ESTIMATING IMPACT OF OECD BEPS PLAN IMPLEMENTATION ON NATIONAL TAX REVENUES

by

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TABLE OF CONTENTS

LIST OF FIGURES iii
LIST OF TABLES iv
LIST OF ABBREVIATIONS v
Chapter 1. Introduction 1
Chapter 2. Literature review 4
Chapter 3. Methodology 8
Chapter 4. Data 15
Chapter 5. Results 21
Chapter 6. Conclusions and Recommendations 25
REFERENCES 28
APPENDIX 31

LIST OF FIGURES

Name	*Page*
Figure 1. Distribution of National Corporate Tax Revenue	16
Figure 2. Distribution of Natural logarithm of national corporate tax revenue	16
Figure 3. Distribution of Corporate Tax Rate	17
Figure 4. Distribution of GDP growth rate	18
Figure 5. Correlation matrix of the observed variables	20
Figure 6. Regression residual histogram	23

LIST OF TABLES

Name	*Page*
Table 1. Variables description	11
Table 2. Descriptive statistics for utilized variables	15
Table 3. OLS regression outcomes	21

LIST OF ABBREVIATIONS

BEPS Base erosion and profit shifting

OECD Organization for economic cooperation and development

GDP Gross domestic product

MNC Multinational corporation

ETR Effective tax rate

CETR Cash effective tax rate

TaxDiff Tax differentials

TCJA Tax Cuts and Jobs Act

OLS Ordinary Least Squares

CHAPTER 1. INTRODUCTION

Changing dynamics of differential varieties concerning taxation has become one of the chief topics of learned and policy-oriented discourses within an increasingly interdependent global economy. Digitized business operations in fast-growing multinational enterprises currently pose a challenge to conventional methods of taxation to capture and control economic value effectively. Financial innovation is simultaneously a productive factor of growth and development, and at the same time, it generates complexities that are important for international tax enforcement.

There are several interrelated reasons for carrying out this research. The first of them is the growing concern over financial innovation, which although accelerates economic growth and development, brings new complexities and risks into the global financial system. They can also give rise to tax avoidance and evasion opportunities making it difficult to enforce tax laws.

Secondly, taxation systems face considerable difficulties in the contemporary global economy. These include interlinkages between economies and the rise of multinational corporations that make it hard for individual countries to effectively tax corporate profits. Many a time these firms use legal but aggressive strategies of profit shifting allowing them to transfer profits to low-tax jurisdictions thereby undermining the tax bases of high-taxing nations.

This has further been exacerbated by the digitalization of the economy as traditional rules on taxation that have been based on physical presence have become increasingly inadequate when addressing activities associated with digital businesses. Accordingly, there is an incongruity between where value is produced and where profits are taxed creating fairness and equity concerns in the global tax system.

Additionally, because the tax laws change frequently and the world is continuously moving towards full integration of the BEPS plan, it is necessary to evaluate how effective these measures are in terms of their impact on income taxes both currently and in the

future. Equally important are the decisions regarding policy interventions that may be taken with respect to such measures as there have been no empirical studies conducted in this area. My contribution to this debate and attempt to recommend solutions for better and fairer taxation will be based on this research.

Consequently, the main aim of this paper is to provide an assessment of the consequences arising from the implementation of the BEPS plan as regards particular nations' tax revenues. The study's primary goal therefore is to examine how fiscal outcomes interact with BEPS instruments while providing some insights into the effectiveness of intergovernmental tax reforms. Answering this broad research question includes a combination of theoretical synthesis and empirical data analysis: to what extent can there be an effect on the tax revenues that these states obtain from implementing the BEPS plan at the country level? And what factors limit the results?

The novelty is therefore the country-centric analysis of the BEPS plan implications using the dummy variables in OLS regression with fixed effect. Very importantly, dummy variables help to determine categorical influences that would remain unrealized through more conventional regression analysis; they allow qualitative factors to be introduced into a quantitative analytic model. It can include these variables in an OLS regression model to note how the changes in these categories, say, as affected by the implementation of OECD BEPS actions, in fact, affect national tax revenues. Using this methodological framework, the impacts of those policy changes could be seen in more fine-grained detail with differential estimation regarding their specific contributions versus alternative potential confounders. But very clearly, it is the OLS regression model that lets one, with ease, see just how policy changes translate into changes in tax revenue and at the same time accommodate nonlinear relationships and multiplicative effects.

