CHARLES UNIVERSITY

FACULTY OF SOCIAL SCIENCES

Institute of Economic Studies

Bachelor's Thesis

2024 **Stevan Šijan Stojić**

CHARLES UNIVERSITY

FACULTY OF SOCIAL SCIENCES

Institute of Economic Studies

Tax Evasion and its Implications on Country-level Tax Revenue Structure

Bachelor's Thesis

Author of the Thesis: Stevan Šijan Stojić

Study programme: Economics and Finance

Supervisor: Mgr. Evgeniya Dubinina

Year of the defence: 2024

Declaration

1. I hereby declare that I have compiled this thesis using the listed literature and resources only.
2. I hereby declare that my thesis has not been used to gain any other academic title.
3. I fully agree to my work being used for study and scientific purposes.

In Prague on Stevan Šijan Stojić

26.07.2024.

References

Šijan Stojić, Stevan. *Tax Evasion and its Implications on Country-level Tax Revenue Structure.* Prague, 2024. Bachelor's thesis (Bc). Charles University, Faculty of Social Sciences, Institute of Economic Studies. Supervisor Mgr. Evgeniya Dubinina.

Length of the Thesis: 56,548 (including spaces)

Abstract

This Bachelor thesis investigates the effects of tax evasion on government tax revenue structure. The study aims to fill the research gap by exploring whether countries adjust their tax revenue structure in response to tax evasion. Using data from 37 countries over the period 2001 to 2016, and employing linear multivariate panel data regression, the research examines the relationship between tax evasion and different types of tax revenues, including total tax revenue, tax revenue from income, profits and capital gains, property tax, and indirect tax revenues. The findings reveal that tax evasion statistically significantly affects the composition of government tax revenues.

Abstrakt

Tato bakalářská práce zkoumá vliv daňových úniků na strukturu vládních daňových příjmů. Studie si klade za cíl vyplnit výzkumnou mezeru zkoumáním, zda země upravují strukturu svých daňových příjmů v reakci na daňové úniky. S využitím dat z 37 zemí za období 2001 až 2016 a aplikováním lineární multivariační panelové datové regrese zkoumá výzkum vztah mezi daňovými úniky a různými typy daňových příjmů, včetně celkových daňových příjmů, daňových příjmů z příjmů, zisků a kapitálových zisků, daně z nemovitostí a nepřímých daňových příjmů. Zjištění ukazují, že daňové úniky statisticky významně ovlivňují složení vládních daňových příjmů.

Keywords

Tax evasion, Tax havens, Tax revenue structure, Offshore wealth, Fixed effects model, Income tax, Capital gains tax, Property tax

Klíčová slova

Daňové úniky, Daňové ráje, Struktura daňových příjmů, Offshore bohatství, Model fixních efektů, Daň z příjmu, Daň z kapitálových zisků, Daň z nemovitosti

Title

Tax Evasion and its Implications on Country-level Tax Revenue Structure

Název práce

Daňové úniky a jejich dopady na strukturu daňových příjmů na úrovni státu

Acknowledgement

Big thanks to my supervisor Mgr. Evgeniya Dubinina for all the valuable feedback, tips, and help. Additionally, a big thanks to my family for always supporting me in this challenge, especially my late grandfather who was my biggest supporter and role model.

Table of Contents

List of Figures

List of Tables

1. Introduction

This paper studies the effects of tax evasion on government tax revenue structure. Tax evasion is a growing problem that impacts many economies worldwide (Vellutini et al., 2019). The term tax evasion refers to the underreporting or failure to report income to the regulatory authorities by individuals or corporations. Furthermore, the act of transferring wealth to offshore tax havens is also considered tax evasion. Transfers to tax havens are unreported, causing anomalies in external statistics, more precisely, reported global liabilities exceed reported global assets, due to undeclared assets being moved to tax havens. These anomalies in external statistics are the basis for tax evasion research, and they provide a rough overview of the amount of unrecorded asset shifting. On the other hand, tax havens are countries that attract foreign investments by keeping taxes low or non-existent, having high financial secrecy, and by giving investors the possibilities to establish companies with little to no requirements (Pellegrini et al., 2017). Some examples of tax havens are: Switzerland, Luxembourg, Cayman Islands, Hong Kong, and Ireland (Zucman, 2013).

This issue of tax evasion leads to lower government revenue, which impacts public services, while worsening economic inequality and lowering economic stability. Many studies have pointed out to the high amount of taxes not paid on a yearly level as estimated by Zucman (2013), that the global portfolio gap was around US$4.5 trillion in 2008. Additionally, recent studies have revealed that the magnitude of offshore wealth has been increasing throughout the years, as Alstadsæter et al. (2018) showed that tax evasion was US$8.3 trillion in 2018, approximately 10% of the global GDP. Furthermore, tax evasion is one of the key contributors to economic inequality, with studies suggesting how concentrated tax evasion is among the elite. According to Alstadsæter et al. (2018), the top 0.01% of the richest households evade approximately 25% of their taxes by concealing assets and investments in offshore accounts. Thus, a vast amount of tax revenue is not collected, and in many cases, governments may try to compensate for these losses by moving the tax burden on other groups of taxpayers.

One of the main aims of this thesis is to try to fill the gap between tax evasion and changes in government tax-revenue structure. Specifically, this work will investigate whether

countries modify tax revenue structure to compensate for the effects of tax evasion. The "Taxation papers" published by the European Commission (Vellutini et al., 2019) will be used as the basis for this work as the authors were able to estimate tax evasion (by individuals) for 37 countries for the 2001-2016 period. The authors utilize international investment statistics data sets in order to establish the discrepancy between global recorded assets and liabilities, thus giving them an estimate of offshore wealth. The panel data from the study covers all the EU-28, OECD, and other big non-OECD countries. Furthermore, the estimates of this study are expected to be consistent with the existing literature (Zucman (2013), Zucman et al. (2015), and (Pellegrini & Tosti, 2017)). More information regarding this study will be given in the next section.

The Ernst & Young (2024) tax policy and controversy outlook report shows the current situation of tax evasion, and how governments are working to curb tax evasion in the most effective way. The EY (2024) report shows many of the ways countries are fighting to reduce the shifting of offshore wealth. Enhancing enforcement by making mandatory audits more frequent and using AI and data analytics to detect fraud. Furthermore, the implementation of mandatory digital e-invoice systems leads to more control over issued and received invoices, this increases transparency, and it allows tax institutions to notice discrepancies, and track transactions. Additionally, there is a strong emphasis on complying with international tax standards set by organizations such as the OECD, many jurisdictions are aligning with these standards to reduce tax evasion. Overall, the EY (2024) report shows that there is a global trend towards stricter enforcement, higher technical capabilities to combat tax evasion, and increased international cooperation.

Understanding the relationship between tax evasion and government tax revenue structure is crucial for policymakers. The existence of tax evasion and its effects on countries has indicated how mandatory studies in this field are. Governments heavily rely on tax revenue to fund public goods and services, and a substantial loss of tax revenue affects the government's ability to properly provide these services. This thesis is a contribution to the growing literature on tax evasion, as it explores a topic that could be useful to policymakers to find an approach to minimize profit shifting in the most effective way possible. Many papers shed light on the consequences of tax havens, and their impact on inequality and such, however, only a few have been concerned with how offshore wealth can affect tax structure.

As already stated, the objective of this study is to produce estimates of how much tax evasion affects government tax revenue structure based on empirical data.
The purpose of this thesis will be to prove the following hypothesis:

Hypothesis: Tax evasion and tax revenue structure have a statistically significant relationship.

Linear multivariate panel data regression will be used to examine the relationship between tax evasion and government tax revenue. In order to measure the variation of tax revenue, other relevant control variables will be included in the regression, they include: GDP, population, and foreign direct investment (FDI). The dependent variables are government tax revenues, and tax revenue structure shares (as a percentage of total tax revenue and as a percentage of GDP). The data covers the period from 2001 to 2016, for 37 countries (EU-28, Australia, Brazil, Canada, China, India, Japan, Russia, South Korea, and the United States. A fixed effects model will be used, accounting for time and country fixed effects. Furthermore, the Hausman test will be used to establish whether fixed effects or random effects models are statistically preferable. More on the methodology of this thesis will be given in Section 3.

