data to estimate underreported income, caveats of the data, definitions, assumptions, and method used must be adhered to in order to yield a more accurate estimation of underreported taxable income by taxpayers (Slemrod, 2016).

Economic Determinants of Tax Compliance

Income Source, Income Level, and Marginal Tax Rates

Research shows that taxpayers' income source (endowed or earned) affects their tax compliance (Coricelli, 2014; Duch & Solaz, 2017). Taxpayers who have worked very hard to earn income are less likely to understate their income and risk being punished in the form of penalties which will reduce their hard-earned money. On the other hand, taxpayers who earn income with little to no effort have the propensity to underreport their income (Davis et al., 2010). Such taxpayers view their initial income as gains and consider any penalties incurred for underreporting their income as a reduction of their gains. Money gained with little to no effort by taxpayers is consider as house money and taxpayers' willingness to risk some of this money is considered as house money effect (Durham et al., 2014). The house money effect is very

common with endowed income in experiments in which participants continue to risk more money until the house money is depleted. Contrastingly, Bühren and Kundt (2014) performed an experiment in which participants were either endowed with income, worked moderately for income, or work arduously for income and found that those who worked hard for their income evaded more taxes which is consistent with the prospect theory. They also found little evidence to support the prediction that those who receive endowed income would evade more taxes than those who work moderately for their income.

Sunk cost effect involves participants in a study taking on more risky alternatives in order to attain their aspiration level (serves as a reference point in determining whether an outcome is satisfactory or no) which is to make up for all previous losses (Zeelenberg & van Dijk, 1997). Since participants consider their current income position as a loss and give more weight to losses than gains, it promotes a reverse sunk cost effect with participants preferring more certain outcomes to risky ones. Kirchler, Muehlbacher, and Hoelzl (2009) found that the reverse sunk cost effect explains why taxpayers who work hard to earn money are more risk-averse and report their income honestly to tax authorities. They further advocate that the IRS should seek ways to increase taxpayers' aspiration level as taxpayers with low aspiration levels evade more taxes. Thus, if taxpayers " aspiration level can be satisfied by a safe option and the risky option offers a better outcome, but simultaneously bears the risk of falling below one's expectations, the "classical" sunk cost effect can reverse and lead to risk-averse behavior" (Kirchler et al., 2009, p. 504).

Several studies have found a high negative correlation between income level and tax compliance (Artavanis et al., 2016; Doerrenberg, 2015; Kapranova et al., 2016; Lee, 2016). Hofmann et al (2017) found a small negative correlation between income level and tax

compliance. High-income earners on average pay more in taxes than low-income earners with either a flat or progressive tax system. A number of reasons have been ascribed to the high noncompliance rate among high-income earners. The use of tax revenue is a form of redistribution and some high-income earners disagree with how much they pay in taxes and the benefit they receive compared to low-income earners (Doerrenberg & Duncan, 2014a). Some high-income taxpayers are of the view that they earn more because they exert more effort and skills into their jobs than low-income earners and should not be punished by forcing them to pay more taxes which mostly benefit the low-income earners (Deffains, et al., 2016). Such high-income earners justify cheating as a means of correcting distributional justice (Bühren & Kundt, 2014). On the other hand, Grundmann and Graf Lambsdorff (2017) found that high-income earners cheat because there is a "psychological force that tempts rich people to cheat more often, a force that is not responsive to distributional justice or to absolute levels of taxation" (p. 28).

There is an ambiguous relationship between tax rate and tax compliance. Some studies show that tax rate and tax compliance are negatively correlated and that taxpayers are more compliant when they view their tax rate as fair (Berger et al., 2016; Charlot et al., 2015). Other studies found a negative relationship between tax rate and tax compliance (Alm et al., 1995; Beck et al., 1991). Tax authorities have more difficulty assessing and collecting taxes in an informal sector than in a formal sector. An increase in tax rate leads to an increase in the informal sector in both developed and developing countries (Mitra, 2017). There can also be either a negative or no relationship between tax rate and informality since the relationship "depends on the degree of tax enforcement and the level of credit market development in an economy" (Mitra, 2017, p. 117). Pappadá & Zylberberg (2017) note that tax hikes serve as incentives for some taxpayers to conceal part of their activity. Other studies have found that high

tax rates promote the shadow economy (Ellul et al., 2016; Berdiev & Saunoris, 2016; Goel & Nelson, 2016). The optimal tax rate should be the rate at which the net tax revenue is maximized. Piketty, Saez, and Stantcheva (2014) advocate that an "optimal tax system should be designed to minimize tax-avoidance opportunities through a combination of tax enforcement, base broadening, and tax neutrality across income forms" (p. 231).

Audit Rates and Probability of Detection

The average audit rate for individual income tax returns in the US is typically less than 1% ("IRS Enforcement: Examinations", n.d.). For example, for all individual income tax returns filed in the 2016 calendar year, only 0.6% were audited in the 2017 fiscal year (October 1, 2016, to September 30, 2017) ("IRS Enforcement: Examinations", n.d.). Also, the audit rate for the 2016 and 2015 fiscal years was 0.7% and 0.6%, respectively ("IRS Enforcement: Examinations", n.d.). Although the probability of selecting a taxpayer for an audit is extremely small, it increases for taxpayers who file complex tax returns or report very high income (McTigue Jr., 2017). The inability of the IRS to increase its audit rate is due to constraints. The limited resources of the IRS prevents it from drastically increasing the audit rate (Vossler & McKee, 2017). In addition, the IRS has to estimate the net benefit of increasing the audit rate before doing so since it is not worthwhile to embark on an activity that would yield a net negative benefit. The IRS uses methods such as random selection, averaging, and related audits in selecting which taxpayers to audit. ("IRS Audits", n.d.).

The results from empirical research on the correlation between audit rate and tax compliance are mixed. Some studies found a positive correlation between audit rate and tax compliance (Beer et al., 2015; Gangl et al., 2014). Other studies found a negative or no relationship between audit rate and tax compliance (Iyer et al., 2010; Slemrod et al., 2001).

DeBacker, Heim, Tran, and Yuskavage (2014) examined the impact of IRS audit on taxpayers subsequent taxpaying behavior using data from the IRS National Research Program on random audits on individual tax returns filed from 2006 to 2009 and matched to tax returns from all filers from 2000 to 2012. The researchers found that taxpayers who have been previously audited reported an average of $952 more in adjusted gross income and that " this effect appears to persist for at least six years" (DeBacker et al., 2014, p. 23). Particularly, there is a significant decrease in reported itemized deduction after an audit. This result is also supported by Ratto et al. (2014) who found that taxpayers who have been previously audited are likely to be more tax compliant than those who have never been audited. Alm, Bloomquist, and McKee (2017) also obtained similar results and reported that an increase in the audit rate increases the amount of reported income on individual income tax returns.

There are two types of benefits from an audit: direct and indirect. The direct benefit is the net revenue obtained from the audit whiles the indirect benefit is the positive effect after an audit. The indirect benefit is the effect of the audit because "more audit coverage translates into a higher perception of detection, which in turn reduces noncompliance through the classic general deterrent effect" (Keen & Slemrod, 2017, p.140). Studies comparing the value of direct and indirect benefits show that indirect benefit is more valuable than the direct benefit from a tax audit (DeBacker et al., 2014; Tagkalakis, 2014). An increase in reported income after an increase in the audit rate would suggest the audit rate should be increased by the IRS but increasing the audit rate has its drawbacks. High audit rates could "signal distrust in taxpayers and lead to the perception that the tax authority and its enforcement actions are excessive and unfair" (Mendoza et al., 2017, p. 285). The mistrust of tax authorities leads to a high rate of noncompliance among taxpayers (Gangl et al., 2015). Thus, the relationship between the level of audit and tax

compliance is convex. Tax compliance increase as the audit level increases until it reaches a critical audit level beyond which any further increase in the audit level decreases tax compliance (Mendoza et al., 2017). This agrees with other studies that report that distrust and unfairness create a backfiring effect from an audit (Bazart & Bonein, 2014; Kessler & Leider, 2016; Mendoza & Wielhouwer, 2015). The convexity of the relationship between audit level and tax compliance explains the mixed results (positive, negative, or no effect) obtained by various studies (Devos, 2014; Jimenez & Iyer, 2016).

The IRS has limited resources and should there employ effective auditing methods. Fan and Yim (2014) advocate for the use of strategic uncertain to improve tax compliance. Strategic uncertainty can be created by "informing the taxpayers of the maximum number of audits to be carried out, instead of telling them directly what the audit probability is" (Fan & Yim, 2014, p. 162). Fan and Yim (2014) reported that the participants in their study tend to overestimate the audit probability and were more compliant than in situations where they were given the audit probability. This indicates that an increase in the level of strategic uncertainty among taxpayers could be effective at improving tax compliance. The type of audit also affects tax compliance. D'Agosto, Manzo, Pisani, and D'Arcangelo (2018) found face-to-face or field audits to be more effective at yielding best results compared to desk audits. The issue with field audits is that it is more costly than desk audits. This implies that the IRS should use a cost-benefit approach to determine when to use field audits (Carrillo, 2018). The probability of detecting noncompliance by taxpayers can be increased with moderate to an extensive effort by the IRS (Langenmayr, 2014). The probability of detection is a function of the audit rate, audit effectiveness, and cost-benefit variables (Rablen, 2018). The IRS should, therefore, choose these factors to yield maximum benefit from a tax audit (Hodge et al., 2015).

Penalty for Noncompliance

Studies on how to increase tax compliance have found various means by which this can be accomplished. Some of the solutions are increasing third-party reporting (Carrillo et al., 2014; Gillitzer & Skov, 2016; Grundmann & Graf, 2017), increasing audit and detection rates (Langenmayr, 2017; Hashimzade et al., 2013; Phillips, 2014), and increasing intrinsic motivation (Alm et al., 2017a; Calvet Christian & Alm, 2014; Kapranova et al., 2016). Yet, other studies report that using deterrence approaches such as penalties, fines, and other punishment is the most effective means of improving tax compliance and that the effectiveness of deterrence approach depends on the severity of the punishment (Langenmayr, 2017; Litina & Palivos, 2016; Phillips, 2014). IRS can take one or more of the following actions against noncomplying taxpayers: impose penalties and fines, file charges, file a notice of a federal tax lien on taxpayers' property and even seizure of taxpayers' property.

Other studies have found the threat of punishment to be effective at improving tax compliance among taxpayers (Doerrenberg & Schmitz, 2017**;** Slemrod, 2016). However, Mohdali, Isa, and Yusoff (2014) report that "the threat of punishment appears to not have only an insignificant impact on compliant taxpayers but also triggers their intentions to be less compliant" (p. 291). Thus, the threat of punishment and other deterrence approaches can backfire because it can create mistrust of tax authorities among taxpayers (Gangl et al., 2014). Hallsworth, List, Metcalfe, and Vlaev (2017) note that even though deterrence approaches to combating tax noncompliance are effective, they are far more expensive than non-deterrence approaches such as promoting intrinsic motivation, tax education, social norms, perceptions of fairness, and tax morale. The literature on non-deterrence approaches shows mixed results. Studies show that non-deterrence factors significantly increase tax compliance (Hallsworth et al.,

2017; Dwenger et al., 2014), partially increase tax compliance (Pomeranz, 2015), or have no significant effect on tax compliance (Castro & Scartascini, 2015).

Another form of deterrence approach advocated by some studies is to use the threat of shaming taxpayers publicly (Alm et al., 2017a; Bo et al., 2015; Perez-Truglia & Troiano, 2015). Alm, Bernasconi, Laury, and Lee (2017) performed identical laboratory experiments in the United States and Italy involving two forms of disclosure of tax evaders. The first is full disclosure which is to show the picture of all tax evaders, the type of non-compliance, amount evaded and other pertinent information about tax evaders. The second form of disclosure is full confidentiality in which no picture, type of noncompliance, amount evaded, or any other information about tax evaders are not disclosed to the public. Alm et al. (2017a) found "strong support for the notion that public disclosure acts as an additional deterrent to tax evaders, and that the deterrent effect is concentrated in the first stage of the two-stage model (or whether to evade or not)" (p. 177). The effect of deterrence was also similar in the United States and Italy.

Using a natural experiment, Bo, Slemrod, and Thoresen (2015) found that there was an increase in reported business income in 2002 after making tax data public on the internet in Norway in 2001 and that the increase in reported income was more pronounced in communities that previously had limited disclosure. Perez-Truglia and Troiano (2015) conducted a field experiment in Kansas, Kentucky, and Wisconsin to study the impact of increasing the names, tax debts, and other information on tax delinquents on the internet. They found that an increase in delinquent taxpayers' information online forced them to make on average a $2,274 payment towards their debt but did not have any significant effect on taxpayers with high debt. Hoopes, Robinson, and Slemrod (2018) found that private companies in Australia reacted positively by been more tax compliant on the threat that their tax information would be made public.

Casal and Mittone (2016) report that shaming and threat of shaming affect the complex behavior of taxpayers who become more compliant. The authors argue that companies reacted positively to the threat of disclosing their tax delinquency publicly because they want to avoid any backlash from their business partners and customers on any negative tax information that would be released online (Christensen et al., 2017; Dyreng et al., 2016). Some taxpayers do not want their reputation to be tarnished and this forces them to be tax compliant when their tax noncompliance information can be potentially disclosed to the public (Austin & Wilson, 2017; Gallemore et al., 2014). On the other hand, Hasegawa, Hoopes, Ishida, and Slemrod (2013) found that there is a disclosure threshold beyond which it encourages taxpayers to underreport their taxable income by analyzing disclosure of individual and corporate tax information in Japan. This result is supported by Casagrande, Cagno, Pandimiglio, and Spallone (2015) who did not find any shaming effect in a random audit game.

Blank (2014) advocates for non-monetary penalties in the form collateral tax sanctions and that "governments should embrace collateral tax sanctions as a means of tax enforcement and that taxing authorities should publicize them affirmatively" (p. 725). Collateral tax sanctions include various non-monetary negative consequences faced by noncomplying taxpayers. Some collateral tax sanctions are denying taxpayers access to government, state, and local programs and benefits, denying citizenship to immigrants, threat of deportation of immigrants, revoking taxpayers' passport, revoking driving license, and revoking the professional license of taxpayers. Blank (2014) emphasized the importance of using collateral sanctions to improve tax compliance noting that collateral tax sanctions create greater deterrence than traditional monetary tax penalties, provoke taxpayers' loss aversion biases, lead to greater indirect economic cost than penalties, and give negative reputational signals about taxpayers.

Behavioral Determinants of Tax Compliance

Complexity of the Tax Code, Tax Knowledge and Errors

The internal revenue code alone is 6,499 pages long. The internal revenue code combined with regulations, revenue rulings, and annotated case laws are over 74,000 pages long (US Code, n.d.). Alm, Cherry, Jones, and McKee (2010) note that the "tax code is relentlessly complex, and the computation of allowable deductions, credits, and the like is frequently open to interpretation" (p. 579). Kapranova, Stankevicius, Simanaviciene, and Luksaite (2016) view tax complexity as the most important determinant of tax compliance. The complexity of the tax code can lead to both intentional and unintentional noncompliance by some taxpayers (Vossler & McKee, 2017). Some taxpayers can become frustrated and intentionally evade taxes since they do not understand why they have to put in so much effort just to comprehend the tax code when they are trying to perform their civic duty. On the other hand, some taxpayers who are uncertain about the interpretation of the tax code can overstate their income or overpay taxes and this situation is very common with taxpayers who have high loss aversion (Kirchler et al., 2008). Some taxpayers can comply with the law while taking advantage of grey areas of the tax code that are legal (Onu & Oats, 2018).

Tax noncompliance is not always intentional since some taxpayers are willing to comply but do not know how to do so (Pickhardt &Prinz, 2014). Tax authorities admit to the fact that more taxpayers are willing to comply but face challenges due to the complexity of the tax code and that such taxpayers are more than those who intentionally evade taxes (SME Customer Segmentation, 2010). Even policymakers also have difficulties understanding the tax code. Pickhardt and Prinz (2014) report that "in all developed countries at least, tax laws are a very complicated subject matter which requires a lot of knowledge to be understood and as a

consequence, without support from tax authorities as well as tax practitioners lawmakers might be lost in the complexity of their own tax laws"(p. 2). The complexity of the tax code is as a result of various credits and deductions allowed by the tax code with specific eligibility rules (Vossler & McKee, 2017). Only a small number of taxpayers who file complex tax returns have considerable knowledge about compliance requirements. Errors on tax returns can be due to the complexity of the tax code but Slemrod (2016) notes that some taxpayers are simply lazy and sloppy. Such taxpayers can make errors that could have been avoided with a little effort and attention.