The data for this research was gathered from a combination of international databases and national tax revenue reports. Specifically, data was obtained from CEIC Global Data GATE, the OECD Library, and the World Bank Database, focusing on 91 countries that adopted the OECD BEPS plan from 2012 to 2021. To capture the impact of BEPS implementation on national tax revenues, key variables include a dummy variable

for BEPS plan implementation, which distinguishes the period after the introduction of the BEPS plan, assigned values of 0 and 1 before and after implementation respectively. Additionally, a dummy variable for Tax Haven status categorizes countries as either tax havens (1) or non-tax havens (0). National Corporate Tax Revenues, Corporate Tax Rates, and GDP Growth Rate are also included to provide a comprehensive analysis of how BEPS measures affect tax revenues. The dataset, comprising 4,550 data points from annual reports over a decade, was downloaded and processed using Microsoft Office to ensure accuracy and reliability.

This paper therefore posits that the countries adopting the OECD BEPS plan will have more revenues in taxation after implementation. An ordinary least squares regression with fixed effects will be used to test this hypothesis. Among other characteristics, the OLS model is best suited to review how categorical changes affect tax revenue results. This will be through the analysis of data from periods before the implementation of BEPS vis-à-vis afterward, to establish whether there is any rise in tax revenues that could be attributed to the BEPS plan. This will now give an inside look into the relationship between the implementation of the BEPS plan and changes in national tax revenues, thereby informing how BEPS measures are effective in improving tax collection. This will further enhance one's understanding of how global reforms of tax policies are impacting national tax revenues and, thus, guide policy decisions for the times to come.

The paper is organized as follows: Chapter 1 introduces the research topic, defines the objectives, and outlines the hypotheses. Chapter 2 presents the literature overview, which reviews relevant studies and theories dealing or relevant to the implementation of the OECD BEPS plan and its effects on national tax revenues. Chapter 3 describes the methodology, including the methods of data collection and data analysis, with justification for using such methods. Chapter 4 describes the information used and key variables during analysis: basic information, method of gathering the data, and sources. Chapter 5 introduced the research study where the findings were presented and discussed. Chapter 6 consisted of the conclusion of the paper by summarizing the findings, discussing implications, and giving recommendations for further studies.

CHAPTER 2. LITERATURE REVIEW

Over the past few years, there has been much concern and debate from policymakers and academic researchers regarding aggressive tax avoidance by MNCs. MNCs are accused most of the time of deploying policies that enable them to transfer most of their earnings to jurisdictions that do not charge taxes to the extent that those located in other countries do. Indeed, this practice has been noted in studies with a range to a higher degree of intensity. Desai, Foley & Hines (2006a & 2006b) offer preliminary empirical evidence on the amount of profit shifting by MNCs into low-tax countries through computer simulations indicating that these entities often book over proportions of their profits in low-tax countries. In a similar vein, Huizinga and Laeven (2008) employ estimates to measure the economic effect of profit manipulation on the international taxation system of countries within the European Union and the results show that these countries lost greatly as a result of these manipulations. Heckemeyer & Overesch (2013) replicated the previous or primary studies and did a further meta-analysis of such studies by supporting the severe level of direct profit shifting and stressing the negative impact related to the national tax base.

In order to mitigate the effects of profit shifting, the OECD piloted the BEPS project in 2013. BEPS project is a global plan that consists of fifteen measures that seek to address aggressive tax planning by making sure that profits are taxed in jurisdictions that generate economic activities and value (OECD, 2013a, 2013b, 2014). The initiative also stresses the role of multilateralisation and the clamor to expose the act of tax avoidance. Mainly, the BEPS actions aim at different strategies by which MNCs abuse in order to shift their profits: transfer pricing, hybrid mismatch arrangements, and domestic tax laws.

The OECD's approach has been to distinguish between harmful tax practices and tax competition per se. Thus, according to the interview with the head of OECD tax policy, the BEPS strategy will not remove all forms of tax competition because it will eliminate only harmful tax practices. However, the initiative concedes that there is still scope for

more legitimate forms of tax competition whereby countries slightly adjust their taxes to attract investors (Sydney Morning Herald, 2014).