The thesis will be organized in the following way. The second chapter covers the existing literature, the history of tax havens and tax evasion, and the methodologies applied when estimating tax evasion, along with the implications of offshore wealth on economic inequality. It also includes a brief discussion on the compilation of the estimates of tax evasion, and how tax evasion has progressed throughout the years. The third chapter covers the sources of data, and the relevance of this data, it also covers the methodology used to test the hypothesis. The fourth chapter presents the results. The fifth chapter concludes and it provides the contributions made to the literature of tax evasion; it also discusses the limitations of this work.

2. Literature Review

This section reviews the existing literature on tax evasion, including a brief overview of the history of tax havens. Subsequently, it examines research studies that estimate the extent of tax evasion and analyze its impact on inequality. Additionally, Section 2 covers literature that estimates how tax evasion influences government tax revenue.

The comprehensive history of tax evasion and tax havens was covered in detail in Zucman's "Hidden Wealth of Nations" (2015). It shows that the transformation of Switzerland into the World's first tax haven began shortly after the first World War in the 1920s. Neighboring European countries were forced to raise taxes in order to compensate the losses from the war, thus, giving the wealthy an incentive to try and evade their taxes. Furthermore, Switzerland's neutral status before and during World War II coupled with economic stability, strong banking infrastructure, and a stable financial industry made it the perfect destination for wealthy individuals to conceal their assets (Zucman et al., 2015). Additionally, in 1934, Swiss banks introduced a new law making it illegal for banks to share client information (Zucman et al., 2015). This caused a surge in offshore wealth managed by Swiss banks occurred between 1920 and 1938, when the assets held by residents of other countries increased more than tenfold; from 10 billion Swiss francs to 125 billion Swiss francs (Zucman et al., 2015). The ability of Swiss banks to ensure anonymity and evade international scrutiny sustained their appeal. By the 1970s, nearly 5% of European financial holdings were hidden in Swiss banks (Zucman et al., 2015). Over this time, Swiss banks developed an advanced financial services industry, now offering many services to its wealthy clients, such as asset management, and investment advisory. Nearing the end of the 20th century, new tax havens started to emerge. The UK, Hong Kong, Singapore, Luxembourg, Cayman Islands, and the British Virgin Islands became attractive to investors for tax evasion purposes, following Switzerland's examples (Zucman et al., 2015).

Tax evasion significantly worsens income and wealth inequality by allowing the wealthiest individuals to disproportionately reduce their tax liabilities. Alstadsæter et al. (2018) estimate that around 10% of global GDP is held in offshore tax havens, with this wealth being highly concentrated among the richest individuals. This hidden wealth skews the true distribution of wealth, as it is not captured in official statistics. The estimation is done by

combining macroeconomic data (BIS data, Swiss National Bank Data, and HSBC leaked data) and existing estimates, primarily those done by Zucman (2013). The authors updated the global offshore wealth estimate by applying Zucman's (2013) methodology, and by using the latest available international investment statistics available. Furthermore, they allocated the global amount of offshore wealth to individual countries using the geographical distribution of bilateral cross-border bank deposits in offshore centers (Alstadsæter et al., 2018), this allows them to derive the global offshore wealth. Moreover, the before mentioned research by Alstadsæter et al. (2018) concludes that the distribution of offshore wealth is influenced by the geographical proximity to Switzerland, and historical political and economic instability, rather than by tax rates. Another study by Alstadsæter et al. (2019) shows that offshore wealth is highly concentrated among the wealthy, and the top 0.01 percent of the richest households evade about 25% of their taxes. Furthermore, tax audits detect less than 5% of tax evasion (Alstadsæter et al., 2019). The wealthiest individuals use sophisticated methods to conceal their wealth, including offshore accounts and shell companies. However, the study by Alstadsæter et al., (2022) demonstrates that increased enforcement to reduce tax evasion does not result in a significant rise in tax avoidance[1], suggesting that effective policy measures can improve tax progressivity and reduce inequality. Their findings indicate that efforts, by the government, to lower tax evasion led to substantial and sustained increases in tax payments by the wealthy.

This thesis is based on tax evasion estimates from the research paper by Vellutini et al. (2019). Tax evasion is not easily measured due to the unavailability of data surrounding the topic. This section will explain and review the primary methods researchers use to estimate tax evasion. Furthermore, the "taxation papers" from which the tax evasion estimates were obtained will be explored in greater detail.

2.1 Estimates of Tax Evasion

When estimating tax evasion, researchers utilize a similar methodology that involves using international investment statistics to estimate the global portfolio gap. In the "Missing Wealth of Nations", Zucman (2013) introduced the methodology of estimating offshore

[1] The process where an individual legally lowers (or avoids) their tax liability. Contrary to tax evasion where tax liabilities are lowered through illegal ways.

wealth with the use of international statistics. The international investment statistics show that global liabilities exceed global assets which leads to the assumption that assets are not recorded properly. By comparing recorded global liabilities with global assets, the author identifies a discrepancy he attributes to unrecorded offshore wealth. Additionally, Zucman (2013) uses a unique data set from the Swiss National Bank (SNB), which provides a detailed overview on the securities and bank deposits held by foreigners in Switzerland, one of the biggest tax havens. This dataset reveals that a significant amount of the wealth managed by Swiss banks is owned by foreign households. He applies a method that accounts for the total amount of securities and deposits held in tax havens, adjusting for the portion of these assets that are unrecorded. Combining the discrepancies in the international investment statistics data and the SNB data set, gives the author the ability to get an estimate of tax evasion. According to the study, approximately 8% of the global financial wealth was held in tax havens in 2008. This translates to US$4.5 trillion. To validate the findings the author uses CPIS (Coordinated Portfolio Investment Survey)[2] allowing him to get insight on bilateral portfolio assets data for all countries in 2008. When analyzing this dataset, the author concludes that the portfolio gap matches with his estimates, adding to the robustness of the research.

In a study done by Pellegrini et al. (2017), global undeclared assets were estimated to be between US$6 trillion and US$7 trillion at the end of 2013. The authors' methodology involves using the, before mentioned, CPIS data and integrating it with other international databases such as the Extended Wealth of Nations II and the Bank of International Settlements databases. The authors estimated the annual tax evasion related to these assets range from US$20 billion to US$42 billion for capital tax income, and between US$2.1 trillion and US$2.8 trillion for personal income tax at the end of 2013 (Pellegrini et al., 2017). Zucman et al. (2015) estimated tax evasion to be US$7.6 trillion in 2014, using a similar, but more detailed methodology in comparison with the previous paper (Zucman, 2013). The mentioned studies align with the taxation papers, enhancing the validity and accuracy of the tax evasion estimates.

[2] CPIS – IMF's bi-annual survey that collects data regarding cross-border portfolio investments. Provided by the International Monetary Fund.