Tax return errors have been drastically minimized with the use of tax preparation software by most taxpayers (Hunt & Iyer, 2018). The IRS reports that about 90 percent of individual taxpayers now use e-filing which uses online tax preparation software because it is convenient, often free, and reduces errors (especially calculation errors). E-filing also offers several payment options and enable fast submission and acknowledgment of receipt by the IRS with refunds typically received by taxpayers in less than 21 days (IRS e-file, 2018). Hunt and Iyer (2018) found that most tax software has audit features that alert taxpayers of items that are likely to be audited by the IRS and this makes most taxpayers who use online tax preparation software more compliant than those who file a paper return. This can be explained by the prospect theory which proposes that most people in general "have a value function that is concave for gains but convex for losses, that is people are more sensitive to prospective losses as compared to prospective gains of similar magnitude" (Hunt & Iyer, 2018, p. 2). In spite of all the advantages of using an online tax preparation software, it has some unintended consequences. Brinks and Lee (2015) performed an experiment where participants used tax software in preparing their tax returns and found that "participants display framing effects by reporting more

aggressively in the tax-due prepayment position than do participants in the refund position" (p. 132). Aggressive reporting worsens when the tax software displays the tax due or refund as taxpayers prepare their tax return. In cases of tax due, taxpayers do a lot of manipulation or fine-tuning by increasing deduction and credits in order to lower their tax liability (Bhattacharjee et al., 2015; Brinks & Lee, 2015).

Very few studies have examined the relationship between taxpayers' tax knowledge and tax compliance (Hassan et al., 2016; Saad, 2014). Saad (2014) reports that most taxpayers do not have sufficient technical knowledge and also perceive the tax system as complex. There is, therefore, the need for tax authorities to enhance tax compliance by educating taxpayers on taxes (Hassan et al., 2016). Several studies (Hofman et al., 2018; Rodriguez-Justicia & Theilen, 2018; Ross & McGee (2012) have studied the relationship between education and tax compliance. The problem is that general educational level does not automatically translate into tax knowledge. Whiles it is generally perceived that higher level of tax knowledge will improve tax compliance, Ross & McGee (2012) note that "people who are more knowledgeable in general, and who are more knowledgeable about the tax law in particular, are in a better position to evade taxes than are people having a lower degree of knowledge" (p.96). In conclusion, improving tax knowledge would improve tax compliance among taxpayers who genuinely do not comply with their tax returns because of inadequate tax knowledge but would have little to no influence on taxpayers who evade taxes intentionally.

Fairness of Tax System, Trust in Government, and Use of Tax Revenue

The United States uses a progressive tax system. Under a progressive tax system, higher income levels are taxed at higher rates than lower-income levels whereas, with a flat system, all income levels are assessed the same tax rate. The question of which tax system is fair can be

answered in terms of either rich and poor view or justice in the form of equal tax rates view (Hennighausen & Heinemann, 2015). The rich and poor view is that rich people earn more money and should, therefore, pay more taxes than poor people. The justice in the form of equal tax rate view centers on the notion that it is proper and fair to assess all people the same tax rate since using a progressive system is comparable to punishing the rich. Progressive and flat tax rate systems can also be viewed in terms of efficiency and fairness considerations respectively. Pántya, Kovács, Kogler, and Kirchler (2016) note that both "laypeople and experts do not necessarily agree with respect to these considerations, and empirical findings are inconclusive concerning attitudes towards flat and progressive tax systems as well as with regard to work motivation and tax compliance" (p. 1). An argument in favor of a progressive tax system is that it maximizes social welfare more than a flat-rate tax system (Antràs et al., 2018; Heathcote et al., 2014; Krishna & Senses, 2014).

Pántya et al. (2016) examined the effect of the tax system on compliance and work performance. The researchers found an increase in tax compliance when the tax system is changed from progressive to flat as compared to using a progressive system constantly or a change from a flat tax system to a progressive tax system. Pántya et al. (2016) also found a very significant increase in work performance when a progressive system is changed to a flat-rate tax system. This result agrees with the findings of Peichl (2014) that a flat rate system motivates taxpayers to work harder since they pay less tax. In contrast, Fochmann & Weimann (2013) report that participants in a study work harder in a progressive tax system. Some lower-income earners would work hard to enhance their financial status irrespective of the tax system but higher-income earners tend to work less in a progressive tax system especially when they attain their income satisfaction level (Heathcote et al., 2014). Appel and Orenstein (2013) argue that a

flat tax system can enhance work performance and also improve the competitiveness of the economy. Adhikari and Alm (2016) compared the GDP per capita of eight Eastern and Central European countries (Estonia, Latvia, Russia, Slovak Republic, Ukraine, Georgia, Romania, and Turkmenistan) before and after changing from a progressive tax system to a flat tax system between 1994 and 2005. Adhikari and Alm (2016) found "positive impacts of tax reform on the level of income in all eight countries, with these impacts significant at conventional levels in seven out of eight cases" (p. 438).

Trust in government or tax authorities is another important determinant of tax compliance. Taxpayers tend to be more tax compliant when they trust tax authorities (Kastlunger et al., 2013; Litina & Palivos, 2016). Tax authorities should also have power and the means to detect tax evasion and punish evaders. Thus, neither the power of authorities nor trust in tax authorities can independently improve tax compliance. The best result is achieved when the power of authorities and trust in tax authorities are combined (Mas'ud et al., 2014). Jimenez and Iyer (2016) show that "trust in government is an antecedent to perception of fairness; and trust influences compliance through the fairness construct" (p. 18). Also, Holtz (2013) argues that trust is a consequence of fairness. Trust in government can be affected by factors such as high audit rates, taxpayers' communication experience with tax authorities, and use of tax revenue (Kessler & Leider, 2016; Mendoza et al., 2017: Mendoza & Wielhouwer, 2015).

The use of tax revenue is similar to the redistribution of wealth. Some taxpayers care about how tax revenue is used and this influences their tax compliance decisions (Fochmann & Kroll, 2016). For example, Doerrenberg (2015) using a laboratory experiment found that participants were more compliant when they were told that the tax revenue would be used for research and charity but were less compliant when the tax revenue was to be transferred into the

federal budget. Doerrenberg and Duncan (2014a) found participants in a laboratory experiment to be most compliant when the tax revenue was to be donated to the Red Cross than when the tax revenue was to be used for any other purpose. Taxpayers who are pro-social are on average more tax compliant by reporting a higher percentage of their taxable income than those who are anti-social (Fochmann & Kroll, 2016). Pro-social taxpayers are in general more tax compliant than anti-social taxpayers (Chetty et al., 2014). Hallsworth, List, Metcalfe, and Vlaev (2017) using a field experiment found that tax compliance is influenced by the salience of tax revenue use. This suggests that the government should pay attention to how tax revenue is spent and also communicate the use of tax revenue to taxpayers.

Notification and Collection Strategies of Revenue Authorities

Revenue authorities cannot achieve full tax compliance. The burden, therefore, falls on revenue authorities to take steps to notify delinquent taxpayers and also make collections. The message contained in communication letters to delinquent taxpayers can determine whether they would respond positively or not (Slemrod, 2016). Different people react differently. Some studies show that using threat of shame letter is effective at improving tax compliance (Alm et al., 2017a; Bo et al., 2015; Perez-Truglia & Troiano, 2015) whiles other studies show that using public and civic duty appeal letters improve tax compliance more than using threat letters (Besley et al., 2014; Chirico et al., 2016; Hallsworth, 2017).

Perez-Truglia and Troiano (2015) examined the impact of sending 34,334 letters to delinquent taxpayers in Kansas, Kentucky, and Wisconsin and threating to shame them publically unless they settle their tax liability in full. Overall, the reminder letters yielded positive results by improving compliance with the greatest level of compliance among those owing smaller debt. The greatest positive respond by taxpayers with lower debt can be explained

by their rational that not paying their small debt is not worth the public shame and humiliation. There can be situations in which tax authorities fail to communicate with delinquent taxpayers. Alm, Bruner, and McKee (2016) report that in addition to and sometimes in the absence of official enforcement information from tax authorities, peer communication can play a vital role in improving tax compliance. Their study shows that most individuals report truthfully about their audit experience which promotes tax compliance among their peers while others systematically lie about their audit experience. Alm, Jackson, and McKee (2009) show that informal or unofficial communication among taxpayers augments official information from tax authorities.

An extensive field experiment to test the effectiveness of the message type sent to non-paying taxpayers was conducted in Philadelphia by Chirico, Inman, Loeffler, MacDonald, and Sieg (2016). The field experiment was conducted in collaboration with the Philadelphia Department of Revenue. The standard practice of the Philadelphia Department of Revenue is to send reminder letters to residents who owe property taxes. The standard letter contains the initial tax liabilities, payments made, interest, and penalties. The standard letter was used as the control group for the experiment. In addition, three other letter types were sent to taxpayers. Each letter was worded to either "(a) threatened the potential loss of the taxpayer's home or property if taxes were not paid, (b) appealed to the positive community benefits in provided public services that the taxpayer's dollars provide, or (c), appealed to the positive benefits of fulfilling their civic duty to themselves and others by paying their taxes" (Chirico, et al., 2016, p. 134). The authors were of the opinion that the alternative letter types may have a more positive impact on taxpayers who may respond positively by paying their tax more than the standard letter. Specifically, the three alternative letters were worded as follows:

"*Threat letter*: Not paying your real estate taxes is breaking the law. Failure to pay your real estate taxes may result in seizure or sale of your property by the city. Do not make the mistake of assuming we are too busy to pursue your case.

Public Service Appeal letter: We understand that paying your taxes can feel like a burden. We want to remind you of all the great services that you pay for with your real estate tax dollars. Your tax dollars pay for schools to teach our children. They also pay for the police and firefighters who help keep our city safe. Please pay your taxes as soon as you can to help us pay for these essential services.

Civic Duty Appeal letter: You have not paid your real estate taxes. Almost all of your neighbors pay their fair share - 9 out of 10 Philadelphians do so. Paying your taxes is your duty to the city you live in. By failing to pay, you are abusing the goodwill of your Philadelphia neighbors." (Chirico, et al., 2016, p. 138-139).

In all 4,297 letters were randomly sent to all groups: control (1,075), threat (499), public service (2,211) and civic duty (1,142). Upon receiving the reminders letters, taxpayers made average payments more than the control group as follows: $152 (public service appeal letter), $82 (civic duty appeal letter) and $41(threat letter). The results suggest taxpayers are more motivated to pay their tax liability by a public service appeal more than by any other type of appeal. This result is consistent with that obtained by Hallsworth, List, Metcalfe, and Vlaev (2017) who modified the reminder letters send to British income taxpayers. In addition to the standard letter (control group), twelve other letter types were sent to non-paying taxpayers. The letters can be classified into either descriptive norms or injective norms. Some of the descriptive norm messages are "*General descriptive*: The great majority of people in the UK pay their tax on time, *Local descriptive*: The great majority of people in your local area pay their tax on time and

Debt descriptive: Most people with a debt like yours have paid it by now" (Hallsworth, 2017, p. 22). Some of the injective norm messages are "*General injunctive*: The great majority of people agree that everyone in the UK should pay their tax on time, *Fraction injunctive*: Nine out of ten people agree that everyone in the UK should pay their tax on time, and *Percentage injective norm*: 88% of people agree that everyone in the UK should pay their tax on time" (Hallsworth, 2017, p. 22). The results of the studies indicate that descriptive norms are more effective than injunctive norms messages. Thus, taxpayers respond more positively in situations where the appeal is to their civic duty and specifically stating how similar taxpayers behave.

The United Kingdom also faces similar tax delinquency problems. In the UK, Her Majesty's Revenue and Customs (HMRC) is responsible for assessing and collecting tax revenues whiles Her Majesty's Courts and Tribunals Service (HMCTS), a division of the Ministry of Justice, administers the processing and collection of fines. It is very expensive for employees of HMCTS to follow-up on delinquent taxpayers through phone calls. The Behavioral Insights Team (UK Cabinet Office) and HMCTS, introduced a series of randomized trials designed to test the effectiveness of low-cost fine collection strategies by sending text messages to taxpayers. Haynes, Green, Gallagher, John, and Torgerson (2013) conducted an extensive field experiment to assess the impact of the notification message on delinquent taxpayers.

The experiment was conducted in conjunction with HMCTS. The experiment involved two phases. In the first phase, 1,817 taxpayers were either sent no text message, standard text message, personalized name text message, personalized amount text message or personalized name and amount text message. The standard text message contained the following text message "You have not paid your fine. Pay immediately or a warrant will be issued to the bailiffs. Call 03007909901" (Haynes et al., 2013, p. 721). The personalized name, personalized amount, and

personalized name and amount text message contained the standard text message in addition to the taxpayer's name only, amount only, and both name and amount respectively. The average payment made by taxpayers for each text message type was £4.46 (no text message sent), £8.62 (standard text message), £10.53 (personalized amount text message), £11.74 (personalized name and amount text message), and £12.87 (personalized name).

The second phase of the experiment involved sending 3,363 text messages to taxpayers but this time the no text message group was omitted. The second phase was used to test the accuracy of the effectiveness of each text message. The effectiveness of each text message in the second phase mimics that of the first phase. The average payment by taxpayers who received each message type was £8.34 (standard text message), £8.82 (personalized amount), £9.68 (personalized name and amount), and £11.74 (personalized name). The results obtained by Haynes et al. (2013) agrees with the results obtained by Fellner, Sausgruber, and Traxler (2013). Fellner et al. (2013) found that the type and tone of the message influenced the actions of Austrians who did not pay their television tax. The urgency of the message and the threat of punishment improved compliance. Also, customized messages with the amount of tax or fine and information on the rights of the tax authority to take alternative actions against those who do not comply improve tax compliance. In conclusion, effective notification strategies by tax authorities can yield results at lower cost compared to the using audits, penalties and fines as means of improving tax compliance (Carrillo et al., 2014; Castro & Scartascini, 2015; Dwenger et al., 2016; Gangl et al., 2014; Pomeranz, 2015).

Risk Attitude of Taxpayers

Several factors influence the compliance decision of taxpayers. Some of the factors are fairness of the tax system, tax rate, audit rates, penalties, trust in government, use of tax revenue,

and tax morale (Gangl et al., 2014; Grundmann & Graf Lambsdorff, 2017; Hallsworth, 2015; Langenmayr, 2017; Litina & Palivos, 2016; Pántya et al., 2016), Phillips, 2014). One factor that is often overlooked but plays a vital role in shaping taxpayers' compliance decisions is the risk attitude of taxpayers. Taxpayers' behavior in assuming the risk of tax noncompliance can be consistent or inconsistent depending on how much money is at stake. The orthodox theory (Neumann-Morgenstern expected utility theory), referred to as the standard theory of rational choice under conditions of risk and uncertainty states the when faced with uncertain outcomes involving risk, people will always make consistent risk decisions. The utility function for the orthodox theory is concave for both gains and losses. In contrast, evidence from empirical studies shows people do not maintain a consistent risk attitude when making decisions with uncertain outcomes.

Markowitz (1952) examined the orthodox theory's consistent risk attitude in a study in which participants had to choose gains or losses from $1 to $10,000,000. The results of the studies showed that participants had different risk attitude which was influenced by the expected outcome. Specifically, most participants exhibited risk aversion with a 10% probability of large gains and small losses and were risk-seeking with a 10% probability of small gains and large losses. Markowitz (1952) explained the different risk attitudes to the perception of gains (risk aversion for large gains and small losses) and perception of losses (risk-seeking for small gains and large losses) using a utility function. Markowitz's utility function is both concave and convex for both gains and losses with the inflection point (individual's wealth endowment or customary wealth) dividing gains and loss. Markowitz stressed on the limitations of his model and noting that "to have an exact hypothesis - of the sort one finds in physics - we should have to specify two things: (a) the conditions under which customary wealth is not equal to present

wealth (i.e., the conditions referred to as recent windfall gains or losses) and (b) the value of customary wealth (i.e., the position of the second inflection point) when customary wealth is not equal to present wealth" (Markowitz, 1952, p. 157).

Kahneman and Tversky (1979) developed the prospect theory to explain risk attitude. The prospect theory uses a reference point to define gains (right side of the reference point) and losses (left side of the reference point). The utility function under prospect theory is concave for gains and convex for losses. This differs from Markowitz's utility function which is both concave and convex for both gains and loss. Another difference between the Markowitz's utility function and that of the prospect theory is that the curve is steeper for losses than for gains (Appendix B). The stepper curve for losses than gains can be explained by individuals' perceiving the same gains and losses differently and desiring to avoid losses. People who are loss averse will avoid taking a risk when they stand the chance to gain or loss the same amount. Loss aversion can even persist when the potential gains are larger than potential losses. Kahneman (2015) notes that "for most people, the fear of losing $100 is more intense than the hope of gaining $150 and that losses loom larger than" (p. 283). Put another way, the pain of losses is greater than the joy of gains with most people only willing to gamble when the expected gain is twice the expected loss (Kahneman, 2015).