The introduction of anti-tax avoidance measures, such as the BEPS initiative, has led to significant changes in the behavior of MNCs. The Economist (2015) notes that there are signs that some companies have begun physically transferring their chief officers and head-office employees to these new jurisdictions to mitigate the impression of tax evasion. This trend shows the evolution of the tendency not only to shift the accounting practices but also to transfer significant parts of their operations. This movement can have broader economic implications, including the loss of jobs and tax revenues in high-tax countries.

Since the launch of the OECD BEPS project, it has attracted significant attention from academia in different ways and attempts have been made to measure the various effects such as tax avoidance and profit shifting among MNCs. Nonetheless, the outcomes of this research work sometimes provide mixed-nuts scenarios somehow. Different methods have been used in the BEPS project to assess the impacts of particular actions in more detail. Similarly, Joshi (2020) discussed the impact of Action 13 also called the "Country by Country Reporting", concerning taxation issues and profit shifting. Despite this, the study conducted to implement Action 13 revealed that there was a positive correlation between Action 13 implementation and the consequent decrease in tax avoidance by MNCs, while profit shifting was not strongly influenced. However, such manipulation was sensitive to the selection of the proxies for tax avoidance, including the effective tax rate (ETR), the cash effective tax rate (CETR), and the tax differentials (TaxDiff).

However, other scholars as well have found other benefits associated with the implementation of Action 5 of the BEPS project. This action was intended to help bring the location of MNCs' intangible assets in line with their economic activity and indicates a positive movement towards addressing profit-shifting issues (Popescu, 2020). However, there is another point of view in the literature, which states that the success of the OECD BEPS Project in minimizing profit shifting depends also on whether the low tax

jurisdictions offer other location advantages to MNCs other than a low tax system (Pieretti & Pulina, 2020).

According to this view, if high-tax countries offer better infrastructure development and access to larger markets, the BEPS Project will be more efficient in preventing profit shifting to low-tax countries without competitive location factors. As a result, the impact of the BEPS Project in combating profit shifting depends on the location factors, that is factors in the source economy and the recipient economy. The attractiveness of location infrastructure as deterring greater real investments from MNCs is an important parameter that goes towards determining the success of the BEPS plan in combating profit shifting.

Furthermore, insights derived from the empirical research that was conducted on the direct impact of regulatory action, like the Tax Cuts and Jobs Act (TCJA) in the US, indicate that similar policies can enhance the home country's tax net register to a large extent (Clausing, 2020). Regulatory interventions can be used to enforce tax rules and improve the level of transparency, which could effectively discourage the practice of shifting profits and thus increase domestic revenues.

Profit shifting is still a major issue. However, MNCs also lower their taxes by relocating real activities to countries with low taxation rates. This approach is most suitable where countries at the receiving end do not tax income from other jurisdictions, under territorial taxation principles. Dharmapala (2008) and Dharmapala and Hines (2009) therefore posit that MNCs are not just attracted to tax havens for low taxes but especially for the modern and stable infrastructure in those countries. Gonzalez and Schipke (2011) continue similar opinions and assert that the existence of a powerful regulatory environment and decent institutions, which foreign operations require, are of profound importance.

According to Hines (2014), even though activity shifting is not unlawful under current rules against tax avoidance, it can be effectively regarded as base erosion from the viewpoint of these high-tax countries. This currently experienced form of base erosion

involves shifting of actual and reasonable fixed assets within MNCs to some low-taxing countries thus aggressively minimizing the tax base in their home countries.

The review of literature conducted herein offers a comprehensive elucidation of the dynamics underpinning the implementation of the BEPS plan and its potential effect on the tax revenues of nations. The metadata analysis of the numerous studies cited above has provided an intricate understanding of the profit-shifting behavior of MNCs and the effectiveness of regulation, especially those being proposed under the BEPS project. While some of the indicated reviews and studies show the positive outcomes linked to particular BEPS interventions, others stress the necessity to consider the factors of the specific location and the regulatory environment while evaluating the efficiency of anti-profit-shifting measures. Hence, this review of literature provides an important stepping stone for future research that aims to measure the revenue-earning effect of BEPS implementation quantitatively and in order to inform evidence-based policy formulation efforts towards enhancing national tax compliance and revenue mobilization.