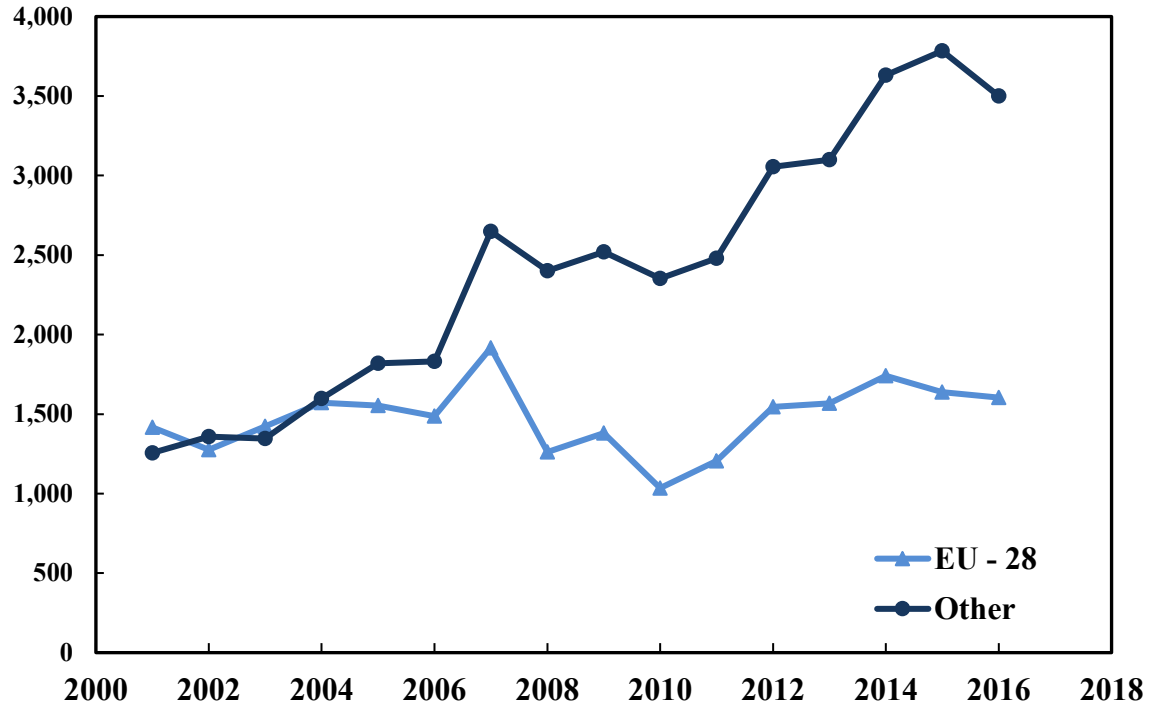
The tax evasion estimates utilized in this paper are derived from the Taxation Papers published by the European Commission (Vellutini et al., 2019). Similarly to the previously mentioned studies, the methodology in this paper begins with identifying the discrepancy between global international portfolio assets and liabilities. The gap is used as the basis for estimating offshore wealth. In order to estimate portfolio assets and liabilities for each country, the authors rely on data from the CPIS, International Investment Position (IIP)[3], and the External Wealth of Nations (EWN)[4] database. The authors then proceed to allocate the estimated global offshore wealth to individual countries based on the residency of the owners. This is done by using data on international shares of offshore deposits. The authors arrived at an estimated global offshore wealth of US$7.8 trillion in 2016 which is consistent to the research published by Zucman (2017), and the BCG (2017) report (Vellutini et al., 2019). Some of the most important points found by the taxation papers:

1. Offshore wealth amounts to US$7.8 trillion in 2016, or 10.4% of the GDP (Vellutini et al., 2019).
2. Yearly average for the 2001-2016 period is US$5.8 trillion (Vellutini et al., 2019).
3. The yearly tax revenue lost due to tax evasion averages out to EUR 46 billion for the EU-28 (Vellutini et al., 2019).
4. Estimates of tax evasion by individuals from 2001 until 2016, for all EU-28 countries, and other countries: Australia, Brazil, Canada, China, India, Japan, Russia, South Korea, and the USA.

Figure 1 illustrates the trends in tax evasion by individuals from 2001 to 2016, separated into two categories: EU-28 and other countries. The y-axis represents the amount of tax evasion in billions of US dollars:

[3] International Investment Position - report summarizing the total value of a country's financial assets held abroad and its liabilities to foreign residents, provided by the OECD.
[4] External Wealth of Nations – estimates of country-level external financial liabilities and assets. Milesi-Ferretti, G. M., & Lane, P. (2024). The external wealth of nations database. Brookings. Available at: https://www.brookings.edu/articles/the-external-wealth-of-nations-database/.

Figure 1: Tax Evasion by individuals (in billions of $US) 2001-2016

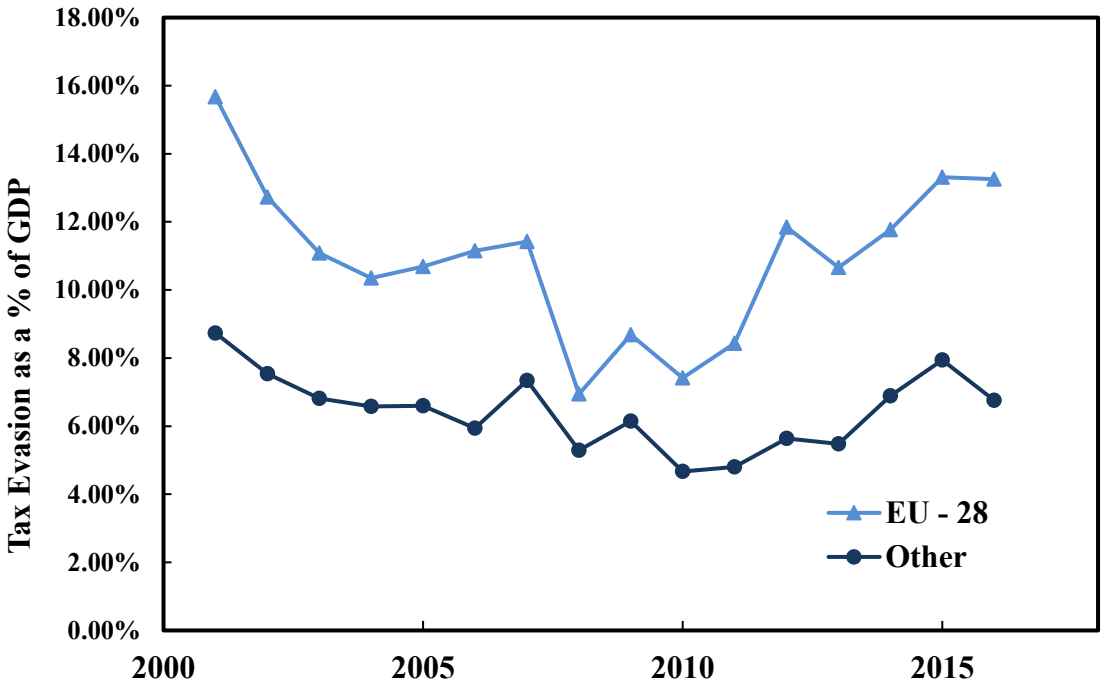


Source: Author's own work, data obtained from Vellutini et al. (2019). *Figure 1 shows the annual (absolute) average amounts of tax evasion (in billions of $US) for EU-28, and other countries (Australia, Brazil, Canada, China, India, Japan, Russia, South Korea, and the United States).*

Both the EU-28 and other countries show an overall increasing trend in tax evasion over the 16-year period. Tax evasion in other countries consistently remains higher than in the EU-28 throughout the entire period, and this is mainly due to the US and China. This trend highlights the need for robust international tax enforcement and cooperation to address the rising levels of tax evasion effectively. However, it is also useful to look at the graph of tax evasion as a percentage of GDP, as there are many factors that may influence the values in Figure 1, such as inflation, shocks, economic stability, etc.

Figure 2 shows how tax evasion as a percentage of GDP has progressed from 2001 up until 2016:

Figure 2: Tax Evasion as a % of GDP 2001-2016

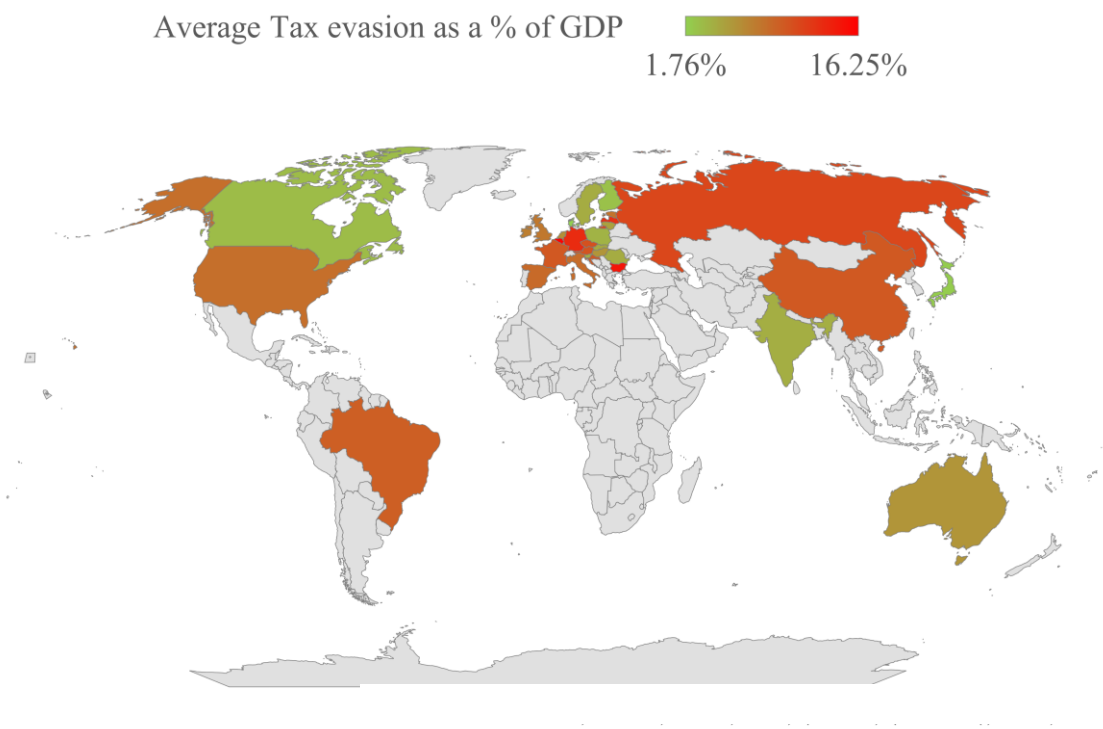


Source: Author's own work, data obtained from (Vellutini et al., 2019). *Figure 2 shows the annual average of tax evasion as a percentage of GDP for EU-28, and other countries (Australia, Brazil, Canada, China, India, Japan, Russia, South Korea, and the United States).*