A risk-neutral individual will be indifferent between losses and gains of the same magnitude and the same probability of occurrence. A risk-seeking individual would embrace and take a risk in situations where the probability of losing and the loss amount is equal to or less than the probability of winning and the gain amount (Kahneman, 2015). Individuals who overweigh small probabilities and under weigh large probabilities exhibit risk-seeking under gains and loss aversion under losses. The expected payoff and how probabilities are weighed

determines the risk preference of individuals. The risk attitude of taxpayers is influenced by the amount of money earned for noncompliance, the probability of audit, and penalties. Under prospect theory, people are risk-averse when faced with either a high probability of gain or a low probability of loss, and are risk-seeking when faced with either a low probability of gain or a high probability of loss. The risk-seeking attitude in situations of a high probability of loss was confirmed by Bhattacharjee, Moreno, and Salbador (2015) who found that taxpayers are aggressive in underreporting their income and taking tax credits and deductions when they owe a tax liability than when they are due a refund. The predictions of the risk attitude under the prospect theory have been confirmed by other studies (Bouchouicha & Vieider 2017; Oliver & Wolff, 2014; Scholten & Read, 2014).

Some people more risk-averse than others and this can be due to a variety of factors. Research shows that risk preference is affected by factors such as gender (Filippin & Crosetto, 2016), age (Bonsang & Dohmen, 2015), character (Jordan & Rand (2018), and genetics (Harrati, 2014). Studies show that people of different age groups do not have the same risk attitude (Dohmen et al., 2017). Bonsang and Dohmen (2015) reported that there is a negative linear relationship between age and risk. The unwillingness to take on risk as one age show that cognitive aging influences risk preference. Tymula, Rosenberg, Ruderman, Glimcher, and Levy (2013) report that the relationship between risk attitude and age is an inverted U-shaped function with both adolescents and elders being more risk-averse than midlife adults. Dohmen, Falk, Golsteyn, Huffman, and Sunde (2017) obtained similar results and reported that "the willingness to take risks declines throughout life and that this decline appears to become less pronounced from around age 65 onwards (p.F97). Dohmen et al. (2017) controlled for calendar time and

cohort effects before obtaining the results. This is different from other studies examining the relationship between age and risk which did not consider calendar time and cohort effects.

Several studies show that gender affects the risk preference of individuals and that women are consistently more risk-averse than men (Crosetto et al., 2015; Saqib & Chan, 2015). Filippin and Crosetto (2016) underscored the importance of gender in determining risk preferences noting that "the frequency and the importance of gender differences reflect specific characteristics of the elicitation methods over and above true differences in the underlying (and latent) risk attitude"(p. 3). Risk preferences can also be explained by biological factors. Specifically, risk preferences are closely associated with hormones and neurotransmitters which is linked with the brain's rewards system (Sokol-Hessner et al., 2018; Zhong et al., 2009).

Harrati (2014) performed an extensive genome-wide association study of risk aversion using genetic data from the U.S. Health and Retirement Study. The study sample comprised of 10,455 adults. The main goal of the study was to the answer the question "Is the heritable portion of risk aversion in individuals driven by a few genetic variants with large causal effects, or by a high number of variants, each providing small effects but contributing collectively to more pronounced individual variation in risk aversion?" (Harrati, 2014, p. 186). The findings of the study reveal that risk aversion is a complex trait that is also highly polygenic and that there exist "detectability bound calculations that suggest that the known heritability in risk aversion is likely to be driven by a large number of genetic variants, each with a small effect size" (p. 186). Other studies investigating the link between risk preferences and heredity show that risk preferences are partly determined by genetic variations (Le et al., 2010; Zhong et al., 2009). Le et al. (2010) examined the relationship between risk aversion and genetic factors in twin studies comparing monozygotic and dizygotic twins in Australia. The study involved a total of 1,875 twin pairs

(867 pairs of identical twins and 1,008 pairs of nonidentical twins). The result of the study estimate that approximately 20% of the variation in risk can be explained by genetic differences. Cesarini et al. (2009) using 314 twins in China and Zyphur et al. (2009) using 200 males twin from the Minnesota Twin Registry both found 20% of risk preference to be explained by genetic difference. Zhong et al. (2009) using 232 twin pairs from China found that genetic differences explain 57% of differences in risk preferences. These results help to explain why some people are more disposed to taking risk than others.

Jordan & Rand (2018) found economic decisions to be explained by four main character traits: caring (kindness, love, gratitude, fairness, humility or modesty, forgiveness or mercy, honesty, appreciation of beauty and excellence, hope, teamwork); leadership (leadership, zest, bravery or courage, hope, social intelligence, and perseverance); inquisitiveness (curiosity, love of learning, creativity, perseverance, perspective or wisdom, and humor); and self-control (self-regulation, prudence, judgment or critical thinking, and perseverance). The study reveals that people with leadership traits exhibit anti-social behavior, often seek their own benefit, and also like taking risk. Caring traits rely on intuitive decision making, are cooperative and also willing to pay for other people to benefit. Inquisitiveness traits behave efficiently in both social and risk domains and are purposeful in decision-making. Self-control traits are risk-averse and careful in arriving at reasonable decisions. Other studies (McGrath & Walker, 2016; Ruch et al., 2017; Zhao & Smillie, 2015) obtained similar results. Thus, taxpayers who have leadership character traits can exhibit low-risk aversion which can lead to tax noncompliance whiles those with caring, inquisitiveness, and self-control trait can exhibit medium to high-risk aversion which can lead to tax compliance. Taxpayers who are loss averse are more likely to be tax compliant but

his is not always because they want to be ethical and tax compliant but because they want to avoid getting into trouble with tax authorities.

Ethics, Tax Morale, and Social Norms

Ethics is a set of moral principles that shape how individuals behave either in their private life, career, or publically. In most cases what is considered ethical is what society deems as the right and appropriate thing to do in situations. For example, it is considered ethical to generally act in a manner that benefits society, one of which is declaring the right amount of taxable income and also paying the tax liability. Research shows that taxpayers who are ethical exhibit higher levels of tax compliance than those who are unethical (Alm et al., 2017b; McGee, 2012). For example, honesty can serve as an ethical motivation for some taxpayers to declare all their taxable income, take the right deductions and credits, as well as pay their tax liability (Kapranova et al., 2016). Tax morale is an intrinsic motivation for paying taxes. Thus, higher levels of tax morale lead to higher levels of tax compliance. Factors such as religiosity and social norms can also serve as intrinsic motivation leading to higher tax morale and consequently higher tax compliance.

Religiosity can be broadly defined as adhering to a set of beliefs, doctrine, or ideology. Torgler (2006) examined the impact of religiosity on tax morale using multivariate analysis on World Values Survey data collected from 30 countries between 1995 and 1997. Religiosity was assessed by using answers to questions on whether participants belong to a religious group, were brought up in a religious home, and how often they attended church, mosque or any other religious group meetings. The level of tax morale was assessed by answers provided by participants to the questions stating various scenarios and whether participants think it is never justified, sometimes justified, or always justified when they have the chance to cheat.

Participants answered each question by selecting a number between 1 (never justified) and 10 (always justified). The study shows that there is "the tendency that Catholics, Hindus, Buddhists and people with another religion have a higher tax morale than people without a religious denomination, whiles Orthodox and Protestants have the tendency to a lower tax morale than the reference group, although the coefficient Protestant is not always significant" (Torgler, 2006, p.91).

There are certain acts that are unacceptable by almost all religions. Examples are cheating, lying, and murder. This is the reason why religious people are in general more tax compliant than non-religious people since tax noncompliance involves lying and cheating in the form of underreporting taxable income and falsely claiming credits and deduction. Other studies have also confirmed that taxpayers who are more religious have higher tax morale and are consequently more tax compliant than other taxpayers who are either less religious or non-religious (Calvet Christian & Alm, 2014; Mohdali & Pope, 2014) whiles Alm, Bernasconi, Laury, and Lee (2017) find no significant effect of religion on tax compliance.

Social norms or culture influence how people in a society behavior whether positively or negatively (Cronk, 2017, Jensen et al., 2015). The compliance attitude of some taxpayers is influenced by the compliance attitude of other taxpayers (Alm et al., 2017b). Alm, Bloomquist and Mckee (2017) report that "providing information on what one's neighbors are doing has a statistically significant and economically large impact on individual filing and subsequent reporting decisions, but this 'neighbor' information does not always improve compliance, depending on the precise way in which this information is provided" (p. 610). This suggests that letting taxpayers know about the positive compliance behavior of other taxpayers can improve tax compliance and that each taxpayer's tax compliance attitude can have a larger effect by

affecting the tax compliance attitude of other taxpayers. Other studies also find social norms to influence tax compliance (Brizi, et al., 2015; Buettner & Grimm, 2016).

Other factors such as tax benefits, education, trust in government, income levels, and tax system influence the tax morale of taxpayers. It is logical to reason that taxpayers who benefit more (net beneficiaries) from tax revenue would be more tax compliant than those who receive less benefit (net contributors). The reason is that taxpayers who receive more public goods would have intrinsic motivation and moral obligation to be tax compliant. Rodriguez-Justicia and Theilen (2018) examined this assumption by considering direct benefits received by taxpayers and the following variables: education, number of children, employed, unemployed, self-employed, retired, and other variables. The study shows that "education has a positive impact on tax morale for those individuals that are net beneficiaries of the welfare state, and a negative impact for those that are net contributors" (p. 18). The positive impact of education on tax morale is because highly educated taxpayers have "better knowledge on public affairs and exhibit higher levels of tax morale in countries that have better quality public services, a fairer tax system, and higher quality institutions"(p. 18). Kirchler, Hoelzl, and Wahl (2008) also find trust in government to promote tax morale. Other perceptions of trusts such as trust in the legal system, tax officials, and the president have a positive impact on tax morale. Torgler, Demir, Macintyre, and Schaffner (2008) and also Konrad and Qari (2012) find no significant impact of income levels on tax morale whiles Doerrenberg and Peichl (2013) find a negative relationship between income and tax morale.

Summary

The problem of tax noncompliance is challenging for authorities and governments. Tax noncompliance can be in the form of underreporting of taxable income, underpayment of tax

liability, and nonfiling of tax returns. The gross tax gap has been increasing with the most recent estimates by the IRS covering tax years 2001, 2006, and 2008 to 2010 approximating the gross tax gap at $345 billion, $450 billion, and $458 billion, respectively (IRS Research, Analysis & Statistics, 2016). Underreporting of taxable income constitute the most form of tax noncompliance and it is estimated by the IRS at $376 (83.6%) of the $450 billion gross tax gap for the 2006 tax year and at $387(84.5%) of the $458 billion gross tax gap for the 2008 to 2010 tax years (IRS Research, Analysis & Statistics, 2016).

Several studies have examined how taxpayers form their tax compliance decisions (Alm et al., 2017a; Langenmayr, 2017; Mendoza, 2017). Knowing and understanding the factors that influence tax compliance can lead to solutions that would improve tax compliance. The factors that impact tax compliance can mainly be categories into three: demographic (age, gender, education, and occupation), economic (income source, income level, and tax rates, audit rates and probability of detection, penalty for noncompliance) and behavioral (complexity of the tax code, tax knowledge and errors, fairness of tax system, trust in government, and use of tax revenue). Some studies advocate for deterrence approaches (enforced compliance) to improve tax compliance by increasing audit rate and imposing severe punishment on offenders (Gangl et al., 2014; Hallsworth, 2015; Hashimzade et al., 2013; Langenmayr, 2017; Litina & Palivos, 2016; Pántya et al., 2016; Phillips, 2014). Other studies are in favor of using non-deterrence approaches (voluntary compliance) to improve tax compliance by improving trust in government, tax education, and tax morale (Alm et al., 2017a; Calvet Christian & Alm, 2014; Chirico, et al., 2016; Kapranova et al., 2016; Keen & Slemrod, 2017).

This study focused on how tax knowledge affects the compliance attitude of taxpayers since this area has not been given as much attention as other areas. Specifically, a quantitative

correlational research design was used to examine the extent to which self-filing taxpayers' relevant tax knowledge is explained by their sex, age, income level, and educational level. The findings of the study may help tax authorities to identify the type and level of tax education each group of taxpayers needs in order to reduce unintentional underreporting of taxable income and ultimately increase the tax compliance rate.

Databases, Search Engines and Parameters, Literature and Range of Years

Below is a list of the databases, search engines, search parameters, types of literature, and range of years used in this chapter.

Databases

Academic Search Complete

Business Source Complete

Complementary Index

Directory of Open Access Journals

Education Research Complete

Health Source: Nursing/Academic Edition

IEEE Xplore Digital Library

International Security & Counter Terrorism Reference Center

Journals@OVID

LexisNexis Academic: Law Reviews

MEDLINE Complete

OmniFile Full Text Select (H.W. Wilson)

PsycARTICLES

PsycINFO

ReferenceUSA - U.S. Businesses

Regional Business News

SAGE Knowledge

ScienceDirect

Social Sciences Citation Index

Supplemental Index

Search Engines

Academic Info

CORE

Google Scholar

Microsoft Academic

Refseek

Roadrunner Search

Science.gov

Semantic Scholar

ResearchGate

Search Parameters

Collateral tax sanctions

Risk AND character OR traits

Risk AND genetics

Slippery slope framework

Social norms AND tax compliance

Tax AND prospect theory

Tax compliance AND age

Tax compliance AND audit AND rate OR level

Tax compliance AND complex AND tax code

Tax compliance AND demographic AND determinants OR factors

Tax compliance AND deterrence approach OR non-deterrence approach

Tax compliance AND education

Tax compliance AND errors OR mistakes

Tax compliance AND expected utility theory

Tax compliance AND frameworks

Tax compliance AND gender OR sex

Tax compliance AND marginal tax rates

Tax compliance AND occupation OR profession

Tax compliance AND penalty OR punishment

Tax compliance AND probability of detection

Tax compliance AND tax knowledge

Tax compliance AND tax revenue AND use OR purpose

Tax compliance AND tax system AND fair OR unfair

Tax compliance AND trust AND government OR revenue authority

Tax gap and fiscal policy

Tax gap estimate

Tax morale OR tax ethics

Taxpayers AND risk attitude

Underreporting AND taxable income AND factors OR determinants

Underreporting AND taxable income AND income

Underreporting AND taxable income AND income source

Underreporting AND taxable income AND occupation OR profession

Use of tax revenue

Types of Literature

Academic Journals

Books

Conference Materials

Dissertations/Theses

Electronic Resources

Primary Source Documents

Publications

Reports

Reviews

Range of Years

1944 – 2018

Chapter 3: Research Method

Introduction

The gross tax gap was estimated at $345 billion, $450 billion, and $458 billion for tax years 2001, 2006, and 2008 to 2010, respectively (IRS Research, Analysis & Statistics, 2016). The increase in the gross tax gap is a direct result of the continual decline in the voluntary tax compliance rate, which is the amount that taxpayers pay voluntarily expressed as a percentage of the actual tax liability owed by taxpayers on their individual income return. The overall (compliance on filing a tax return, reporting taxable income, and paying tax liability on time for individual income tax, corporate tax, and employment tax) voluntary compliance rates for tax years 2001, 2006, and 2008 to 2010 were 83.7%, 83.1%, and 81%, respectively. Voluntary compliance rates on individual income tax only for tax years 2001, 2006, and 2008 to 2010 were 79%, 77%, and 74%, respectively (IRS Research, Analysis & Statistics, 2016). Underreporting of taxable income accounted for $376 (83.6%) of the $450 billion gross tax gap for the 2006 tax year; and $387(84.5%) of the $458 billion gross tax gap for the 2008 to 2010 tax years (IRS Research, Analysis & Statistics, 2016).

Underreporting of taxable income on individual income tax return is the highest single component causing the gross tax gap, as it accounted for $235 billion or 52.2% of the gross tax gap attributed to all tax types and 62.5% of the gross tax gap attributed to individual income tax for the 2006 tax year; and also accounted for $264 billion or 68.2% of the gross tax gap attributed to all tax types and 57.6% of the gross tax gap attributed to individual income tax for 2008 to 2010 tax years (IRS Research, Analysis & Statistics, 2016). The other components of the tax gaps are underreporting of taxable income on corporate tax returns, nonfiling, and underpayment of tax liability. The problem addressed by the study was how differences in

taxpayers' knowledge levels can lead to different rates at which taxpayers unintentional underreport their taxable income on their individual income tax return.