CHAPTER 3. METHODOLOGY

The data collection methodology is described as follows. Three main databases provide data for this study: CEIC Global Data GATE, OECD Library, and World Bank Database. In order to analyze national tax revenues together with examining how well BEPS has been implemented; these databases have rich economic and financial information which is reliable. To gather data, these databases are downloaded for the relevant datasets while putting into consideration that the data is new enough and covers the appropriate time frame and countries.

The data analysis methodology is applied in the following manner. Tax revenues within selected countries are comprehensively analyzed for impact by this research through a robust OLS regression methodology. The analysis seeks to separate the BEPS plan's specific effect by introducing a dummy variable that distinguishes between before and after BEPS measures implementation in each country. Splitting the data across these two periods is intended to provide an in-depth understanding of how the BEPS plan has shaped tax dynamics over the years.

The regression model specification is provided below. The main analytics framework used in this study is an OLS log linear-regression model with a fixed effect of country that captures the association between corporate tax revenue and some of its key determinants like corporate tax rates, GDP growth rate as well as the BEPS dummy variable. The Tax Haven dummy variable was not used eventually in the analysis due to its time-invariant nature. However, it should be mentioned in the research as it was used in the process of identifying the right model. The model can be defined as follows:

$$\ln(NCTR) = \alpha_i + \beta_1 * CTR + \beta_2 * GDPGR + \beta_3 * BEPSD + \varepsilon_{it} \qquad (1)$$

In this regression equation, NCTR is the dependent variable and represents the natural logarithm of annual national-level tax revenues derived from corporate sources. A couple of reasons as to why logarithmic transformation applies to NCTR are considered in the following order. First and foremost, logarithm helps treat the probable problem of diminishing returns that are associated with changes in the explanatory variable. The tax

revenue effects are nonlinear, and a logarithmic transformation strengthens this model in appropriately modeling diminishing effects. Allowing for differences in the scale of economies and tax structures of various nations, calling attention to proportional changes rather than absolute values provides enhanced capabilities for the model. The approach is very important since if revenues differ among countries of different sizes, there will be no single absolute value to measure the effect. The use of absolute tax revenues in this case due to this fact may lead to a distorted result and, hence, disqualify the validity of the analysis due to the domination of larger economies. These will ensure the coefficients are estimated with high detail and more comparability in the analysis of impacts caused by the introduction of BEPS policies: those of changes in corporate tax rates; changes in GDP growth rates; the implementation of BEPS; and the status of the tax havens.

The corporate tax rate (CTR) is an independent variable in the model. It reflects the percentage of profits that by law, corporations are required to pay as taxes. The CTR is a very important variables that help a lot in understanding how changes in corporate tax rates affect national tax revenues. When rates of corporate taxation vary, these directly affect the amount that a government collects from corporation profits, and the behavior may significantly change the financial operations of multinational corporations. That is, tax revenues within the jurisdiction could be changed because of the decision of a multinational on where to book profits, with obvious implications for how tax revenues are divided among jurisdictions. Since the model would have embedded the CTR, one could also extract the impact based on changes in tax rates to the national tax revenues, which is unrelated to BEPS or anything else.

GDPGR (GDP growth rate) represents the annual percentage change in a country's Gross Domestic Product and is used within the model to measure the overall economic performance. It is significant to the general measure of economic welfare, representing the growth and shrink size of a country's economy. Including GDPGR in the model allows accounting for broader economic conditions that impact countries' tax revenues. Isolates changes due purely to economic growth from those results of BEPS implementation: economic growth directly impacts tax revenues since increasing corporate

profits, increasing wages, and increasing consumer spending in times of growth tend to increase overall tax receipts while decreasing levels of those factors throughout economic downturns often result in decreasing revenues. Again, including GDPGR provides context for interpreting the BEPS effects and thereby allows further analysis of how the implementation of BEPS impacted tax revenues according to different economic conditions.

BEPSD is a dummy variable to measure the impact of the BEPS plan on national tax revenue. It is a time dummy that changes from 0 to 1 when the country adopts the BEPS plan on a national level. After changing from 0 to 1 dummy variable never changes backwords. The dummy variable allows the model to isolate, in estimation, effects that are solely due to BEPS measures. The introduction of the BEPS plan aimed at various ways MNEs could avoid taxation, such as profit shifting to jurisdictions with a low tax burden, thereby eroding the tax base of higher-tax countries. Such incorporation would, therefore, enable consideration of whether BEPSD has indeed achieved a change in the national revenues, hence an important insight into such policy effectiveness in curbing avoidance and enhancing revenue collection.