The line representing EU-28 shows a sharp decline, and in 2008 tax evasion reaches its lowest point. After 2008, tax evasion increases with slight fluctuations for EU-28. However, other countries show a significantly lower percentage of tax evasion relative to their respective GDP. Post 2008, tax evasion for other countries begins to rise again, with slight fluctuations.

Furthermore, the figure below represents the annual average tax evasion (by individuals) as a percentage of GDP, according to the "Taxation Papers" by Vellutini et al. (2019):

Figure 3: Average Tax Evasion as a % of GDP (2001-2016, in billions of $US)



Source: Author's own work, data obtained from (Vellutini et al., 2019). *Figure 3 shows the average tax evasion as a % of GDP. The average of the 16-year period was taken.*

After removing outliers such as: Cyprus, Malta, Portugal, and Greece which have 38%, 31%, 26%, and 23% average tax evasion as a percentage of GDP, respectively, we are left with Figure 3 that gives a picture of the amounts of tax evasion Worldwide. As already mentioned before, one of the key determinants of tax evasion is the country's distance to Switzerland (Alstadsæter et al., 2018), and from Figure 2 and Figure 3 it can be concluded that the highest amounts of tax evasion are seen in Europe, in countries like: Belgium, Bulgaria, Germany, Latvia, Russia, Czech, and Austria. The gray countries are the ones for which there is no data.

The primary aim of this thesis is to address the existing gap in research by exploring the relationship between tax revenue and tax evasion, a topic that has not been examined in previous studies. By exploring this topic, this paper can conclude if tax evasion is a determinant in tax revenues collected by governments, and whether tax evasion has a statistically significant relationship with government tax revenue structure.

The next sub-section covers the current literature focused on researching how tax evasion influences government tax revenue.

2.2 Tax Revenue & Tax evasion

The literature concerned with analyzing the direct relationship between tax evasion and government tax revenue structure is not extensive. There are studies that have analyzed tax evasion as one of the determinants of tax revenue, but there are a few which try to find the relationship between tax evasion and government tax revenue structure. Furthermore, there are studies that estimate how much revenue loss tax evasion causes, but there are only a handful of studies that try to find a statistically significant relationship between tax evasion and government tax revenue.

A study done by Mehrara & Farahani (2016) highlights how tax evasion influences tax revenue in OECD countries. The authors use data for 29 OECD countries for the time period from 1990 up until 2013. Their study shows that higher tax rates lead to more tax evasion, or in other words, increases in tax revenue (through higher tax rates) increase the probability of tax evasion. Another study by Macharia (2014) analyzed the effects of tax evasion on government revenue in Kenya. The study concluded that tax evasion significantly negatively impacts tax revenue in Kenya. Another article studied the effects of tax evasion on the tax structure in Colombia, highlighting how developed countries tend to have progressive tax systems while Latin American countries, including Colombia, have regressive systems that disproportionately affect lower-income individuals through indirect taxes (García Carrillo et al., 2021). Furthermore, the researchers found that there are several causes for tax evasion in Colombia, some of them being social, cultural, political, economic, legal, technical, and administrative factors (García Carrillo et al., 2021). Furthermore, a study by Ozili, (2020) explores the relationship between tax evasion and financial instability, highlighting how tax evasion negatively affects government revenue and weakens financial systems. The research concludes that tax evasion drastically lowers the financial stability, by limiting the government intervention capabilities during economic shocks (Ozili, 2020). Moreover, a study by Cobham (2005) discusses the impact of tax evasion on the financial situation of developing countries. The author argues that developing countries lose an estimated $US385 billion annually due to tax evasion and tax avoidance, showing how important it is for

developing countries to have good tax systems.

The primary aim of this thesis is to address the existing gap in research by exploring the relationship between tax revenue and tax evasion, a topic that has not been fully examined in previous studies. By exploring this topic, this paper can conclude if tax evasion is a determinant in tax revenues collected by governments, and whether tax evasion has a statistically significant relationship with government tax revenue structure.

3. Data & Methodology

3.1 Data

Multiple data sources have been used in order to compile the panel data used in this paper. Tax evasion estimates have been obtained from the "Taxation papers" by Vellutini et al., (2019). Country-level tax revenue data has been taken from the UNU-WIDER Government Revenue Dataset (GRD) [5]. The GRD provides a detailed overview of government revenue and tax trends. Furthermore, other relevant country variables such as: FDI, population, and GDP were taken from the World Bank Data. The data for personal income tax was taken from KPMG, while the data on corporate tax has been used from the Tax Foundation dataset. The time period ranges from 2001 to 2016, and there is a total of 37 countries in the panel dataset. The data was compiled in a panel form in Excel. The table below shows the variables used and their source:

Table 1: List of Variables

Variable	Description	Source
Tax Evasion	Tax evasion by individuals	Taxation Papers
Government Tax Revenues	Tax Revenues	UNU-WIDER GRD
GDP Per Capita	GDP Per Capita current $US	World Bank Data
FDI	FDI, net inflows as % of GDP	World Bank Data
Population	Population in each country	World Bank Data
Corporate Tax Rates	Corporate tax rates	Tax Foundation
Personal Income Tax	Personal income tax rates	KPMG

The dependent variables are different types of government tax revenues, as described below:

Dependent Variables as a percentage of GDP

1. Total tax revenue as a percentage of GDP
2. Tax revenue from income, profits and capital gains as a percentage of GDP
3. Property tax revenue as a percentage of GDP
4. Indirect tax revenue as a percentage of GDP

[5] 'UNU-WIDER Government Revenue Dataset'. Version 2023. https://doi.org/10.35188/UNU-WIDER/GRD-2023.

Dependent Variables as a percentage of total tax revenue

5. Ratio of tax revenue from income, profits and capital gains as a percentage of GDP divided by the Total tax revenue as a percentage of GDP (IPC tax revenue as a percentage of total tax revenue, referred to as IPC Ratio)
6. Ratio of property tax revenue as a percentage of GDP divided by the Total tax revenue as a % of GDP (Property tax revenue as a percentage of total tax revenue, referred to as Property Ratio)
7. Ratio of indirect tax revenue as a percentage of GDP divided by the Total tax revenue as a % of GDP (Indirect tax revenue as a percentage of total tax revenue, referred to as Indirect Ratio).

3.2 Methodology

The hypothesis that will be tested in this thesis is:

Ho: There is no statistically significant relationship between tax evasion and tax revenue structure.

Ha: Tax evasion and tax revenue structure have a statistically significant relationship.

Linear multivariate panel data regression will be used to examine the relationship between tax evasion and different types of tax revenues. The regression analysis will provide insights into how tax evasion influences government tax revenue structure, holding other attributes constant. To measure the variation of tax revenue, besides tax evasion, relevant country attributes to capture country' characteristics such as GDP, population, FDI will also be included in the regression. The regressions were carried out in Rstudios.