The purpose of this quantitative correlational study was to examine the relationship between the dependent variable, relevant tax knowledge and each of the following independent variables: sex, age, income level, and educational level of self-filing taxpayers. Relevant tax knowledge refers to only tax knowledge that taxpayers are expected to have. It is expected that taxpayers know whether types of income that they earn are taxable or not. Taxpayers who cannot determine whether their earned income is taxable or not can unintentionally underreport their taxable income on their individual income tax return. The study focused on self-filing taxpayers' relevant knowledge on only income types they earn or have ever earned since only their knowledge on these types of income as taxable or nontaxable can lead to unintentional underreporting of taxable income. In essence, what is relevant tax knowledge to some taxpayers may not be relevant tax knowledge to other taxpayers.

Taxpayers' lack of knowledge on income types that they have never earned would not impact their compliance with reported income. It is also possible that taxpayers would examine as they earn income from new sources as to whether such income is taxable or not. Including participants' responses to questions on all types of income is therefore likely to cast doubt on the results of the study. The study also focuses on only taxpayers who file their own taxes since including taxpayers who use the services of tax professionals in filing their taxes can affect the validity of the study. Tax professionals are more knowledgeable on taxable and non-taxable income and have less tendency to mistakenly underreported taxable income. The rest of this chapter is organized as follows: research design and methodology, population and sample,

materials or instrumentation, operational definitions of variables, data collection and analysis, assumptions, limitations, delimitations, ethical assurances, and summary.

Research Methodology and Design

A correlational research design was used to examine the relationship between self-filing taxpayers' relevant tax knowledge and each of the following factors: sex, age, income level, and educational level. Relevant tax knowledge refers to taxpayers' knowledge of whether the type of income they earn or receive is taxable or not. Relevant tax knowledge is a self-designed instrument that provides a more accurate measurement of the tax knowledge relevant to each taxpayer. Taxpayers can have different relevant tax knowledge from one another depending on the type of income earned or received. Villarruel et al. (2009) advocate for scoring only relevant items since it is "more accurate to calculate a mean or sum score based on the items that are applicable to participants, rather than including all items in scoring" (pp. 140-141). Correlational research design is most suitable for examining the existence and strength of the relationship between dependent and independent variables. Other quantitative research designs (descriptive, quasi-experimental, and experimental) would have been ideal for this study.

A descriptive design is ideal for situations in which subjects are observed without influencing them. Hypotheses are not developed before the study but after the collection of data. A descriptive design has the advantage of being a true experiment since subjects behave normally without any external influence which could alter the way subjects behave. It can also be used to determine if a phenomenon can be tested quantitatively. A descriptive design has the drawback of being unreliable since it cannot be statistically analyzed and repeated because no variables are manipulated. Taxpayers cannot be practically observed whiles they are preparing

their tax returns and even if observed the researcher cannot determine the factors that make taxpayers underreport their taxable income without finding out from the taxpayers themselves.

A quasi-experimental design (causal-comparative) is the most ideal design when the goal of a study is to establish a cause-effect relationship between dependent and independent variables. Independent variables are not manipulated and subjects are assigned to groups to be tested without any random pre-selection process. The effects on the groups upon which variables are tested are compared to control groups that are not exposed to the variables. A quasi-experimental design would not have been ideal for this study since it would be difficult to determine which particular factors either independently or together cause underreporting of taxable income by taxpayers after controlling for other variables. This is due to the numerous factors that can either directly or indirectly make taxpayers underreport their taxable income.

An experimental design uses a scientific method to determine a cause-effect relationship between dependent and independent variables. Typically, all other variables are controlled with the exception of the independent variable. The effect of the independent variable on the dependent variable is examined for a cause-effect relationship. Experimental research design has the advantages of being able to be statistically analyzed, replicated and results validated. On the other hand, experimental design can be expensive and variables may not be completely controlled which will not be a true representation of actual conditions the experiment is expected to mimic. The inability to completely control all variables that need to be controlled in an experiment can lead to misleading conclusions. It is for this reason why an experimental design was not suitable for this study since not all other factors that influence underreporting of taxable income could be controlled in order to determine if a single factor causes underreporting of taxable income.

Of the three main correlational research types (naturalistic observation, survey, and archival), survey research was the most suitable for this study given the sensitive nature of the study. Using a survey method such as through online or mail questionnaires allow participants to protect their privacy which encourages them to be truthful with their answers (Preisendörfer & Wolter 2014). Using the naturalistic method for this study would have involved observing participants as they file their tax returns. This would not have been feasible. Even if participants were observed while they are preparing their tax return, there is no way to determine what types of income participants earned or received and also whether they underreported their taxable income or not without asking them. The archival method would have involved researching participants' past tax returns and again there is no way to determine what types of income participants earned or received and also whether they underreported their taxable income or not without finding out directly from them.

Survey participants were asked to answer questions on their sex, income level, educational level, and whether certain income types are taxable or not. Sex had two ordinal values (male = 1, female = 2). Age and educational level were measured in years while income level was measured in dollars and cents. The questions on taxable income were of two parts. The first part asked participants to indicate if they have ever earned or received a particular income type. Any income for which a participant has never earned nor received is not relevant to that participant since it expected that taxpayers should know whether any income they earn or receive is taxable or not. Only participants who answered in the affirmative proceeded to answer the second part of the question for which they indicated if that particular income type was taxable or not. Thus, the number of the second part of questions on taxable income answered differed from one participant to another since all participants did not have the same income sources. For each

participant, the number of questions answered correctly was divided by the total number of the second part of the tax knowledge questions answered to obtain a relevant tax knowledge score.

A Chi-square test of independence was used to examine the relationship between self-filing taxpayers' relevant tax knowledge and their sex, age, income level, and educational level. A Chi-square test of independence is the ideal statistical tool to use in examining the existence and strength of the association between two categorical variables. Sex was categorized into two groups: male and female. The demographic factors, age, income level, and educational level were each categorized into three groups or levels (low, medium, and high). The categorization was based on the range for each factor obtained after collecting the data and also taking into consideration outliers so as not to distort the interval for each group and the results of the study (Dulleck et al., 2016). Relevant tax knowledge score was grouped into two: low and high based on the range of the results obtained.

Population and Sample

The population for this study consists of Maryland state taxpayers who filed their 2018 individual income tax returns themselves without using the services of tax professionals or help from knowledgeable family members and friends. The number of eligible participants was estimated using the most recent filing statistics at the state level provided by the Internal Revenue Service (IRS). For Maryland State, a total of 2,950,840 individual tax returns were filed in the 2016 tax year but of this figure, 1,466,330 were filed by paid preparers and 57,830 were filed by volunteers ("SOI Tax Stats - Historic Table 2", n. d). This leaves 1,426,680 individual income tax returns that were self-prepared. Some self-prepared tax returns are done with the help of family members and friends. Since the goal of the study was to select participants who prepared their own tax return without using the services of tax professionals or help from family

members and friends, the number of self-prepared tax returns (1,426,680) was reduced by the estimated number of self-prepared tax returns that used help from family members and friends. The number of self-prepared tax returns that used the help of family members and friends is estimated using a study done by GoBankRates. In a study posing the question "How do you file your taxes?" to respondents, GoBankRates asked 5028 respondents how they plan to file their 2016 tax return. Excluding respondents who selected "None of the above options", the survey shows the following filing type distribution: "Digital tax-prep tool (i.e. Turbo Tax): 34.5%"; "I have an accountant file my taxes: 28.5% "; "A friend or family member does it for me: 10.9% "; "I use the IRS forms and calculate myself: 8.5%"; "Brick-and-mortar company (i.e. H&R Block): 8.3%", and "I do not file my taxes: 9.2%" ("How do you file your taxes?", 2016).

The ratio of self-prepared taxpayers who used the help of a friend or family member to the total number of self-prepared tax returns ("Digital tax-prep tool (i.e. Turbo Tax)", "I use the IRS forms and calculate myself", and "A friend or family member does it for me") is 20.22% (10.9 % / (34.5%+8.5%+10.9%)). Thus, of those who self-prepared their tax returns 79.78% prepared their tax returns on their own without using help from family members or friends. Using this figure, the number of taxpayers who filed their own tax returns without using help from family members or friends is 1,138,205. (1,426,680 x 79.78%). This estimate was done using 2016 tax year filing statistics at the state level. It is expected that this figure will increase in 2018 tax year but the increase is not expected to significant based on the total number of individual income tax returns received by the IRS in 2016 and 2017. The total number of individual income tax returns filed by Maryland residents in 2016 and 2017 fiscal years were 2,959,007 and 2,950,158, respectively, representing approximately 0% increase ("IRS 2017 Data Book", n. d). The total number of individual income tax returns filed by Maryland residents in

2017 and 2018 fiscal years were 2,950,158 and 2,976,987, respectively, representing a 1% increase ("IRS 2018 Data Book", n. d). The number of eligible participants for this study is estimated at 1.2 million.

Type I error, which is rejecting the null hypothesis when it is true and Type II error, which is accepting the null hypothesis when it is false work in opposite directions but both should be minimized to acceptable levels. Since decreasing one type of error increases the other, the appropriate balance is needed. The study used the conventionally beta/alpha ratio of 4:1 in order to balance the risk of committing Type I and Type II errors (Cohen, 1992). For given alpha and beta values, a small effect size yield the highest sample size which can be difficult to achieve whiles a large effect size yield the smallest sample size but can lead to misleading results (Zhang et al., 2016). A medium-size effect was used in this study. This allows the study to have enough power to detect any relationship between the dependent variable, relevant tax knowledge and each of the following independent variables: sex, age, income level, and educational level. The study used a G*Power Software with the following specifications: Test family: χ^2 test; Statistical test: Goodness-of-fit tests: Contingency tables; Type of analysis: A prior: Compute required sample size - given α, power, and effect size; and determined the minimum sample size needed for the study at 108 where size effect w = 0.3, α = 0.05 and β = 0.2, power (1- β) = 0.80, and Df = 2 (Appendix A).

Materials/Instrumentation

An online survey questionnaire was used to collect data from participants. Participants were Maryland state residents aged 18 and above who filed their 2018 individual income tax return on their own without using the services of tax professionals, or help from family members or friends. Participants were chosen at random. The survey questions asked participants to

indicate which demographics they belong in terms of sex, age, income level, and educational level. Participants also indicated whether they have ever earned or received various types of income and also whether they are taxable or not. The questions on taxable income were limited to 27 so as to cover both common and uncommon income types and also not overburden participants (Preisendörfer & Wolter 2014). The survey questionnaire is presented in Appendix C. Informed consent form, and Institutional Review Board approval letter are presented in Appendix D and Appendix E, respectively.

The validity of a study refers to whether or not it actually measures what it is intended or claim to measure. The quality of a test significantly dependents on its validity. This study measured tax knowledge for each participant by dividing the number of relevant tax knowledge questions answered correctly by the total number of relevant tax knowledge questions. Prior studies have used survey questionnaires to measure tax knowledge with the level of tax knowledge calculated as the percentage of tax knowledge questions answer correctly by participants to the total number of tax knowledge questions. (Eriksen & Fallan, 1996; Loo & Ho, 2005, Palil, 2010).

Operational Definitions of Variables

In this study, the relationship between the dependent, self-filing taxpayers' relevant tax knowledge and each of the independent variables: sex, age, income level, and educational level was examined.

Self-filing Taxpayers. This refers to taxpayers who file their own individual income tax returns without using the services of tax professionals or help from knowledgeable family members and friends. The study focused on taxpayers who file their own taxes because their lack of tax knowledge is more likely to lead to unintentional underreporting of taxable income on

their individual income tax returns compared to those who use the services of tax professionals or help from family members and friends who are knowledgeable about taxable and nontaxable income sources. Therefore, only survey participants who filed their own 2018 individual income tax returns without using the services of tax professionals or help from family members and friends were included in the study.

Relevant Tax Knowledge. The dependent variable, relevant tax knowledge was operationalized by dividing the number of relevant tax knowledge questions answered correctly by the total number of relevant tax knowledge questions. It is expected that taxpayers know whether types of income that they earn are taxable or nontaxable. Survey participants were asked to indicate by each question on taxable income whether they have ever earned or received the income type referenced in the question. If the participant answers "yes" to earning a particular type of income, that question was then classified as a relevant tax knowledge question for that particular participant. If a participant answers "no" to ever earning or receiving a particular type of income, that question was not be considered for that participant. For each participant, the number of relevant tax knowledge questions answered correctly was divided by the total number of relevant tax knowledge questions to obtain a relevant tax knowledge score for that participant.

Sex. Sex was categorized into two groups: male (1) or female (2).

Age. Participants were asked to indicate their age in years.

Income level. Participants were asked to indicate their annual income in dollars and cents earned in the 2018 tax year.

Educational level. Participants were asked to state the number of years of formal education they have attained.

Data Collection and Analysis

The data for this study were collected through an online survey. The target survey respondents were Maryland state residents aged 18 and above who filed their 2018 individual income tax return on their own without help from tax professionals, family members or friends. The survey asked participants demographic and tax knowledge questions. The demographic questions were about participants' age, income level (earned or received for the most recent tax year) and educational level. The tax knowledge questions were closed-end requiring participants to indicate if an income type is taxable or nontaxable

The completeness of the collected data was partly ensured through the collection process. The online questionnaire was designed with restrictions to ensure that participants answer questions as expected. For example, participants were required to indicate their sex (male or female) before proceeding to the subsequent questions on age, income level and educational which also had similar restrictions requiring participants to answer questions before proceeding to answer subsequent questions. Also, for questions on income types ever earned or received by participants and whether they are taxable or nontaxable, participants were allowed to answer the second part (whether earned income is taxable or nontaxable) of question only if they answered the first part in the affirmative. This prevented participants from indicating whether income types they have never earned nor received are taxable or nontaxable. This was a very crucial restriction since the data collection goal was for participants to answer only tax knowledge questions that were relevant to them. The survey questionnaire was administered to participants using the services of an independent third party, SurveyMonkey. Participants were not directly compensated but SurveyMonkey donated $0.50 to the charity participants' choice upon

completing the survey. Studies show that incentives improve survey response rates (Hsu et al., 2017; Robb et al., 2017; Wiant et al., 2018).

The online survey link was closed at the end of the response period. The data were then exported from SurveyMonkey for secure storage on the researcher's USB device. The survey did not track any personal identifiers. Some survey responses were deidentified since some participants voluntarily entered their names. The responses collected were imported to a Statistical Package for the Social Science (SPSS) software for data analysis. Responses that were partially completed were deleted. Violating the assumptions of a statistical test can lead to misleading results (de Winter, 2016).

A Chi-Square test makes the following assumptions two: (1) the two variables being examined for the existence and strength of relationship should be measured at an ordinal or nominal level or categorical data, and (2) the two variables should consist of two or more categorical, independent groups. The demographic factors, age, income level, and educational level were each categorized into three groups or levels. The categories were based on the range for each factor and also taking into consideration outliers so as not to distort the interval for each group and the results of the study (Dulleck et al., 2016). Relevant tax knowledge score was grouped into two: low and high based on the range of the results obtained. All the categories were independent of one another. Sex had two ordinal values: "1" for males and "2" for females. Relevant tax knowledge had two ordinal values using ranges based on the results obtained. Also, age, income level, and educational level all had ordinal values from 1 to 3 using ranges based on the results obtained. SPSS was also used to compute Cronbach's Alpha (α) in order to test the reliability of the data collected. The Cronbach's Alpha (α) was 0.72. Cronbach's alpha greater than or equal to .7 is largely accepted to indicate reliability.

Scatter plots between the dependent variable (relevant tax knowledge score) and each of the independent variable (sex, age, income level, and educational level) were created for visual examining of any possible linear relationship that could warrant the use of other correlational statistical tests. No linear relationship existed between the dependent variable (relevant tax knowledge score) and any of the independent variables (sex, age, income level, and educational level) (Appendix F). A Chi-square test of independence was performed to examine the existence and strength of the relationship between the dependent variable, taxpayer's relevant tax knowledge and each of the following independent variables: sex, age, income level, and educational level.

Assumptions

An assumption of the study was that those who file their own income tax returns without being knowledgeable about whether the types of income that they earn are taxable or nontaxable can lead them to unintentionally underreport their taxable income. While it is also possible for lack of tax knowledge to lead taxpayers to over-report their taxable income, this figure is very negligible compared to underreported taxable income (IRS Research, Analysis & Statistics, 2016). For this reason, the study focused on only underreporting of taxable income by including only taxable income types on the survey questionnaire. The study also assumes that taxpayers would not underreport their income in order to pay lower tax liability due to other reasons such as the unfairness of the tax system, mistrust of government, audit rate, and penalty rates or any other reason that make taxpayers take deliberate actions to underreport their taxable income. If any of these factors motivate taxpayers to underreport their taxable income, then their tax knowledge on which income types are taxable would be irrelevant. Another assumption that is made is that participants were honest and truthful with their responses and also about filing their

2018 individual income tax return on their own without using the services of tax professionals or help from knowledgeable family members and friends.