THD is a dummy variable that dichotomizes with 1 being tax haven countries and 0 otherwise. Details on the same were from the Corporate Tax Haven Index by the Tax Justice Network, which ranks jurisdictions based on how much of a tax haven they are. Including THD allows the model to capture how BEPS plan implementation would affect various jurisdictions' revenues through variation in those two categories of jurisdictions. Tax havens usually enjoy favorable tax regimes and can easily attract most multinationals with huge turnovers that seek to reduce tax incidences through profit shifting. Thus, their efficacy on average would vary across tax havens as compared to non-tax havens because evasion techniques are structured in a way to avoid these controls.

The selection of variables for this research was guided by three main criteria:

1. Relevance to the tax revenue analysis: The variables chosen are crucial for understanding the impact of BEPS implementation on national tax

revenues. They are selected based on their established importance in economic and tax policy analysis.

2. Data accessibility: The variables must be relatively easy to obtain from reliable sources. This ensures that the data can be readily sourced from reputable databases and reports, making it accessible for replication and verification purposes.
3. Empirical support: The variables included have been used in similar studies and have demonstrated their significance in previous research. This ensures that the selected variables are not only relevant but also proven to contribute meaningfully to the analysis.

All these variables satisfy the above-mentioned criteria, provided that important financial and economic indicators necessary for a proper assessment of the impact of measures connected with BEPS would be defined in detail and shown in Table 1.

Table 1. Variables description

Variable	Symbol	Expected Sign	Description
National corporate tax revenue	NCTR	N/A	Annual national-level amount collected as income from taxes on income from corporations.
Corporate tax rate	CTR	?	Tax rate of profits applied to corporations which indicates the proportionate tax burden.
GDP annual growth rate	GDPGR	+	The annual percentage change in a country's GDP, indicating economic growth or decline.
BEPS implementattion dummy variable	BEPSD	+	Dummy variable is 1 if BEPS measures are adopted and 0 otherwise.

This is an OLS regression model with fixed effects, which is sufficient for the analysis of the relationship between the adoption of the BEPS plan and national tax revenues. The reasons behind adopting this methodology are many and justifiable. First, variables such as corporate tax rates, GDP growth rates, and the state of BEPS implementation, among others, could be sourced from easy and accessible sources of high credibility, such as the Corporate Tax Haven Index, availably made public by the Tax Justice Network; OECD Library; and World Bank Database. Information is so easily accessible that replicating and verifying results becomes a snap. Hence, the OLS regression is simple and, therefore, apt for a preliminary mode of investigation into testing influences exerted by BEPS measures on tax revenues. This, in essence, reflects the proper relationship between BEPS implementation and changes in tax revenues. Third, given this panel structure of the data where, for each country, the observations are replicated over time - the fixed effect model should serve well in controlling for unaccounted heterogeneity across countries.

The one-way fixed effects model explicitly controls for unobservable country-specific attributes that are time-invariant - institutional, geographical, and cultural determinants, for example, finding their way to the current tax revenue potential for each country. Holding country effects constant, this model will pick up the effect of the time-varying explanatory variables - that is, the implementation of BEPS and changes in tax rates - on tax revenue. Another important advantage of this procedure is that the estimates can, by controlling for possible omitted variable bias - if unobserved time-invariant factors are correlated with any of the right-hand-side variables - be considered more valid. Fixed effects will yield more precise estimates since it confines itself to within-country variation over time, thus allowing this method to account for the invariant, unique characteristics of each country which might confound the analysis.

This is in line with the purpose of the analysis, looking at how different changes within countries, for instance, adopting BEPS or changing tax rates, affect tax revenues owing to country differences. This represents a full analytical setting that best captures the country-specific behavior of tax revenues while maintaining control over the very

particular, time-invariant characteristics of every nation that would otherwise mask this effect.

This preliminary hypothesis will therefore guide the inquiry in this study on how the BEPS plan influences the domestic revenues of these countries.