The key dependent variables are tax revenue, denoted as $Y_{i,t}$, which can be measured as either tax revenue as % of GDP (in different types such as tax revenue from income, profits and capital gains; property tax revenue; and indirect tax revenue) or tax revenue types (i.e. tax revenue from income, profits and capital gains; property tax revenue; and indirect tax revenue) as a percentage of total tax revenue. Tax revenue can be explained by tax evasion and country attributes $X_{i,t}$. The data ranges from year 2001 to 2016. Fixed effects are pivotal and will be included in the model as θ_t and c_i:

The country tax revenue panel data model can be expressed as below:

$$Y_{i,t} = \alpha + \beta X_{i,t} + \theta_t + c_i + \varepsilon_{i,t}$$

where $X_{i,t}$ represents country's characteristics including tax evasion and country economic conditions (GDP, FDI, population); $\varepsilon_{i,t}$ is the idiosyncratic shocks that are iid and follow a distribution (0; σ_ε^2); θ_t are year dummy variables, or in other words, year fixed effects; c_i are country dummy variables or country fixed effects. Time fixed effects are used to control for time variant unobservables and country fixed effects to control for time invariant individual countries' characteristics.

Given that the dataset is panel data, varying across countries and over time from 2001 to 2016, both fixed effects and random effects panel data methods can be applied. The primary distinction between the fixed effects (FE) and the random effects (RE) models lies in the assumption regarding unobserved heterogeneity (c_i). In the FE model, it is assumed that this unobserved heterogeneity is correlated with covariates ($X_{i,t}$), where tax revenue varies across country and is dynamic over t for the same country i. This key assumption holds for FE models due to financial and economic conditions, as well as country characteristics in each country tend to be correlated with tax revenue. The Hausman test will be used to examine whether FE or RE model is more statistically appropriate.

The objective of this paper is to study the link between tax evasion and tax revenue. Therefore, the following three models are investigated:

(1)

$$Tax\ Revenue_{i,t} = \beta_0 + \beta_1 Tax\ Evasion_{i,t} + \theta_t + c_i + \varepsilon_{i,t}$$

(2)

$$Tax\ Revenue_{i,t} = \beta_0 + \beta_1 Tax\ Evasion_{i,t} + \beta_2 Log(pop)_{i,t} + \beta_3 Log(GDPpc)_{i,t} + \beta_4 FDI\ (\%GDP)_{i,t} + \theta_t + c_i + \varepsilon_{i,t}$$

(3)

$$Tax\ Revenue_{i,t} = \beta_0 + \beta_1 Tax\ Evasion_{i,t} + \beta_2 Log(pop)_{i,t} + \beta_3 Log(GDPpc)_{i,t} + \beta_4 FDI\ (\%GDP)_{i,t} + \beta_5 Corporate\ Tax_{i,t} + \beta_6 Personal\ Income\ Tax_{i,t} + \theta_t + c_i + \varepsilon_{i,t}$$

where tax revenues are dependent variables indicating tax revenue in country i at time t,

representing tax revenue. Tax revenues are measured as total tax revenues; tax revenues from income, profits and capital gains; property tax revenue and indirect tax revenue as percentage of GDP, respectively. The main independent variable is tax evasion.

Relevant country characteristics are important determinants of tax revenue. $X_{i,t}$ is a set of country characteristics that affect tax revenue including tax evasion, log of population, log of GDP per capita, FDI as percentage of GDP, corporate tax and personal income tax. The primary coefficient of interest is β_1 across all models. The regression results will be displayed in Tables 2 through 7 in the results section, with the discussion provided in Section 5. Year dummy variables are also used to represent the year fixed effects, year dummy variables from 2002 to 2016 take into account business cycles, economic growth, macroeconomic changes, capturing the variation in tax revenues over the years. The panel data methodology helps in accounting for unobserved fixed effects, capturing industry-specific heterogeneity and changes in business and financial conditions that influence tax revenue variation. Including year fixed effects and leveraging panel data dynamics enhances the accuracy of tax revenue predictions and explains the variation more effectively.

Each table has the results on both RE and FE models. In panel data analysis, the choice between fixed effects (FE) and random effects (RE) models depends on whether the unobserved effects correlate with tax evasion. The Hausman test is used to determine the most statistically suitable model (RE or FE). If the Hausman test yields a p-value greater than 0.05, the null hypothesis is not rejected, indicating that random effects estimates are more efficient, making RE models appropriate. Conversely, if the p-value is less than 0.05, the null hypothesis is rejected, suggesting that fixed effects estimates are more consistent, thus favoring the use of FE models.

4. Results

This section will present and provide the results from the regression models. Section 4.1 covers the dependent variables as a percentage of GDP, while Section 4.2 covers the dependent variables as a percentage of total tax revenue.

4.1 Panel A – Dependent Variables as a % of GDP

Table 2 shows the estimation results for model 1:

Table 2: Panel A Estimation Results for Model 1

	Total Revenue		IPC Tax		Property Tax		Indirect Tax	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	RE	FE	RE	FE	RE	FE	RE	FE
Tax Evasion	0.0139**	0.0148**	0.00408	0.00417	0.00513***	0.00487***	0.00293	0.00445
	(0.00473)	(0.00475)	(0.00341)	(0.00343)	(0.000989)	(0.00100)	(0.00294)	(0.00296)
Constant	0.236***	0.236***	0.103***	0.103***	0.0100***	0.0101***	0.119***	0.119***
	(0.00937)	(0.00198)	(0.00780)	(0.00143)	(0.00144)	(0.000383)	(0.00426)	(0.00125)
Year FE	✓	✓	✓	✓	✓	✓	✓	✓
Country FE		✓		✓		✓		✓
Hausman p-value	0.1165		0.5131		0.1022		0.2363	
Final Model	RE		RE		RE		RE	
N	591	591	591	591	571	571	578	578

Source: Author's work
Standard errors in parentheses
* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Table 2 presents the results on the relationship between tax evasion and tax revenues in total and various types (IPC, property, and indirect tax revenues as a percentage of GDP) without controlling for other economic factors. The Hausman test p-values are all above 0.05 suggesting that the random effects model is preferred over the fixed effects model for all the models. The tax evasion coefficient is significant at the 1% level for total tax revenue and property tax in both the RE and FE models. Table 2 indicates that one more billion US dollar increase in tax evasion is significantly associated with 0.0139 increases in total tax revenues as percentage of GDP on average, holding other things constant (or 1.39 percentage-points increase in total tax revenues as percentage of GDP). Previous research by García Carrillo et al. (2021) and Macharia (2014) highlighted a negative relationship between tax evasion and government tax revenue in developing countries such as Kenya and Colombia. In this paper, where the data set primarily includes developed countries, it can be inferred that

developed countries may be compensating for tax evasion in their tax revenues. However, further research is needed to substantiate this conclusion.

The coefficient for tax evasion is positive across all tax revenue types, indicating that as tax evasion increases, tax revenues as a percentage of GDP also increase. This result seems counterintuitive, as one would expect tax evasion to reduce tax revenues. It could suggest that higher tax evasion might correlate with higher tax rates or aggressive tax policies which might not be fully effective. However, result with property tax revenue is quite intuitive because property is not as movable as "paper" profits or income for tax evasion purposes. Both the indirect tax revenue, and tax revenue from income, profits and capital gains are not significant at any level.

Table 3: Panel A Estimation Results for Model 2

	Total Revenue		IPC Tax		Property Tax		Indirect Tax	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	RE	FE	RE	FE	RE	FE	RE	FE
Tax Evasion	0.0172***	0.0209***	0.00425	0.00494	0.00580***	0.00643***	0.00554	0.0172***
	(0.00509)	(0.00511)	(0.00375)	(0.00370)	(0.00103)	(0.00102)	(0.00311)	(0.00509)
Log(pop)	-0.0114**	-0.0422**	-0.00207	0.0286**	0.000352	-0.00526	-0.00877***	-0.0114**
	(0.00433)	(0.0149)	(0.00305)	(0.0108)	(0.000641)	(0.00272)	(0.00215)	(0.00433)
Log(GDPPC)	-0.00395	-0.00874**	-0.0000559	-0.00236	-0.00160**	-0.00339***	-0.00227	-0.00395
	(0.00296)	(0.00313)	(0.00217)	(0.00227)	(0.000571)	(0.000614)	(0.00186)	(0.00296)
FDI(%GDP)	0.00000679	0.00000881	-0.000000415	-0.00000508	-0.00000377	-0.00000386	0.00000862	0.00000679
	(0.0000171)	(0.0000169)	(0.0000126)	(0.0000123)	(0.00000318)	(0.00000309)	(0.0000105)	(0.0000171)
Constant	0.462***	1.015***	0.138*	-0.348	0.0190	0.128**	0.285***	0.462***
	(0.0822)	(0.255)	(0.0584)	(0.185)	(0.0128)	(0.0465)	(0.0430)	(0.0822)
Year FE	✓	✓	✓	✓	✓	✓	✓	✓
Country FE		✓		✓		✓		✓
Hausman p-value	0.001		0.001		0.001		0.001	
Final Model	FE		FE		FE		FE	
N	591	591	591	591	571	571	578	578

Source: Author's own work
Standard errors in parentheses
* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Table 3 shows the results between tax evasion and tax revenues when controlling other factors. The final model chosen is the FE model in all of the cases as the p-values from the Hausman test are all lower than 0.05. The coefficients for IPC are not significant, indicating that tax evasion does not have a significant impact on tax revenues from income, profits, and capital gains.