Limitations

A limitation of the study was the possibility for taxpayers to have earned or received a particular type of income in the past but have now forgotten whether they reported it is taxable or nontaxable. This can happen with income types that taxpayers do not normally earn or receive. The goal of the study was to examine the existence and strength of the relationship between the dependent variable, taxpayers' relevant tax knowledge and each of the following independent variables: sex, age, income level and educational level using correlational research design. A limitation of the study is that the existence of a correlation between the dependent variable and any of the independent variables does not imply causation.

Delimitations

The scope of the study was narrowed to suit its goal by several delimitations. The gross tax gap was estimated at $345 billion, $450 billion, and $458 billion for tax years 2001, 2006, and 2008 to 2010, respectively (IRS Research, Analysis & Statistics, 2016). Tax noncompliance can be in the form of underreporting of taxable income, underpayment of tax liability, and nonfiling of income tax returns. Underreporting of taxable income accounted for $376 (83.6%) of the $450 billion gross tax gap for the 2006 tax year; and $387(84.5%) of the $458 billion gross tax gap for the 2008 to 2010 tax years (IRS Research, Analysis & Statistics, 2016). Clearly, underreporting of taxable income is the largest form of tax noncompliance. Several studies have identified factors associated with underreporting of taxable income. Factors such audit levels (Mendoza et al., 2017; Tan & Yim 2014), prior audits (DeBacker, 2014), penalties (Hallsworth, 2015; Litina & Palivos, 2016, Phillips, 2014), trust in government (Litina & Palivos, 2016;

Mas'ud et al., 2014), use of tax revenue (Doerrenberg, 2015; Fochmann et al., 2016), the tax rate and system (Grundmann & Graf Lambsdorff, 2017; Pántya et al., 2016) all influence taxpayers' compliance attitude. Other factors that also impact tax noncompliance are errors and complexity of the tax code (Yaniv, 2013), educational level (Rodriguez-Justicia & Theilen, 2018), demographics (Hofmann et al., 2017) the religious belief and the tax morale of taxpayers (Alm et al., 2017a; Calvet Christian & Alm, 2014), and social norms (Brizi, et al., 2015).

The study focused on only unintentional underreporting of taxable income by self-filing taxpayers due to poor their tax knowledge which is an area that has not been given much attention. The tax knowledge considered in the study was only those that were relevant to each participant since it is only relevant tax knowledge that can influence unintentional underreporting of taxable income on individual income tax returns. The participants for the study were limited to Maryland state residents aged 18 and above who filed their 2018 individual income tax return on their own without using the services of tax professionals or help from knowledgeable family members and friends. Only closed-end questions were asked on the survey questionnaire which has the advantages of being consistent, easy and quick to answer, easy to compare responses of questionnaires, and easier to analyze compared to open-ended questions.

Ethical Assurances

Participants for the study were assured of the privacy and confidentiality of all provided information through a signed statement. Participants were clearly informed about the purpose of the study and how exactly the collected data were to be used (Appendix D). Participants were also guaranteed that all data provided would not be used for any other purpose other than for the purpose of this research. Participants were assured that proper data protection measures would be used to avoid the data from getting into the hands of unintended users. Providing such

assurances, as well as the contact information of the researcher, encourage more participants to respond to survey questions (Hottenstein, 2018). The researcher's contact information allows participants to contact the researcher when they want more clarification on any issue that they may have. For this reason, participants were given the option to contact the researcher by phone, email or in writing to ask questions or seek further clarification.

Tax issues are always sensitive subjects by nature. Participants were not asked to provide any sensitive information such as their date of birth, address, and social security. Survey response rates decrease drastically low when participants are asked to provide any information that they may deem as too personal. Asking any personally identifiable information would have likely led most participants to believe that their information may be passed on to the IRS or state tax authorities, potentially resulting in audits of their individual income tax returns in the future.

Summary

The goal of the study was to examine the existence and strength of the relationship that may exist between the dependent variable: relevant tax knowledge and each of the independent variables: sex, age, income level, and educational level considered separately using correlational research design. Data for the study were collected through an online survey questionnaire. Survey participants consisted of Maryland state residents age 18 and above who filed their most recent individual income tax return on their own without using the services of tax professionals or help from family members and friends. Participants were informed about the purpose of the study and how collected data would be used as well as assuring them of the confidentiality and privacy of the information they provide. The survey questions were on participants' demographics (sex, age, income level, and educational level) and relevant tax knowledge. Participants answered closed-end questions on whether they have ever earned a particular

income type and if so, whether that income type is taxable or nontaxable. The collected data were entered into SPSS.

A Chi-square test of independence is sensitive to outliers, the presence of which could lead to misleading results and their interpretations. SPSS was used to check for outliers. All outliers were removed from the data. The data were checked for reliability and also ensured that the assumptions of the Chi-square test of independence were satisfied before proceeding to test for the association between the dependent variable (relevant tax knowledge score) and each of the independent variables (sex, age, income level, and educational level), considered separately. The results of the test were analyzed and interpreted.

Chapter 4: Findings

The purpose of this quantitative study was to examine the relationship between the relevant tax knowledge of self-filing taxpayers and their sex, age, income level, and educational level, considered separately. Taxpayers can unintentionally underreport their taxable income on their individual income tax return due to their lack of tax knowledge. This study was to examine if there were any association between self-filing sex taxpayers' relevant tax knowledge and their sex, age, income level, or educational level. For the purposes of this study, taxpayers' relevant tax knowledge is defined as their ability to determine whether the income they have ever earned or received is taxable or non-taxable. The study focused on taxpayers' relevant knowledge on only income types they have ever earned or received since only their knowledge of these types of income as taxable or nontaxable could lead to unintentional underreporting of taxable income. The study also focused on only taxpayers who file their individual income tax return on their own without using the services of tax professionals or help from knowledgeable family members and friends since such taxpayers are more likely to unintentional underreport their taxable income on their individual income tax return compared to those who use the services of tax professionals or help from knowledgeable family members and friends.

The data for the study were collected from 109 self-filing taxpayers from Maryland state aged 18 or above who filed their 2018 individual income tax returns on their own without using the services of tax professionals or help from knowledgeable family members and friends The minimum sample size required for the study was 108 (Appendix A). The study focused the data collection around the following research questions:

RQ1. Is there an association between self-filing taxpayers' relevant tax knowledge and their sex?

RQ2. Is there an association between self-filing taxpayers' relevant tax knowledge and their age?

RQ3. Is there an association between self-filing taxpayers' relevant tax knowledge and their income level?

RQ4. Is there an association between self-filing taxpayers' relevant tax knowledge and their educational level?

The relevant tax knowledge score for each participant was calculated by dividing the number of tax knowledge questions answered correctly by the total number of questions for which the participant indicated as ever earned or received the income referenced in the question.

Chapter 4 has four sections: validity and reliability of the data, results, evaluation of the findings, and summary. The results section includes an overview of the data collection and preparation, demographic characteristics of the sample, testing of relevant assumptions of the statistical test conducted, and results of hypothesis testing. The evaluation of the findings section interprets the results of the study as they relate to results from prior research. The summary section summarizes the main points presented in the chapter.

Validity and Reliability of the Data

The validity of an instrument refers to the degree to which it measures what it is intended to measure. A questionnaire was used to collect data for assessing the tax knowledge of participants. The portion of the questionnaire measuring tax knowledge consisted of 27 income types each of which participants had to indicate whether (1) they have ever earned or received and it is taxable; (2) they have ever earned or received and it is not taxable; or (3) they have never earned nor received. Only income types that are actually taxable were included in the questionnaire. Including nontaxable income types would have distorted the findings of the study

since the study was to examine the association between demographic factors (age, sex, educational level, and income level) and relevant knowledge of taxpayers. The relevant tax knowledge score for each participant was calculated by dividing the number of relevant tax knowledge questions answered correctly by the total number of relevant tax knowledge questions.

All questions for which a participant indicated as never earned or received the income type referenced in the question were omitted since the focus is on income types that are applicable or relevant to each participant. The validity of the study is supported by prior studies that used questionnaires to assess tax knowledge of participants as well as assigning scores based on answers to questions. Loo & Ho (2005) measured tax knowledge using questionnaire asking whether income types are taxable or nontaxable with the following scoring scale: 1 = Yes; 2= No; 3=Not sure. Eriksen and Fallan (1996) used 28 questions on taxable income to measure tax knowledge and "respondents with the correct answer received a score of 3 (well-informed), those with a 'do not know' answer received a score of 2 (un-informed), and those with a wrong answer receive a score of 1 (misinformed)" (p. 399). Palil (2010) measured tax knowledge by using questionnaire asking respondents to indicate whether a given income type was taxable or nontaxable by selecting one of the following answers (score): Definitely Wrong (1), Probably Wrong (2), Not Sure (3), Probably Correct (4), Definitely Correct (5). If the correct answer was '5' and "respondent ticked scale 5, then he would get 5 marks and if he ticked scale 1, he would get 1 mark (the same procedure applied to scale 4, 3 and respectively). (Palil, 2010, p. 250). On the other hand, " if the correct answer was the scale of 1, he would get 5 marks if 1 on the scale was ticked, whereas if he ticked 5 on the scale, he would get 1 mark only" (Palil, 2010, p. 250). This scoring method makes a better distinction between more knowledgeable and

less knowledgeable respondents compared to a scoring scale (1 = Yes; 2= No; 3=Not sure) used by Loo & Ho (2005). The scoring method used in this study essentially measures the tax knowledge of participants as a percentage of the tax knowledge that is relevant to them.

The reliability of a measure refers to its consistency and repeatability. There are four general types of reliability estimates: inter-rater or inter-observer, test-retest, parallel-forms, and internal consistency. The most appropriate reliability estimate for this study was the internal consistency reliability estimate given the difficulty of implementing any of the other reliability estimates due to limitations and constraints. For example, to use the parallel-forms reliability test, two forms of questionnaires that can be considered as equivalent must be created. In the first form, participants could have been asked to determine whether the following income types are taxable or nontaxable: business income, gambling income, and compensation for personal services while in the second form could have contained the following income types: pension or annuity when employer made all contributions, canceled debts when not insolvent or bankrupt, and rental income from personal property. Both forms are assessing the tax knowledge of participants but it would be very difficult to prove the equivalency of the two forms of the questionnaire.

The split-half method which is a form of an internal consistency reliability estimate involves dividing the questionnaire into two halves and correlating scores on one half of the test with scores on the other half of the test. The splitting of the questionnaire can be done in several ways. For example, the questionnaire can be divided into two with one half consisting of all even-numbered questions and the other half consisting of all odd-numbered questions. The Cronbach's Alpha (α), which is an extension of the split-half method is the mathematical equivalent of using the average of all possible split-half correlations (Warrens, 2015). SPSS was

used to compute Cronbach's Alpha (α) in order to test the reliability of the data collected. The Cronbach's Alpha (α) was 0.72. Cronbach's alpha greater than or equal to .7 is largely accepted to indicate reliability.

Descriptive Statistics

There were a total of 109 (57 males and 57 females) participants who completed the survey. The descriptive statistics for participants' age, educational level, and income level are shown in Table 1 below:

Table1

Descriptive Statistics for Demographic Variables

Variable	Minimum	Maximum	Mean	Std. Deviation
Age	18	76	42.21	16.213
Income	0	306,000.00	63,184.53	52,537.30
Education	2	32	13.45	4.896

Results

The demographic factors, age, income level, and educational level were each categorized into three groups or levels. The categories were based on the range for each factor and also taking into consideration outliers so as not to distort the interval for each group and the results of the study (Dulleck et al., 2016). Relevant tax knowledge score was grouped into two: low and high based on the range of the results obtained. Table 2 below details the groupings within each demographic factor, relevant tax knowledge, as well as corresponding ordinal values.

Table 2

Grouping of Demographic Factors, Relevant Tax Knowledge, and Ordinal Values

Variable	Group	Interval	Ordinal Value
Sex			
	Male		1
	Female		2
Age (Range: 18 to 76)			
	Low	18 - 37	1
	Medium	38 - 57	2
	High	58 or older	3
Income (Range: $0 to $306,000)			
	Low	$0.00 - $40,000.00	1
	Medium	$40,00.01- $80,000.00	2
	High	$80,00.01 or higher	3
Education (Range: 2 to 32)			
	Low	0 - 8	1
	Medium	9 -16	2
	High	17 or more	3
Relevant Tax Knowledge Score (Range 0.63 to 1.00)			
	Low	0.00 - 0.80	1
	High	0.81 - 1.00	2

A Chi-Square test makes the following assumptions:

Assumption 1: The two variables should be measured at an ordinal or nominal level or categorical data.

Assumption 2: The two variables should consist of two or more categorical, independent groups.

The groupings and conversions above ensure that both assumptions are satisfied.

The results obtained are summarized in distribution Table 3 below:

Table 3

Distribution of Relevant Tax Knowledge Scores

		Relevant Tax Knowledge Score	
		Low	High
Factor	Group		
Sex			
	Male	13	39
	Female	21	36
Age			
	Low	18	33
	Medium	9	26
	High	7	16
Education			
	Low	10	8
	Medium	18	51
	High	6	16
Income			
	Low	18	22
	Medium	9	26
	High	7	27

The distribution of relevant tax knowledge score for each income type used in the survey is shown in Appendix G.

Research Question 1/Hypothesis

Is there an association between self-filing taxpayers' relevant tax knowledge and their sex?

$H1_0$. There is no association between self-filing taxpayers' relevant tax knowledge and their sex

$H1_a$. There is an association between self-filing taxpayers' relevant tax knowledge and their sex. The Chi-Square test shows that χ^2 (1, N = 109) = 1.777, p = 0.183. The null hypothesis cannot be rejected since the p-value is greater than the significant p-value of 0.05. That is, there is no statistically significant association between self-filing taxpayers' relevant tax knowledge and their sex.

Research Question 2 /Hypothesis

Is there an association between self-filing taxpayers' relevant tax knowledge and their age?

$H2_0$. There is no association between self-filing taxpayers' relevant tax knowledge and their age.

$H2_a$. There is an association between self-filing taxpayers' relevant tax knowledge and their age. The Chi-Square test shows that χ^2 (2, N = 109) = 0.895, p = 0.639. The null hypothesis cannot be rejected since the p-value is greater than the significant p-value of 0.05. That is, there is no statistically significant association between self-filing taxpayers' relevant tax knowledge and their age.

Research Question 3 /Hypothesis

Is there an association between self-filing taxpayers' relevant tax knowledge and their income level?

$H3_0$. There is no association between self-filing taxpayers' relevant tax knowledge and their income level.

$H3_a$. There is an association between self-filing taxpayers' relevant tax knowledge and their income level.

The Chi-Square test shows that χ^2 (2, N = 109) = 5.824, p = 0.054. The null hypothesis cannot be rejected since the p-value is greater than the significant p-value of 0.05. That is, there is no statistically significant association between self-filing taxpayers' relevant tax knowledge and their income level.

Research Question 4 /Hypothesis

Is there an association between self-filing taxpayers' relevant tax knowledge and their educational level?

$H4_0$. There is no association between self-filing taxpayers' relevant tax knowledge and their educational level.

$H4_a$. There is an association between self-filing taxpayers' relevant tax knowledge and their educational level.

The Chi-Square test shows that χ^2 (2, N = 109) = 5.973, p = 0.050. The null hypothesis is rejected since the p-value is not greater than the significant p-value of 0.05. That is, there is a small but statistically significant association between self-filing taxpayers' relevant tax knowledge and their educational level. The results of each of the above Chi-Square tests are presented in Appendix H.

Evaluation of the Findings

The study examined if there were any associations between the relevant tax knowledge of self-filing taxpayers and their sex, age, income level, educational level. Research question one examined the association between self-filing taxpayers' relevant tax knowledge and their sex. The result shows that there is no statistically significant association between self-filing

taxpayers' relevant tax knowledge and their sex. This is in contrast with results obtained by Bhushan and Medury (2013) who found a significant difference between the tax knowledge of salaried males and females. Bhushan and Medury (2013) assessed respondents' tax knowledge using 13 questions about personal income relating to basic concepts of income tax, computation of tax liability, assessment rates, and deductions (p. 78). Other studies (Dulleck et al., 2016; Kogler et al., 2016; Pickhardt & Prinz, 2014; Reese & McDougal, 2018) found women to be generally more tax compliant than men. These studies considered tax compliance in general which includes filing of individual income tax return, reporting all taxable income, and paying tax liability, but differences in tax knowledge specifically affect the reporting of all taxable income.

Research question two examined the association between self-filing taxpayers' relevant tax knowledge and their age. The result shows that there is no statistically significant association between self-filing taxpayers' relevant tax knowledge and their age. The result supports the findings of Hurst et al. (2014) that age does not cause any difference in the level of underreporting of taxable income to tax authorities. The result is inconsistent with other prior studies that found age to be positively related to tax compliance (Al-Mamun et al., 2014; Hofmann et al., 2017). Hofmann, Voracek, Bock, and Kirchler (2017) found that "there is a rather small but significant relationship between the age of taxpayers and their tax compliance" (p. 66). Khafidhoh and Suryarini (2017) explain that taxpayers' tax knowledge improves with age through their experiences with tax authorities.

Research question three examined the association between self-filing taxpayers' relevant tax knowledge and their income level. The result shows that there is no statistically significant association between self-filing taxpayers' relevant tax knowledge and their income level.

The result is inconsistent with prior studies that found a high negative correlation between income level and tax compliance (Artavanis et al., 2016; Doerrenberg, 2015; Kapranova et al., 2016; Lee, 2016). The result is also inconsistent with the findings of Bhushan and Medury (2013) that tax knowledge level is highest for high-income earners. The high rate of tax noncompliance among high-income earners can be attributed to other factors apart from their tax knowledge. Most high-income earners justify the underreporting of their taxable income by arguing that tax is a redistribution of wealth, and that what they pay in taxes does not correspond to the benefit they receive when compared to the taxes paid and benefits received by low-income earners (Deffains, et al., 2016, Doerrenberg & Duncan, 2014a). Grundmann and Graf Lambsdorff (2017) attribute higher underreporting rate among high-income earners to a psychological force that tempts them to cheat rather than to their poor tax knowledge.

Research question four examined the association between self-filing taxpayers' relevant tax knowledge and their educational level. The result shows that there is a small but statistically significant association between self-filing taxpayers' relevant tax knowledge and their educational level. This result lends support to prior studies that found that highly educated taxpayers are more tax compliant than less educated taxpayers (Rodriguez-Justicia & Theilen, 2018, Wenzel, 2007). The result contrasts with results obtained by Hofmann, Voracek, Bock, and Kirchler (2017) that less educated people tend to be more tax compliant than highly educated people. Education does not necessarily translate into tax knowledge and has no direct effect on tax compliance (Ho et al., 2013).

Summary

The goal of the study was to examine the relationships between self-filing taxpayers' relevant tax knowledge and their sex, age, income level, and educational level. Data for the study

were collected through a survey administered to 109 Maryland state residents aged 18 or above who filed their 2018 individual income tax return on their own without using the services of tax professionals or help from knowledgeable family members and friends. The portion of the questionnaire measuring tax knowledge consisted of 27 taxable income types each of which participants had to indicate whether (1) they have ever earned or received and it is taxable; (2) they have ever earned or received and it is not taxable; or (3) they have never earned nor received. The relevant tax knowledge score for each participant was calculated by dividing the number of relevant tax knowledge questions answered correctly by the total number of relevant tax knowledge questions. All questions that referenced to income types that participants have never earned or received were omitted since the focus was on only income types that were applicable or relevant to each participant. The demographic factors, age, income level, and educational level were each categorized into three groups or levels. The categories were based on the range for each factor and also taking into consideration outliers so as not to distort the interval for each group and the results of the study. Relevant tax knowledge score was grouped into two: low and high based on the range of the results obtained.

A Chi-square test of independence was performed to examine the relationship between self-filing taxpayers' relevant tax knowledge and their sex, age, income level, and educational level. The significant level was set at 0.050. The following results were obtained:

Test for association between self-filing taxpayers' relevant tax knowledge and their sex: χ^2 (1, N = 109) = 1.777, p = 0.183.

Test for association between self-filing taxpayers' relevant tax knowledge and their age: χ^2 (2, N = 109) = 0.895, p = 0.639.

Test for association between self-filing taxpayers' relevant tax knowledge and their income level: $\chi 2$ (2, N = 109) = 5.824, p = 0.054.

Test for association between self-filing taxpayers' relevant tax knowledge and their educational level: $\chi 2$ (2, N = 109) = 5.973, p = 0.050.

A small but statistically significant association exists between self-filing taxpayers' relevant tax knowledge and their educational level. There is no statistically significant association between self-filing taxpayers' relevant tax knowledge and their sex, age, or income level.

Chapter 5: Implications, Recommendations, and Conclusions

The problem addressed by this study was how differences in taxpayers' relevant tax knowledge levels could lead to different rates at which taxpayers unintentional underreport their taxable income on their individual income tax return. The three most recent gross tax gap estimates by the IRS covering tax years 2001, 2006, and 2008 to 2010 put the figure at $345 billion, $450 billion, and $458 billion, respectively (IRS Research, Analysis & Statistics, 2016). The increasing tax gap has an adverse effect on the nation's finances. Alm and Soled (2017) note that "the most obvious impact is that it contributes to larger federal government budget deficits, forcing either spending cuts or tax increases" (p. 527). Services received by the public are affected by the actions of noncomplaining taxpayers. Morgan-Thomas and Levine (2012) also note that "reducing the tax gap is an essential step in reducing ongoing federal deficits, leading to improved fiscal health and alleviating cause for future tax increase legislation" (pp. 34-35). Underreporting of taxable income on individual income tax return accounted for $264 billion or 68.2% of the gross tax gap attributed to all sources and 57.6% of the gross tax gap attributed to individual income tax for the 2008 to 2010 tax years (IRS Research, Analysis & Statistics, 2016). Poor tax knowledge can lead to unintentional underreporting of taxable income by taxpayers on their individual income tax returns (Kwok & Yip, 2018; Ritsatos, 2014; Hassan et al., 2016).

The purpose of this quantitative correlation study was to examine the relationship between the relevant tax knowledge of self-filing taxpayers and their sex, age, income level, and educational level, considered separately. Taxpayers can unintentionally underreport their taxable income on their individual income tax return due to their lack of tax knowledge. This study was intended to examine if there were any associations between self-filing taxpayers' relevant tax knowledge and their sex, age, income level, or educational level. For the purposes of this study,

taxpayers' relevant tax knowledge is defined as their ability to determine whether the income they have ever earned or received is taxable or non-taxable. The study focused on taxpayers' relevant knowledge on only income types they have ever earned or received since only their knowledge of these types of income as taxable or nontaxable could lead to unintentional underreporting of taxable income. The study also focused on only taxpayers who file their individual income tax return on their own without using the services of tax professionals or help from knowledgeable family members and friends since such taxpayers are more likely to unintentional underreport their taxable income on their individual income tax return compared to those who use the services of tax professionals or help from knowledgeable family members and friends.

The data for the study were collected from 109 self-filing taxpayers from Maryland state aged 18 or above who filed their own 2018 individual income tax returns without using the services of tax professionals or help from knowledgeable family members and friends. A questionnaire was used to collect data for assessing the tax knowledge of participants. The portion of the questionnaire measuring tax knowledge included 27 income types. For each income type, participants had to indicate whether (1) they have ever earned or received and it is taxable; (2) they have ever earned or received and it is not taxable; or (3) they have never earned nor received. Only income types that are actually taxable were included in the questionnaire. The relevant tax knowledge score for each participant was calculated by dividing the number of relevant tax knowledge questions answered correctly by the total number of relevant tax knowledge questions. The demographic factors, age, educational level, and income level were each categorized into three groups or levels. The categories were based on the range for each factor and also taking into consideration outliers so as not to distort the interval for each group

and the results of the study (Dulleck et al., 2016). Relevant tax knowledge score was grouped into two: low and high based on the range of the results obtained.

A Chi-square test of independence was performed to examine the relationship between self-filing taxpayers' relevant tax knowledge and their sex, age, educational level, and income level. The significant level was set at 0.050. The following results were obtained:

Test for association between self-filing taxpayers' relevant tax knowledge and their sex: χ^2 (1, N = 109) = 1.777, p = 0.183.

Test for association between self-filing taxpayers' relevant tax knowledge and their age: χ^2 (2, N = 109) = 0.895, p = 0.639.

Test for association between self-filing taxpayers' relevant tax knowledge and their educational level: $\chi 2$ (2, N = 109) = 5.973, p = 0.050.

Test for association between self-filing taxpayers' relevant tax knowledge and their income level: $\chi 2$ (2, N = 109) = 5.824, p = 0.054.

A small but statistically significant association exists between self-filing taxpayers' relevant tax knowledge and their educational level. There is no statistically significant association between self-filing taxpayers' relevant tax knowledge and their sex, age, or income level.

A limitation of the study is that it is possible for taxpayers to have earned or received a particular type of income in the past but have now forgotten whether they reported it as taxable or nontaxable. This can happen with income types that taxpayers do not normally earn or receive. Another limitation of this study is that it cannot measure the net effect of reporting taxable income as nontaxable, and reporting nontaxable income as taxable since only taxable income types were included in the questionnaires. Chapter 5 includes a discussion of the implications of these results, recommendations for tax authorities on how to improve the level of

relevant knowledge for each group of taxpayers, recommendations for future research to expand the scope and address limitations, and concluding remarks summarizing the key messages from the study.

Implications

The first research question was intended as a tool to help measure the association between self-filing taxpayers' relevant tax knowledge and their sex. The null hypothesis posited that there was no statistically significant relationship between self-filing taxpayers' relevant tax knowledge and their sex. A Chi-square test of independence was performed to examine the relationship between self-filing taxpayers' relevant tax knowledge and their sex. The result of the test shows that there is no statistically significant relationship between self-filing taxpayers' relevant tax knowledge and their sex. The result of this study contrasts with the results obtained by Bhushan and Medury (2013) who found a significant difference between the tax knowledge of salaried males and females. The difference in results could be attributed to the difference in the participants in the studies. The participants in this study included only self-filing taxpayers who filed their individual income tax return on their own without using the services of tax professionals or help from knowledgeable family members and friends while the study by Bhushan and Medury (2013) included salaried males and females.

Other prior studies have found women to be generally more tax compliant than men (Kogler et al., 2016; Pickhardt & Prinz, 2014; Reese & McDougal, 2018). However, these studies considered tax compliance in general which includes filing of individual income tax return, reporting all taxable income, and paying tax liability, but differences in tax knowledge specifically affect the reporting of all taxable income. Efforts at improving the relevant tax knowledge of taxpayers should target both males and females equally since this study shows that

there is no statistically significant difference between the relevant tax knowledge of males and females.

The second research question was intended as a tool to help measure the association between self-filing taxpayers' relevant tax knowledge and their age. The null hypothesis theorized that there was no statistically significant relationship between self-filing taxpayers' relevant tax knowledge and their age. A Chi-square test of independence was performed to examine the relationship between self-filing taxpayers' relevant tax knowledge and their age. The result of the test shows that there is no statistically significant relationship between self-filing taxpayers' relevant tax knowledge and their age. The result supports the findings of Hurst et al. (2014) that age does not cause any difference in the level of underreporting of taxable income to tax authorities. The result is inconsistent with other prior studies that found age to be positively related to tax compliance (Al-Mamun et al., 2014; Hofmann et al., 2017). Hofmann, Voracek, Bock, and Kirchler (2017) found a small but significant relationship between the age of taxpayers and their tax compliance. Prior studies showing that older taxpayers tend to be more tax compliant than younger taxes may be attributed to differences in risk preference and psychological differences (McGee, 2012; Russo, 2014). Taxpayers can accumulate tax knowledge over time through their interaction with tax authorities (Khafidhoh & Suryarini, 2017), but such tax knowledge accumulation is not enough to considerably improve the unintentional underreporting of taxable income to tax authorities, hence the need to provide tax education to taxpayers of all ages.

The third research question was intended as a tool to help measure the association between self-filing taxpayers' relevant tax knowledge and their income level. The null hypothesis posited that there was no statistically significant relationship between self-filing

taxpayers' relevant tax knowledge and their income level. A Chi-square test of independence was performed to examine the relationship between self-filing taxpayers' relevant tax knowledge and their income level. The result of the test shows that there is no statistically significant relationship between self-filing taxpayers' relevant tax knowledge and their income level. The result is inconsistent with prior studies that have found a high negative correlation between income level and tax compliance (Artavanis et al., 2016; Doerrenberg, 2015; Kapranova et al, 2016; Lee, 2016). High-income earners being more tax noncompliant than low-income earners could be attributed to other factors apart from poor tax knowledge. High-income earners intentionally cheat on their tax return by underreporting taxable due to their disagreement with how much taxes they pay and the benefits they receive compared to low-income earners (Doerrenberg & Duncan, 2014a). No statistically significant relationship between self-filing taxpayers' relevant tax knowledge and their income level suggests that taxpayers of all income levels have similar tax knowledge levels are equally likely to unintentional underreport their taxable income to tax authorities at similar rates.

The fourth research question was intended as a tool to help measure the association between self-filing taxpayers' relevant tax knowledge and their educational level. The null hypothesis suggested that there was no statistically significant relationship between self-filing taxpayers' relevant tax knowledge and their educational level. A Chi-square test of independence was performed to examine the relationship between self-filing taxpayers' relevant tax knowledge and their educational level. The result of the test shows that there is a small but statistically significant relationship between self-filing taxpayers' relevant tax knowledge and their educational level. Prior studies have found a mixed relationship between education and tax compliance. Hofman et al. (2017) using meta-analyses of survey studies in 111 countries found a

statistically significant negative relationship between education and tax compliance, thus less educated people tend to be more tax compliant than highly educated people. Sociodemographic factors "although correlate significantly with tax compliance their predictive power is limited for age and sex, and negligible for education and income" (Hofman et al., p. 68). However, Rodriguez-Justicia and Theilen (2018) found that highly educated taxpayers are more tax compliant than less educated taxpayers and explained that this is "evidence for the fact that the more highly educated are more conscious of the benefits they receive from general tax compliance" (p.9).

Other studies did not find any relationship between education and tax compliance (Al-Mamun et al. 2014, Hassan et al., 2016). All these studies considered tax compliance in general of which unintentional underreporting of taxable income due to poor tax knowledge is a part. Taxpayers with higher educational levels tend to be more aware of the benefits derived from paying taxes which can influence them to be more tax compliant than taxpayers with lower educational levels. Highly educated taxpayers may have a higher tendency to research on tax subjects when in doubt than lowly educated taxpayers. This could explain why there is a small but significant relationship between the self-filing taxpayers' relevant tax knowledge and their educational level. General education does not necessarily translate into tax education. Thus, taxpayers with poor tax knowledge can unintentional underreport their taxable income to tax authorities irrespective of their educational level.

Recommendations for Practice

The results of the study show that there is no statistically significant relationship between self-filing taxpayer's relevant knowledge and their sex, age and income level, and a small but statistically significant relationship between self-filing taxpayers' relevant knowledge and their

educational level. The first recommendation from this study would be to encourage tax authorities to find effective means of identifying the tax knowledge relevant to various groups of taxpayers. It would be impossible to identify the relevant tax knowledge for each taxpayer. Identifying the tax knowledge that is relevant to taxpayers should not be based on taxpayers' sex, age, educational level, and income level since this study indicate that these demographic factors have little to no effect on the relevant tax knowledge of taxpayers. Identification of taxpayers' relevant tax knowledge should be based on the particular income types that they earn or receive. The IRS categorizes taxable income into three main groups: earned or active income (such as wages, salaries, and tips, business income), portfolio or investment income (such as interest and dividends from investing in securities), and passive income (such as rental income and royalties). Educating taxpayers on income tax, self-employment tax, employment tax, and excise tax would be more beneficial to taxpayers who earn business income or are self-employed than to other groups of taxpayers. Such a target education would yield the most benefit giving the cost constraints faced by tax authorities (Vossler & McKee, 2017).

A second recommendation is for tax authorities to consider giving the same degree of education to all targeted taxpayers. The level of tax education given to taxpayers should not be varied based on demographic factors such as sex, age, educational level, and income level since this study shows that these demographic factors have little to no effect on taxpayers' relevant tax knowledge levels. Increasing the relevant tax knowledge of taxpayers would improve the unintentional underreporting of taxable income due to poor tax knowledge.