The addition of control variables provides us with a better understanding of the determinants of government tax revenues. We can see that the coefficients for population are negative and

significant for total tax revenue, and indirect tax revenue. The significant negative coefficients for log of GDP per capita suggest that wealthier countries tend to have lower tax revenues as a percentage of GDP. However, the persistence of the positive and significant coefficients for tax evasion in total tax revenue, property tax, and indirect tax suggests that tax evasion is associated with higher reported tax revenues in these categories, even after accounting for other economic factors. Again, the result for property tax revenue is quite intuitive, as in Table 2.

Table 4: Panel A Estimation Results for Model 3

	Total Revenue		IPC Tax		Property Tax		Indirect Tax	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	RE	FE	RE	FE	RE	FE	RE	FE
Tax Evasion	0.0156**	0.0193***	0.00168	0.00323	0.00561***	0.00641***	0.00755*	0.00929**
	(0.00512)	(0.00511)	(0.00370)	(0.00369)	(0.00105)	(0.00102)	(0.00305)	(0.00297)
Log(pop)	-0.0117**	-0.0530***	-0.00348	0.0167	0.000431	-0.00558	-0.00721***	-0.0703***
	(0.00443)	(0.0155)	(0.00309)	(0.0112)	(0.000617)	(0.00285)	(0.00207)	(0.00895)
Log(GDPPC)	-0.00208	-0.00678*	0.00303	-0.000002	-0.00125*	-0.00333***	-0.00446*	-0.00494*
	(0.00309)	(0.00324)	(0.00223)	(0.00233)	(0.000591)	(0.000639)	(0.00187)	(0.00197)
FDI(%GDP)	0.000006	0.000009	0.0000009	-0.000003	-0.000004	-0.000004	0.000007	0.000014
	(0.000017)	(0.000017)	(0.00001)	(0.00001)	(0.000003)	(0.000003)	(0.00001)	(0.000010)
Corporate Tax	-0.0189	-0.0232	0.0511**	0.0386*	-0.00170	-0.00552	-0.0742***	-0.0641***
	(0.0216)	(0.0218)	(0.0157)	(0.0157)	(0.00409)	(0.00407)	(0.0130)	(0.0128)
Personal Income Tax	0.0226*	0.0257**	0.0290***	0.0211**	0.00220	0.00132	-0.0186***	-0.00564
	(0.00890)	(0.00926)	(0.00644)	(0.00668)	(0.00175)	(0.00179)	(0.00554)	(0.00563)
Constant	0.455***	1.185***	0.117*	-0.186	0.0150	0.135**	0.302***	1.345***
	(0.0834)	(0.262)	(0.0587)	(0.189)	(0.0125)	(0.0480)	(0.0414)	(0.151)
Year FE	✓	✓	✓	✓	✓	✓	✓	✓
Country FE		✓		✓		✓		✓
Hausman p-value	0.001		0.001		0.001		0.001	
Final Model	FE		FE		FE		FE	
N	591	591	591	591	571	571	578	578

Source: Author's own work
Standard errors in parentheses
* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Table 4 includes corporate tax and personal income tax as control variables. Once again, the final model chose is the FE model, as the Hausman p-value is extremely low. Tax rates could be considered as key determinants of tax revenues and can significantly impact taxpayer behavior. Higher tax rates might lead to increased tax evasion or avoidance, while lower rates might enhance compliance and economic activity. By controlling for these tax rates, the model provides a more accurate estimate of the impact of tax evasion on tax revenues.

The significant negative coefficients for corporate tax rates, in the case of IPC tax revenue, suggest that higher corporate taxes might discourage corporate activities or increase tax avoidance, leading to lower overall tax revenues. The positive and significant coefficients for personal income tax rates indicate that higher personal income taxes contribute positively to government revenues, suggesting their effectiveness in increasing tax collections.

Across all three models, we can notice the significant positive relationship between tax evasion and tax revenues. This finding is counterintuitive and suggests that higher tax evasion leads to higher tax revenues. The positive association found between the two suggests the need for a deeper investigation into the mechanisms driving this relationship.

4.2 Panel B – Dependent Variables as a % of Tax Revenue

This sub-section covers the estimation results of the ratios of different tax revenues as percentages of total tax revenue.

Table 5: Panel B Estimation Results for Model 1

	IPC		Property		Indirect	
	(1)	(2)	(3)	(4)	(5)	(6)
	RE	FE	RE	FE	RE	FE
Tax Evasion	0.00890	0.00712	0.0289***	0.0275***	-0.0481***	-0.0466***
	(0.0106)	(0.0107)	(0.00385)	(0.00389)	(0.0105)	(0.0105)
Constant	0.419***	0.420***	0.0416***	0.0420***	0.526***	0.525***
	(0.0172)	(0.00447)	(0.00570)	(0.00149)	(0.0208)	(0.00444)
Year FE	✓	✓	✓	✓	✓	✓
Country FE		✓		✓		✓
Hausman p-value	0.2976		0.0232		0.3157	
Final Model	RE		FE		RE	
N	591	591	571	571	578	578

Source: Author's own work
Standard errors in parentheses
* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Table 5 exhibits the results on the relationship between tax evasion and tax revenues in various types (IPC, Property and Indirect tax revenues) as percentage of total tax revenue without controlling for other economic factors. The results show that tax evasion is statistically significant, at the 1% level, for property tax and indirect tax as a percentage of total tax revenue. The Hausman test p-values are above 0.05 for IPC and indirect ratio

suggesting that the RE model is preferred. On the other hand, the FE model is preferred for the property ratio.

The coefficients for tax evasion are positive but not statistically significant in both random effects (RE) and fixed effects (FE) models, suggesting that tax evasion does not have a significant impact on the ratio of IPC tax revenue to total tax revenue. On the other hand, the coefficients for tax evasion are significant and positive in the case of property ratio, meaning that one more billion dollar increase in tax evasion is significantly associated with 0.0275 increases in property tax revenues as percentage of total tax revenues on average, holding other things constant (or 2.75 percentage-points increase in property tax as percentage of total tax revenues). This suggests that property taxes might be less prone to evasion or that evasion in other areas might shift the burden to property taxes. Furthermore, a one billion dollar increase in tax evasion is significantly associated with a 0.0466 decrease in indirect tax revenues as a percentage of total tax revenues. The negative and significant relationship indicates that higher tax evasion leads to a lower share of indirect taxes in total tax revenue, suggesting that indirect taxes are more susceptible to evasion.

Table 6: Panel B Estimation Results for Model 2

	IPC		Property		Indirect	
	(1)	(2)	(3)	(4)	(5)	(6)
	RE	FE	RE	FE	RE	FE
Tax Evasion	-0.00217	-0.00391	0.0298***	0.0310***	-0.0374**	-0.0372***
	(0.0118)	(0.0109)	(0.00402)	(0.00401)	(0.0118)	(0.0104)
Log(pop)	0.00597	0.277***	0.00431	-0.00314	-0.0135*	-0.308***
	(0.00553)	(0.0317)	(0.00263)	(0.0107)	(0.00636)	(0.0302)
Log(GDPPC)	0.0221***	0.00825	-0.00330	-0.00828***	-0.0207**	-0.00296
	(0.00627)	(0.00667)	(0.00224)	(0.00243)	(0.00676)	(0.00671)
FDI(%GDP)	0.0000029	-0.000039	-0.000009	-0.00001	-0.000006	0.00004
	(0.00004)	(0.00004)	(0.00001)	(0.00001)	(0.00004)	(0.00003)
Constant	0.118	-4.237***	0.00102	0.170	0.939***	5.646***
	(0.121)	(0.544)	(0.0521)	(0.184)	(0.136)	(0.518)
Year FE	✓	✓	✓	✓	✓	✓
Country FE		✓		✓		✓
Hausman p-value	0.001		0.001		0.001	
Final Model	FE		FE		FE	
N	591	591	571	571	578	578

Source: Author's own work
Standard errors in parentheses
* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Table 6 shows that tax evasion is statistically significant at the 1% level for both property

and indirect tax revenues as a percentage of total tax revenue. Once again IPC is not statistically significant which indicates that tax evasion does not have an impact on the IPC ratio. By applying the Hausman test we can conclude that the FE model is appropriate for all of the three dependent variables.

According to the results, larger populations are associated with a higher share of IPC tax revenue, but a lower share of indirect tax revenue. FDI is statistically insignificant at any level suggesting that foreign direct investment does not play a role in determining government tax revenue structure. The consistent findings for the Property Ratio (positive and significant) and Indirect Ratio (negative and significant) across models suggest that these relationships are robust to the inclusion of control variables. These findings suggest that while property taxes remain relatively stable in the face of tax evasion, indirect taxes are more vulnerable.

Table 7: Panel B Estimation Results for Model 3

	IPC		Property		Indirect	
	(2) RE	(3) FE	(4) RE	(2) FE	(3) RE	(4) FE
Tax Evasion	-0.0102	-0.00791	0.0297***	0.0314***	-0.0272*	-0.0335**
	(0.0112)	(0.0107)	(0.00408)	(0.00405)	(0.0113)	(0.0103)
Log(pop)	0.000586	0.249***	0.00455	-0.00108	-0.00825	-0.285***
	(0.00548)	(0.0325)	(0.00260)	(0.0113)	(0.00616)	(0.0312)
Log(GDPPC)	0.0290***	0.0142*	-0.00286	-0.00873***	-0.0298***	-0.00812
	(0.00616)	(0.00680)	(0.00233)	(0.00253)	(0.00663)	(0.00687)
FDI(%GDP)	0.000007	-0.00003	-0.00001	-0.00001	-0.00001	0.00003
	(0.00004)	(0.00004)	(0.00001)	(0.00001)	(0.00004)	(0.00003)
Corporate Tax	0.313***	0.224***	-0.0100	-0.0230	-0.306***	-0.203***
	(0.0467)	(0.0458)	(0.0160)	(0.0161)	(0.0478)	(0.0445)
Personal Income Tax	0.104***	0.0353	0.00280	-0.00202	-0.112***	-0.0289
	(0.0196)	(0.0195)	(0.00683)	(0.00709)	(0.0205)	(0.0196)
Constant	0.0448	-3.902***	-0.00372	0.148	1.032***	5.377***
	(0.118)	(0.551)	(0.0515)	(0.190)	(0.131)	(0.526)
Year FE	✓	✓	✓	✓	✓	✓
Country FE		✓		✓		✓
Hausman p-value	0.001		0.001		0.001	
Final Model	FE		FE		FE	
N	591	591	571	571	578	578

Source: Author's own work
Standard errors in parentheses
* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Table 7 displays the results between tax evasion and tax revenues as percentage of total tax revenues, controlling for the same variables as in table 6, but with the addition of two more variables, which are corporate tax rates and personal income tax rates. Once again, the FE model is the appropriate one for all the ratios, as the Hausman p-value is below 0.05.

Corporate tax rates are associated with a higher share of IPC tax revenue, significant at the 1% level, as is the case with indirect tax. Personal income tax rates are not significant at any level. Furthermore, the findings for tax evasion remain the same, as tax evasion has a significant and positive effect on the share of tax revenue from property tax, and a statistically significant and negative effect on the tax revenue collected from indirect tax.

5. Discussion

This paper examines the significant impact of tax evasion on the structure of government tax revenue, a serious issue where public services are hindered due to less taxes being paid. Tax evasion, which is defined as the underreporting or non-reporting of income to regulatory authorities, presents a serious issue to countries Worldwide. This work aims to fill the research gap by exploring whether countries adjust their tax revenue structures in response to tax evasion.

The main aim of this work was to determine whether tax evasion has a statistically significant relationship with different types of tax revenues. The findings show that tax evasion is positively statistically significant with total tax revenue, and with property tax revenue (as percentages of GDP). On the other hand, when we consider the relationship between tax evasion and indirect tax revenue as a percentage of GDP, it is statistically negative. Furthermore, the study found that tax revenue from income, profits, and capital gains (as a percentage of GDP) is statistically insignificant with tax evasion. Indicating that there might be effective enforcement systems for collecting this type of tax revenue in the countries included in the study.

This paper utilizes a panel data set covering 37 countries, from 2001 to 2016, including EU-28, OECD countries, and other big countries such as China, India, and Brazil. As already mentioned, the tax evasion estimates were taken from the "Taxation Papers" by Vellutini et al. (2019). The UNU-WIDER Government Revenue Dataset was used for tax revenues, while the World Bank data was used for other relevant country variables (GDP, FDI, and population). The methodology involved using linear multivariate panel data regression, in order to examine the relationship between tax evasion and various types of tax revenues. Each table has the results on both RE and FE models. The Hausman test is applied to see which model is more statistically preferable. Year dummy variables were used to represent the year fixed effects, same goes for country fixed effects.

Tables 2-7 in the previous section show the regression results of panel data models presenting the relationship between tax evasion and tax revenues in total and various types with and without controlling for other economic factors. The primary objective of this paper

is to explore the impact of tax evasion on the structure of government tax revenue. Using a series of regression models, the hypothesis was investigated and proven to hold; tax evasion does have a statistically significant impact on government tax revenue structure.

5.1 Limitations & Further Research

The tax evasion estimates were taken from the "Taxation papers" by Vellutini et al. (2019) and the limitations from that work must be taken into consideration as this thesis is based on those estimates. The limitations are:

1. The methodology does not include some elements of wealth such as cash, life insurance contracts, and real estate. This issue arises from the fact that these assets are not reflected in the global discrepancy between portfolio assets and liabilities (Vellutini et al., 2019). This could be the reason why the relationship between tax evasion and tax revenue from income, profits and capital gains as a percentage of GDP is statistically insignificant at any level.
2. The methodology uses Foreign Direct Investment data to make a distinction between cross-border corporate deposits from individual deposits. The authors admit the data could be more precise by using specific data on individual cross-border deposits (Vellutini et al., 2019).
3. New strategies adopted by tax evaders, such as the practice of dual fiscal residencies, may not be captured by the current methodology (Vellutini et al., 2019).

Additionally, the measurement of tax evasion is challenging due to the unavailability of data surrounding the topic. The reliance on the discrepancy between global assets and global liabilities to estimate tax evasion might not capture all forms of evasion, as mentioned above.

The thesis only covers the period from 2001 to 2016. Recent developments in global tax policies and enforcement mechanisms will not be reflected in the data. Moreover, the study focuses on only 37 countries, most of which are well-developed countries. Therefore, the selection of countries may not reflect the true patterns with tax evasion and government tax revenue, as the data completely omits emerging economies and less developed countries

with different tax systems. In 2005, the average tax revenue to GDP ratio in the developed world was approximately 35%. In the developing countries, it was around 15% (Fuest & Riedel, 2009), highlighting how important it is to also include data for less developed countries. Additionally, the study by García Carrillo et al. (2021) mentions how developed countries have more progressive tax systems while less developed countries have regressive systems. Thus, future research should include data on less developed countries to gain insight on how tax evasion influences tax revenue structure in more regressive tax systems. Furthermore, the study also does not account for specific tax policy changes that might have influenced tax revenues and evasion behaviors.

Further research can focus on using more recent tax evasion estimates, while also including emerging economies in the data. Additionally, other variables that could explain the variation in tax revenues could be included: inflation, growth rates, unemployment, etc. This would provide a deeper understanding for the drivers of tax evasion. Furthermore, to get a better understanding on the effects of tax evasion on government tax revenue structure, other dependent variables could be included in the models. For example, the UNU-WIDER GRD contains more forms of government revenues as percentages of GDP, some include: taxes on payroll & workforce, taxes on goods and services, etc. By including these tax revenues as dependent variables, the results could give us a deeper insight on how tax evasion influences tax revenue structure.

This study relies on tax evasion estimates that omit certain wealth elements like life insurance, cash, and real estate. Additionally, the data does not capture new tax evasion strategies such as dual fiscal residencies. The study is limited to 37 well-developed countries from 2001 to 2016, excluding emerging and less developed economies. Future research should incorporate more recent data, include emerging economies, and consider additional variables in order to get a more comprehensive understanding of tax evasion's impact on government tax revenue structures.