Recommendations for Future Research

The study examined the association between the relevant tax knowledge of self-filing taxpayers and their sex, age, educational level, and income level considered separately. The

results of the study show that there is little to no association between self-filing taxpayers' relevant tax knowledge and their sex, age, educational level, and income level. A delimitation of this study is that it was limited to only Maryland state residents who filed their 2018 individual income tax return on their own without using the services of tax professionals or help from knowledgeable family members and friends. Also, the demographic factors considered were limited to sex, age, educational level, and income level. The first recommendation for future research is to expand the scope of the respondents and demographic factors. For example, the respondents can include residents from all states in the country and the demographic factors can include religion and occupation. The reason for such a recommendation is that prior studies show that religion (Mohdali & Pope, 2014), and occupation (D'Agosto et al., 2018) influence tax compliance which include unintentional underreporting of taxable income due to poor tax knowledge. Knowing the association between taxpayers across the country and their various demographics can help tax authorities to determine the appropriate level of tax education to give to targeted groups of taxpayers in order to get the most benefit given their limited budgets.

The second recommendation for future research is to expand the tax knowledge questions to include both taxable and nontaxable income types. The questionnaire used to assess the relevant tax knowledge in this study limited the income types to only those that are actually taxable. It is also possible for lack of tax knowledge to lead taxpayers to over-report their taxable income but this figure is small compared to underreported taxable income (IRS Research, Analysis & Statistics, 2016). Some taxpayers when in doubt about whether particular income types are taxable or nontaxable err on the side of caution by overreporting their taxable income while others take risk and underreport their taxable income to tax authorities (Onu & Oats, 2018). Research that shed light on taxpayers' complete knowledge of taxable and nontaxable

income types would help to determine the level of tax education that has to be given to taxpayers since the goal is for each taxpayer to report all taxable income and exclude all nontaxable income.

The third recommendation for future research is to estimate the amount or percentage of underreported taxable income attributed to taxpayers' poor tax knowledge. Information on the amount of taxable income that is unintentionally underreported due to lack of tax knowledge can help tax authorities in their cost-benefit analysis when considering educational campaigns aimed at improving taxpayers' tax knowledge. Factors such as unfairness of the tax system, mistrust of government, high tax rates, use of tax revenue, low audit rate, low penalties and fines, religiosity, and low tax morale influence some taxpayers to deliberately underreport their taxable income to tax authorities (Doerrenberg & Duncan, 2014b; Grundmann & Graf Lambsdorff, 2017; Hallsworth, 2015; Litina & Palivos, 2016; Mendoza et al., 2017; Pántya et al., 2016). It is therefore essential to focus more effort in areas that would yield the most benefit in the form of taxpayers reporting all their taxable income to tax authorities, taking the right credits and deductions, and paying their tax liability.

The next progression in research could examine if tax education focused on taxable and nontaxable income types can improve taxpayer's tax knowledge and lead to a decrease in the unintentional underreporting of taxable income due to poor tax knowledge. The findings of such research would help tax authorities determine the best action to take to reduce underreporting of taxable income which will ultimately improve tax compliance. In the most recent tax gap estimate by the IRS covering 2008 to 2010 tax years, underreporting of taxable income on individual income tax return accounted for $264 billion or 68.2% of the gross tax gap attributed to all sources ($458 billion) (IRS Research, Analysis & Statistics, 2016). Clearly, underreporting

of taxable income on individual income tax return constitute most of the gross tax gap but its reduction would require the use of different approaches to intentional and unintentional underreporting of taxable income.

Conclusions

The study examined the relationships between self-filing taxpayers' relevant tax knowledge and their sex, age, income level, and educational level. This was to address the problem of how differences in the relevant tax knowledge of self-filing taxpayers could lead to differences in unintentional underreporting of taxable income on their individual income tax returns. Data for the study were collected through a survey administered to 109 Maryland state residents aged 18 or above who filed their 2018 individual income tax return on their own without using the services of tax professionals or help from knowledgeable family members and friends. SPSS was used to perform a Chi-square test of independence between relevant tax knowledge and each of the following demographics factors: sex, age, income level, and educational level. The results of the study show that there is no statistically significant association between taxpayers' relevant tax knowledge and each of the following demographics: sex, age, and income level. The results also show that a small but statistically significant association exists between taxpayers' relevant tax knowledge and their educational level.

The research contributed to the literature on how to increase tax compliance by addressing the problem of underreported taxable income on individual income tax returns which alone accounts for more than two-thirds of the gross tax gap attributed to all sources. Prior studies are inconclusive on how taxpayers' sex, age, income level, and educational level influence their overall tax compliance behavior. The take-home message from this study is that taxpayers' sex, age, income level, and educational level have little to no effect on their relevant

tax knowledge and that tax education aimed at improving tax compliance by reducing underreported taxable income due to poor tax knowledge should target taxpayers at the same or similar rates irrespective of their sex, age, income level, or educational level.

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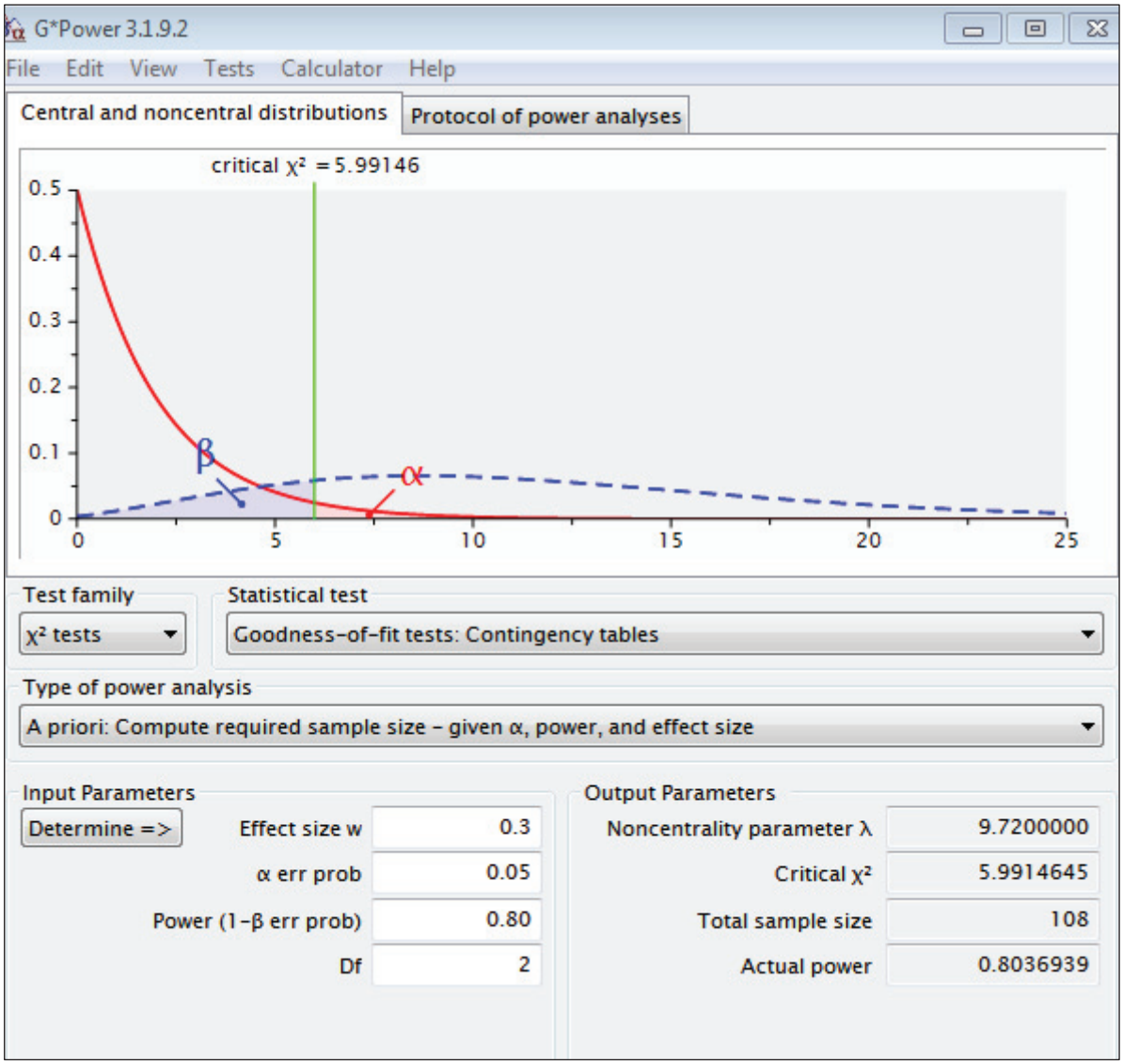
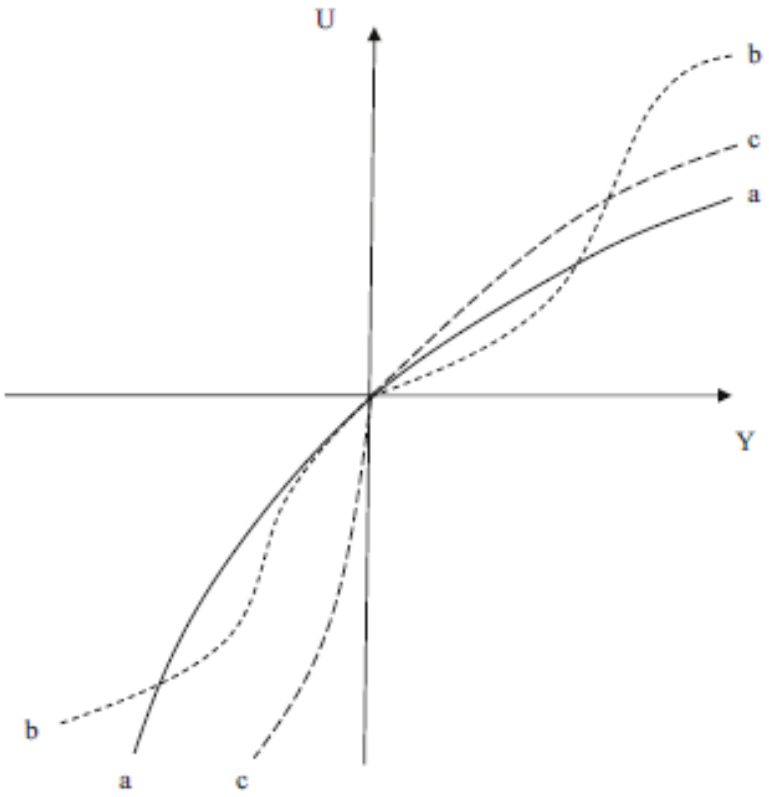
Appendixes

Appendix A: G*Power A Priori Analysis



Appendix B: Utility Function Curves



aa: Orthodox utility curve
bb: Markowitz utility curve
cc: Kahneman-Tversky value curve

Appendix C: Survey Questionnaire

Eligibility Questions

Please answer the eligibility questions below:

1. Are you a resident of Maryland State?
   - ○ Yes
   - ○ No
2. Are you at least 18 years old?
   - ○ Yes
   - ○ No
3. Did you file your 2018 individual income tax return on your own without using the services of tax professionals or help from family members and friends?
   - ○ Yes
   - ○ No

You do not qualify to take the survey if you answered "No" to any of the above questions.

Demographic Questions

4. What is your sex?
   - ○ Male
   - ○ Female
   - ○ Prefer not to answer
5. Would you like to answer the question: "What is your age (in year)?" ? (Please note that selecting "No" will exit you from the survey)
   - ○ Yes
   - ○ No
6. What is your age (in years)?

   [ ]

7. Would you like to answer the question: "How many years of formal education have you completed?" ?(Please note that selecting "No" will exit you from the survey)
   - ○ Yes
   - ○ No

8. How many years of formal education have you completed?

   [ ]

9. Would you like to answer the question: "What was your total gross income in 2018 (in dollars and cents)?" (Please note that selecting "No" will exit you from the survey)
   - ○ Yes
   - ○ No

10. What was your total gross income in 2018 (in dollars and cents)?

    [ ]

Tax Knowledge Questions

Please answer the following questions by selecting one of the given choices:

Never earned nor received (you have never earned nor received the income type)

Earned or received and Taxable: (you have earned the income type before and it is taxable)

Earned or received and Not Taxable: (you have earned the income type before and it is not taxable)

11. Business income
    - ○ Never earned nor received
    - ○ Earned or received and Taxable
    - ○ Earned or received and Not Taxable

12. Self-employment income
    - ○ Never earned nor received

- Earned or received and Taxable
- Earned or received and Not Taxable

13. Capital gains
    - Never earned nor received
    - Earned or received and Taxable
    - Earned or received and Not Taxable
14. Unemployment benefits
    - Never earned nor received
    - Earned or received and Taxable
    - Earned or received and Not Taxable
15. Commissions
    - Never earned nor received
    - Earned or received and Taxable
    - Earned or received and Not Taxable
16. Pension or annuity when employer made all contributions
    - Never earned nor received
    - Earned or received and Taxable
    - Earned or received and Not Taxable
17. Alimony payments
    - Never earned nor received
    - Earned or received and Taxable
    - Earned or received and Not Taxable
18. Barter income (the fair market value of the goods and services received in exchange for goods or services rendered)
    - Never earned nor received

- Earned or received and Taxable
- Earned or received and Not Taxable

19. Canceled debts when not insolvent or bankrupt
    - Never earned nor received
    - Earned or received and Taxable
    - Earned or received and Not Taxable
20. Cash bonus from employer
    - Never earned nor received
    - Earned or received and Taxable
    - Earned or received and Not Taxable
21. Cashed out vacation or sick time
    - Never earned nor received
    - Earned or received and Taxable
    - Earned or received and Not Taxable
22. Compensation for personal services
    - Never earned nor received
    - Earned or received and Taxable
    - Earned or received and Not Taxable
23. Court awards and damages (include any awards received for lost pay, punitive damages and business damages).
    - Never earned nor received
    - Earned or received and Taxable
    - Earned or received and Not Taxable
24. Employer-funded disability benefits

- Never earned nor received
- Earned or received and Taxable
- Earned or received and Not Taxable

25. Dividend received from investment in corporate stocks or mutual fund shares

- Never earned nor received
- Earned or received and Taxable
- Earned or received and Not Taxable

26. Estate and trust income

- Never earned nor received
- Earned or received and Taxable
- Earned or received and Not Taxable

27. Gains from sale of property or securities

- Never earned nor received
- Earned or received and Taxable
- Earned or received and Not Taxable

28. Gambling income

- Never earned nor received
- Earned or received and Taxable
- Earned or received and Not Taxable

29. Garage sale gains

- Never earned nor received
- Earned or received and Taxable
- Earned or received and Not Taxable

30. Interest on certificates of deposit (CDs)

- Never earned nor received
- Earned or received and Taxable
- Earned or received and Not Taxable

31. Lump sum distributions from a pension plan
    - Never earned nor received
    - Earned or received and Taxable
    - Earned or received and Not Taxable
32. Partnership, Estate or S-Corporation income
    - Never earned nor received
    - Earned or received and Taxable
    - Earned or received and Not Taxable
33. Refund of state taxes (if you itemized deduction in year paid and taxes were reduced because of deduction)
    - Never earned nor received
    - Earned or received and Taxable
    - Earned or received and Not Taxable
34. Rental income from personal property
    - Never earned nor received
    - Earned or received and Taxable
    - Earned or received and Not Taxable
35. Royalty income
    - Never earned nor received
    - Earned or received and Taxable
    - Earned or received and Not Taxable

36. Tips and Gratuities for restaurant work, babysitting, delivery, valet services, etc.

- ○ Never earned nor received
- ○ Earned or received and Taxable
- ○ Earned or received and Not Taxable

37. Retirement plan withdrawals from traditional IRAs

- ○ Never earned nor received
- ○ Earned or received and Taxable
- ○ Earned or received and Not Taxable

Appendix D: Informed Consent

Introduction:

My name is Edmund Saarah-Mensah. I am a doctoral student at Northcentral University. I am conducting a research study on how differences in relevant tax knowledge of self-filing taxpayers can lead to differences in unintentional underreporting of taxable income on their individual income tax returns. The purpose of this study is to examine the existence and strength of the relationship between taxpayers' relevant tax knowledge and each of the following factors: sex, age, income level, and educational level.

I am completing this research as part of my doctoral degree. Your participation is completely voluntary. I am seeking your consent to involve you and your information in this study. Reasons you might ***not*** want to participate in the study include not been at ease stating how much money you earned or received as income in the most recently ended tax year. Another reason is that you may fear that the information you provide may be given to tax authorities which may increase the chances of been audited in the future. Reasons you might want to participate in the study include to indirectly contribute to reducing gross tax and to support a charity of your choice. A small amount ($0.50) will be paid to the charity of your choice upon completing the survey. An alternative to this study is simply not participating. I am here to address your questions or concerns during the informed consent process.