5.2 Main Results & Findings

In Panel A, tax evasion exhibits a positive and significant relationship with total tax revenue as a percentage of GDP. We can see this relationship in all three of the tables in panel A

(Tables 2 – 4), the coefficient remains do not vary that much even after controlling for other relevant country factors. The relationship between tax evasion and government tax revenue is similar to the findings in the research paper by (Mehrara & Farahani, 2016), where the authors concluded that tax rate increases lead to the increases of tax evasion. If tax rates increase, we can assume that tax revenues increase, and this leads to more tax evasion according to the models presented in Section 4. The findings may seem counterintuitive, but this situation may arise due to the ways governments may try to mitigate the losses from tax evasion. Governments may respond to high levels of tax evasion by increasing tax rates, which leads to higher government revenue. Additionally, as tax evasion increases governments may try to compensate the losses by increasing indirect tax (which isn't necessarily avoidable). We can see this in Tables 3 and 4, indirect tax increases along with tax evasion. An increase in tax evasion could lead governments to rely more heavily on these indirect taxes, thereby increasing total tax revenue. The relationship between tax evasion and tax revenue from income, profits and capital gains as a percentage of GDP is statistically insignificant at any level in all three of the Tables in Panel A. This finding suggests that tax evasion does not have a significant impact on this specific type of tax revenue. However, result with property tax revenue is quite intuitive as property is not as moveable as other financial assets.

In Panel B (Tables 5 – 7), the Tables present the estimation results of the ratios of different tax revenues as percentages of total tax revenue. Once again, the results show that tax evasion is statistically insignificant for tax revenue from income, profits, and capital gains (IPC) as a percentage of total tax revenue. This suggests that evasion in other areas does not significantly impact the proportion of IPC tax revenue in the overall tax structure. This could mean that governments' have established effective ways of collecting this type of tax revenue, not allowing for individuals to evade this type of tax. Tax evasion is positively and significantly associated with property tax revenue as a percentage of total tax revenue. This indicates that as tax evasion increases, the share of property tax revenue in total tax revenue also increases. This could be due to property taxes being less susceptible to evasion compared to other forms of taxes. This can be attributed to the immovable nature of property, making it more difficult to hide/conceal from authorities. According to the OECD's 2023 'Tax Policy Reform' report, an increasing number of economies have raised their property taxes to boost tax revenues. By doing so, these economies might aim to mitigate losses from

tax evasion, as property taxes are harder to evade compared to other forms of taxation. Additionally, Greece has set a good example by introducing a system that reinforces fairness by basing property tax on market property values (OECD, 2023). This approach helps reduce economic inequality and offsets losses from tax evasion, primarily targeting the wealthy, who are most responsible for such evasion. There is a significant negative relationship between tax evasion and indirect tax revenue as a percentage of total tax revenue. This finding suggests that indirect taxes are more vulnerable to evasion, leading to a reduced share in the total tax revenue when evasion is high.

The OECD report (2023) highlights that tax structures remained stable over time in OECD countries. Furthermore, the average tax to GDP ratio in OECD countries rose by 0.6 percentage points in 2021, continuing the trend since 1990 (OECD, 2023). According to the report, government tax revenues are growing and remain stable despite the challenge of tax evasion. Battling tax evasion is very challenging, as the example of the G20 tax haven initiative shows. The G20 countries pressured tax havens to sign bilateral treaties, in 2021, for the exchange of bank information, aiming to end bank secrecy (Johannesen & Zucman, 2014). However, this resulted in tax evaders shifting their deposits to other havens that had not signed the treaties, leading to only minimal declines in bank deposits. This highlights the significant challenges economies face in reducing tax evasion.

The analysis of tax evasion's impact on government tax revenue reveals several key insights. Panel A demonstrates a positive and significant relationship between tax evasion and total tax revenue as a percentage of GDP, aligning with Mehrara and Farahani's (2016) findings that higher tax rates, and thus higher tax revenues, may increase tax evasion. Governments may mitigate revenue losses from evasion by raising indirect taxes, which are less avoidable. Interestingly, tax evasion does not significantly affect revenue from income, profits, and capital gains. However, property tax revenue shows a positive association with evasion, likely due to property being less concealable compared to other assets. Panel B further highlights that tax evasion does not significantly impact the proportion of IPC tax revenue, which could suggest effective collection mechanisms. Conversely, property tax revenue increases as a share of total revenue with higher evasion, due to its immovable nature. The OECD's 2023 report supports these findings, indicating stable tax structures and rising tax-to-GDP ratios despite ongoing evasion challenges.

List of References

Alstadsæter, A., Johannesen, N., Le Guern Herry, S., & Zucman, G. (2022). Tax evasion and tax avoidance. *Journal of Public Economics*, *206*. https://doi.org/10.1016/j.jpubeco.2021.104587

Alstadsæter, A., Johannesen, N., & Zucman, G. (2018). Who owns the wealth in tax havens? Macro evidence and implications for global inequality. *Journal of Public Economics*, *162*. https://doi.org/10.1016/j.jpubeco.2018.01.008

Alstadsæter, A., Johannesen, N., & Zucman, G. (2019). Tax evasion and inequality. *American Economic Review*, *109*(6). https://doi.org/10.1257/aer.20172043

Cobham, A. (2005). Tax evasion, tax avoidance and development finance. *QEH Working Paper Series*, *129*(129).

EY. (2024). *The outlook for global tax policy and controversy in 2024*. Ernst & Young Global. https://www.ey.com/en_gl/tax-alerts/2024-0689-the-outlook-for-global-tax-policy-and-controversy-in-2024.

Fuest, C., & Riedel, N. (2009). Tax evasion, tax avoidance and tax expenditures in developing countries: A review of the literature. *Report Prepared for the UK Department for International Development (DFID)*, *44*(Oxford University Centre for Business Taxation).

García Carrillo, J. F., Parra Jiménez, O. D., & Rueda Céspedes, F. (2021). Features of tax structure and tax evasion in Colombia. *Apuntes Contables*, *28*. https://doi.org/10.18601/16577175.n28.02

Johannesen, N., & Zucman, G. (2014). The end of bank secrecy? An evaluation of the G20 tax haven crackdown. *American Economic Journal: Economic Policy*, *6*(1 B). https://doi.org/10.1257/pol.6.1.65

MACHARIA, J. K. (2014). The Effect of Tax Evasion on Tax Revenues in Kenya. *Master of Business Administration, University of Nairobi, 2014*. http://erepository.uonbi.ac.ke/handle/11295/74731#:~:text=The%20study%20established%20that%20the,affects%20tax%20revenue%20in%20Kenya.

Mehrara, M., & Farahani, Y. G. (2016). The study of the effects of tax evasion and tax revenues on economic stabilities in oecd countries. *World Scientific News*, *33*.

Ozili, P. K. (2020). Tax evasion and financial instability. *Journal of Financial Crime*, *27*(2). https://doi.org/10.1108/JFC-04-2019-0051

OECD (2023), *Tax Policy Reforms 2023: OECD and Selected Partner Economies*, OECD Publishing, Paris, https://doi.org/10.1787/d8bc45d9-en.

Pellegrini, V., & Tosti, E. (2017). What do External Statistics tell us About Undeclared Assets held Abroad and Tax Evasion? *SSRN Electronic Journal*. https://doi.org/10.2139/ssrn.2917184

Partington, R. (2024, February 29). *'A historic step': G20 discusses plans for global minimum tax on billionaires*. The Guardian. https://www.theguardian.com/news/2024/feb/29/taxation-worlds-billionaires-super-rich-g20-brazil

'UNU-WIDER Government Revenue Dataset'. Version 2023. https://doi.org/10.35188/UNU-WIDER/GRD-2023.

Vellutini, C., Casamatta, G., Bousquet, L., & Poniatowski, G. (2019). Estimating International Tax Evasion by Individuals. In *Taxation Papers*.

Zucman, G. (2013). The missing wealth of nations: Are europe and the U.S. net debtors or net creditors? *Quarterly Journal of Economics*, *128*(3). https://doi.org/10.1093/qje/qjt012

Zucman, G., Fagan, T. L., & Piketty, T. (2015). The Hidden Wealth of Nations. In *The Hidden Wealth of Nations*. https://doi.org/10.7208/chicago/9780226245560.001.0001