PRIVATE INFORMATION

Certain private information may be collected about you in this study. I will protect your private information by using the services of an independent third party, SurveyMonkey, to collect your information anonymously. Even with this effort, there is a chance that your private information may be accidentally released. The chance is small but does exist. You should consider this when deciding whether to participate.

Activities:

If you participate in this research, you will be asked to:

1. Answer demographic questions on your sex, age, income level, and educational level.
2. Indicate if income types you have ever earned or received are taxable or non-taxable.
3. For income types that you have ever earned or received, indicate whether they are taxable or not.

Eligibility:

You are eligible to participate in this research if you:

1. Are a resident of Maryland State.
2. Are you at least 18 years old.
3. Filed your 2018 individual income tax return on your own without using the services of tax professionals, or help from family members or friends.

You are not eligible to participate in this research if you:

1. Are not a resident of Maryland State.
2. Are less than 18 years old.
3. Filed your 2018 individual income tax return using the services of tax professionals, or help from family members or friends.

I hope to include 84 participants in this research.

Risks:

There are minimal risks in this study. A possible risk include for participating in this study is loss of confidentiality. To minimize this risk, no identifiable information will be collected. The data collected will be used solely for the purpose of this study. The data will be stored securely. To decrease the impact of these risks, you can skip any question, and/or, stop participation at any time.

Benefits:

If you decide to participate, there are no direct benefits to you.

The potential benefits to others is that a small amount ($0.50) will be paid to the charity of your choice upon completing the survey.

Confidentiality:

This study is anonymous. It is not the intention of the researcher to collect your name. However, you do have the option to provide your name voluntarily. Please know that if you do, it may be linked to your responses in this study. Any consequences are outside the responsibility of the researcher, faculty supervisor, or Northcentral University. If you do wish to provide your name, a space will be provided. Again, including your name is voluntary, and you can continue in the study if you do not provide your name.

The information you provide will be kept confidential to the extent allowable by law. I will keep your identity confidential by assigning numbers to surveys completed through SurveyMonkey. For this study, the anonymous response option on SurveyMonkey will be used. This makes it impossible to know any personal identifiable information about you. The people who will have access to your information are: myself, and/or, my dissertation chair, and/or dissertation committee. The Institutional Review Board may also review my research and view your information.

I will secure your information with these steps: locking it in a filing cabinet, locking the computer file with a password, and using encryption on my computer.

I will keep your data for 7 years. Then, I will delete electronic data and destroy paper data.

Anonymity:

This study is anonymous, and it is not the intention of the researcher to collect your name. However, you do have the option to provide your name voluntarily. Please know that if you do, it may be linked to your responses in this study. Any consequences are outside the responsibility of the researcher, faculty supervisor, or Northcentral University. If you do wish to provide your name, a space will be provided. Again, including your name is voluntary, and you can continue in the study if you do not provide your name.

Contact Information:

If you have questions for me, you can contact me at: e.saarah-mensah0202@o365.ncu.edu
Phone: 240-671-8241.

My dissertation chair's name is Dr. Kenny Roberts. He works at Northcentral University and is supervising me on the research. You can contact him at: kroberts@ncu.edu
Phone: 850-400-5232.
If you contact us you will be giving us information like your phone number or email address. This information will not be linked to your responses if the study is anonymous.

If you have questions about your rights in the research, or if a problem has occurred, or if you are injured during your participation, please contact the Institutional Review Board at: irb@ncu.edu or 1-888-327-2877 ext 8014.

Voluntary Participation:

Your participation is voluntary. If you decide not to participate, or if you stop participation after you start, there will be no penalty to you. You will not lose any benefit to which you are otherwise entitled.

Future Research:

Any information or specimens collected from you during this research may **not** be used for other research in the future, even if identifying information is removed.

CONSENT

I have read and I understand the provided information. I understand that my participation is voluntary and that I am free to withdraw at any time, without giving a reason and without cost. I voluntarily agree to take part in this study

○ Agree

○ Disagree

Participant's Name. If you wish to provide your name, please type your name in the space below. Including your name is voluntary. You can continue in the study if you do not provide your name.

Appendix E: IRB Approval Letter

NCU Approved Date Stamp
June 23, 2019

Northcentral University

2488 Historic Decatur Road, Suite 100, San Diego, CA 92106 | www.ncu.edu

Date: June 23, 2019
PI Name: EDMUND SAARAH-MENSAH
Chair Name (if applicable): Kenny Roberts
Application Type: Initial Submission
Review Level: Exempt - Category 2
Study Title: Do Differences in the Relevant Tax Knowledge of Self Filing Taxpayers Lead to Differences in Unintentional Underreporting of Taxable Income on Individual Income Tax Returns?

Approval Date: June 22, 2019
Expiration Date: June 21, 2020

Dear EDMUND:

Congratulations! The purpose of this letter is to inform you that your IRB application has been approved. Your responsibilities include the following:

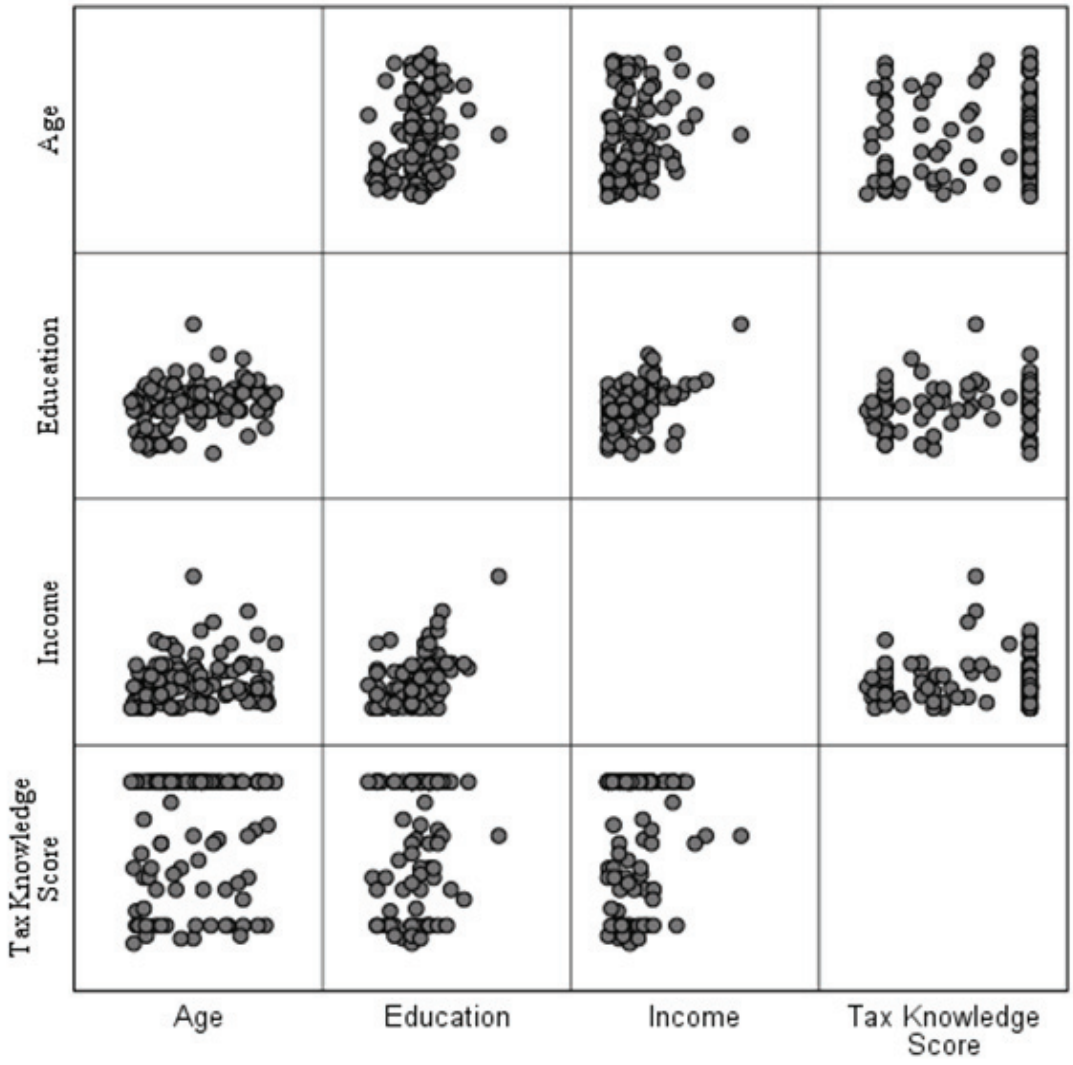
1. Follow the protocol as approved. If you need to make changes, please submit a modification form requesting approval of any proposed changes before you make them.
2. If there is a consent process in your research, you must use the consent form approved with your final application. Please make sure all participants receive a copy of the consent form.
3. Continuing review is required as long as you are in data collection or if data have not been de-identified. Failure to receive approval of the continuing review before the expiration date means the research must stop immediately.
4. If there are any injuries, problems, or complaints from participants, you must notify the IRB at IRB@ncu.edu within 24 hours.
5. IRB audit of procedures may occur. The IRB will notify you if your study will be audited.
6. When data are collected and de-identified, please submit a study closure form to the IRB.
7. You must maintain current CITI certification until you have submitted a study closure form.
8. If you are a student, please be aware that you must be enrolled in an active dissertation course with NCU in order to collect data.

Congratulations from the NCU IRB. Best wishes as you conduct your research!

Respectfully,

Northcentral University Institutional Review Board
Email: irb@ncu.edu

Appendix F: Scatter Matrix Plot



Appendix G: Distribution of Relevant Tax Knowledge Score for Each Income Type

Income Type	Earned or received and Taxable	Earned or received and Not Taxable	Never earned nor received	Relevant Tax Knowledge Score
1. Business income	52	2	55	0.96
2. Self-employment income	43	1	65	0.98
3. Capital gains	39	3	67	0.93
4. Unemployment benefits	17	4	88	0.81
5. Commissions	18	5	86	0.78
6. Pension or annuity when the employer made all contributions	21	6	82	0.78
7. Alimony payments	7	2	100	0.78
8. Barter income (the fair market value of the goods and services received in exchange for goods or services rendered)	6	9	94	0.40
9. Canceled debts when not insolvent or bankrupt	6	3	100	0.67
10. Cash bonus from employer	47	4	58	0.92
11. Cashed out vacation or sick time	35	4	70	0.90
12. Compensation for personal services	26	4	79	0.87
13. Court awards and damages (include any awards received for lost pay, punitive damages, and business damages).	11	2	96	0.85
14. Employer-funded disability benefits	16	4	89	0.80

15. Dividend received from investment in corporate stocks or mutual fund shares	46	3	60	0.94
16. Estate and trust income	19	0	90	1.00
17. Gains from the sale of property or securities	32	1	76	0.97
18. Gambling income	16	9	84	0.64
19. Garage sale gains	7	10	92	0.41
20. Interest on certificates of deposit (CDs)	40	4	65	0.91
21. Lump sum distributions from a pension plan	5	4	100	0.56
22. Partnership, Estate or S-Corporation income	12	0	97	1.00
23. Refund of state taxes (if you itemized deduction in year paid and taxes were reduced because of deduction)	54	7	48	0.89
24. Rental income from personal property	11	8	90	0.58
25. Royalty income	12	0	97	1.00
26. Tips and Gratuities for restaurant work, babysitting, delivery, valet services, etc.	25	6	78	0.81
27. Retirement plan withdrawals from traditional IRAs	27	1	81	0.96

Appendix H: Chi-Square Test Results

Sex and Relevant Tax Knowledge

Sex and Relevant Tax Knowledge Crosstabulation

			Relevant Tax Knowledge		
			1	2	Total
Sex	1	Count	13	39	52
		% within Sex	25.0%	75.0%	100.0%
		% within Relevant Tax Knowledge	38.2%	52.0%	47.7%
		% of Total	11.9%	35.8%	47.7%
	2	Count	21	36	57
		% within Sex	36.8%	63.2%	100.0%
		% within Relevant Tax Knowledge	61.8%	48.0%	52.3%
		% of Total	19.3%	33.0%	52.3%
Total		Count	34	75	109
		% within Sex	31.2%	68.8%	100.0%
		% within Relevant Tax Knowledge	100.0%	100.0%	100.0%
		% of Total	31.2%	68.8%	100.0%

Chi-Square Tests

	Value	df	Asymptotic Significance (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	1.777[a]	1	.183		
Continuity Correction[b]	1.268	1	.260		
Likelihood Ratio	1.791	1	.181		
Fisher's Exact Test				.217	.130
Linear-by-Linear Association	1.760	1	.185		
N of Valid Cases	109				

a. 0 cells (0.0%) have expected count less than 5. The minimum expected count is 16.22.

b. Computed only for a 2x2 table

Age and Relevant Tax Knowledge

Age and Relevant Tax Knowledge Crosstabulation

			Relevant Tax Knowledge		
			1	2	Total
Age	1	Count	18	33	51
		% within Age	35.3%	64.7%	100.0%
		% within Relevant Tax Knowledge	52.9%	44.0%	46.8%
		% of Total	16.5%	30.3%	46.8%
	2	Count	9	26	35
		% within Age	25.7%	74.3%	100.0%
		% within Relevant Tax Knowledge	26.5%	34.7%	32.1%
		% of Total	8.3%	23.9%	32.1%
	3	Count	7	16	23
		% within Age	30.4%	69.6%	100.0%
		% within Relevant Tax Knowledge	20.6%	21.3%	21.1%
		% of Total	6.4%	14.7%	21.1%
Total		Count	34	75	109
		% within Age	31.2%	68.8%	100.0%
		% within Relevant Tax Knowledge	100.0%	100.0%	100.0%
		% of Total	31.2%	68.8%	100.0%

Chi-Square Tests

	Value	df	Asymptotic Significance (2-sided)
Pearson Chi-Square	.895[a]	2	.639
Likelihood Ratio	.904	2	.636
Linear-by-Linear Association	.355	1	.551
N of Valid Cases	109		

a. 0 cells (0.0%) have expected count less than 5. The minimum expected count is 7.17.

Income and Relevant Tax Knowledge

Income and Relevant Tax Knowledge Crosstabulation

			Relevant Tax Knowledge		
			1	2	Total
Income	1	Count	18	22	40
		% within Income	45.0%	55.0%	100.0%
		% within Relevant Tax Knowledge	52.9%	29.3%	36.7%
		% of Total	16.5%	20.2%	36.7%
	2	Count	9	26	35
		% within Income	25.7%	74.3%	100.0%
		% within Relevant Tax Knowledge	26.5%	34.7%	32.1%
		% of Total	8.3%	23.9%	32.1%
	3	Count	7	27	34
		% within Income	20.6%	79.4%	100.0%
		% within Relevant Tax Knowledge	20.6%	36.0%	31.2%
		% of Total	6.4%	24.8%	31.2%
Total		Count	34	75	109
		% within Income	31.2%	68.8%	100.0%
		% within Relevant Tax Knowledge	100.0%	100.0%	100.0%
		% of Total	31.2%	68.8%	100.0%

Chi-Square Tests

	Value	df	Asymptotic Significance (2-sided)
Pearson Chi-Square	5.824[a]	2	.054
Likelihood Ratio	5.769	2	.056
Linear-by-Linear Association	5.222	1	.022
N of Valid Cases	109		

a. 0 cells (0.0%) have expected count less than 5. The minimum expected count is 10.61.

Education and Relevant Tax Knowledge

Education and Relevant Tax Knowledge Crosstabulation

			Relevant Tax Knowledge		
			1	2	Total
Education	1	Count	10	8	18
		% within Education	55.6%	44.4%	100.0%
		% within Relevant Tax Knowledge	29.4%	10.7%	16.5%
		% of Total	9.2%	7.3%	16.5%
	2	Count	18	51	69
		% within Education	26.1%	73.9%	100.0%
		% within Relevant Tax Knowledge	52.9%	68.0%	63.3%
		% of Total	16.5%	46.8%	63.3%
	3	Count	6	16	22
		% within Education	27.3%	72.7%	100.0%
		% within Relevant Tax Knowledge	17.6%	21.3%	20.2%
		% of Total	5.5%	14.7%	20.2%
Total		Count	34	75	109
		% within Education	31.2%	68.8%	100.0%
		% within Relevant Tax Knowledge	100.0%	100.0%	100.0%
		% of Total	31.2%	68.8%	100.0%

Chi-Square Tests

	Value	df	Asymptotic Significance (2-sided)
Pearson Chi-Square	5.973[a]	2	.050
Likelihood Ratio	5.578	2	.061
Linear-by-Linear Association	3.190	1	.074
N of Valid Cases	109		

a. 0 cells (0.0%) have expected count less than 5. The minimum expected count is 5.61.