The positive coefficient that is associated with the dummy variable for the BEPS plan infers the implications that the execution of such a policy contributes positively toward the countries' tax revenues. It basically states that it increases the quantum of taxes collected for those countries, in comparison to the avoidance of profit shifting and base erosion with respect to taxing rights.

There are several reasons why this study has chosen dummy variables regression:

1. Handling Categorical Data.

   Dummy variables permit inclusion of categorical data into the regression equation which allows one to examine how policy changes and country classifications affect national tax revenues.

2. Comparative Analysis.

   Using the BEPS plan dummy variable shows what happens before and after the BEPS plan was adopted, thus, making it easier for one to understand its impacts.

3. Cross-Country Analysis.

   The country-category dummy variable is used in the model to incorporate the differences between tax havens and non-tax havens so that the analysis is robust across different countries.

4. Big Dataset.

   Regression analysis may perform well with big datasets, producing statistically significant results even with 6000 observations and data from 120 countries.

5. Clarity and Interpretability.

The regression's coefficients offer a clear picture of the magnitude and direction of the effects on national tax revenues of the BEPS implementation and tax haven status.

In summary, the methodology in this study involved collecting data from respected sources in addition to having well-structured data collection approaches with regression

analysis that employs dummy variables and fixed effects. This method will provide a better understanding of the effects of the BEPS plan on national tax revenues, also accounting for differences in taxation environment among countries.

CHAPTER 4. DATA

The datasets would, therefore, be from the 91 countries that took on the BEPS plan between 2012 to 2021. The panel data characteristics data requested utilization of fixed effect. We assemble data from individual countries in as much detail as possible so that we can achieve an excellent comprehension of the BEPS plan and its implications for tax revenues. All variables are statistically represented below:

The descriptive statistics for the utilized variables are gathered in Table 2 presented below.

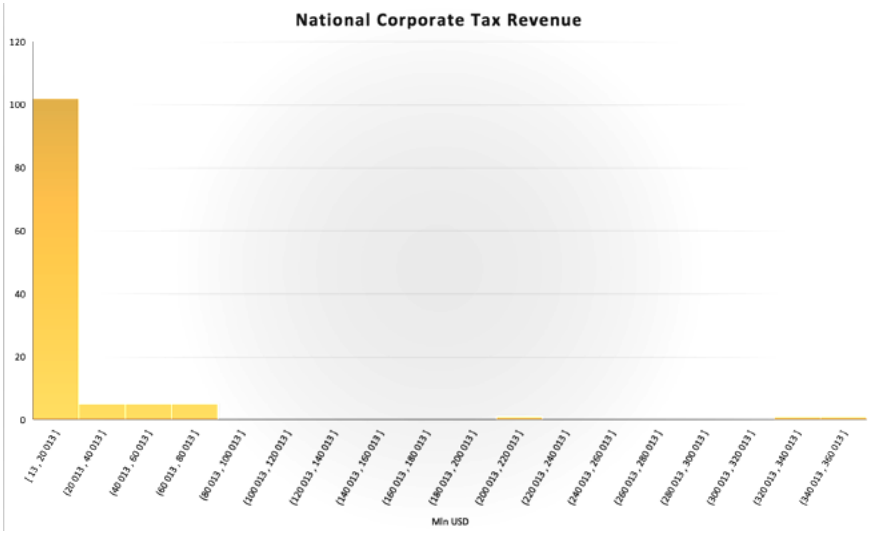
Table 2. Descriptive statistics for utilized variables

	NCTR	lnNCTR	CTR	GDPGR
N	910	910	910	910
Mean	23311.978	7.968	24.059	2.579
St. Err.	2332.625	0.076	0.223	0.153
St.Dev.	70366.452	2.3	6.737	4.6
Min	13.119	2.574	0	-32.909
Max	758862.34	13.54	44.433	37.687

One of the variables is the national corporate tax revenues. In this respect, it can be seen that the amount of taxes thus collected from the corporations of each country has been considered on a yearly basis. Thus, the effect of the implementation of the BEPS schemes can be measured based on how much the corporate revenues have resulted in a change due to the new regulatory tax environment.

The corporate tax revenue distribution chart shows the range and distribution of annual corporate tax revenues for the selected countries. It can be found in Figure 1.

Figure 1. Distribution of National Corporate Tax Revenue

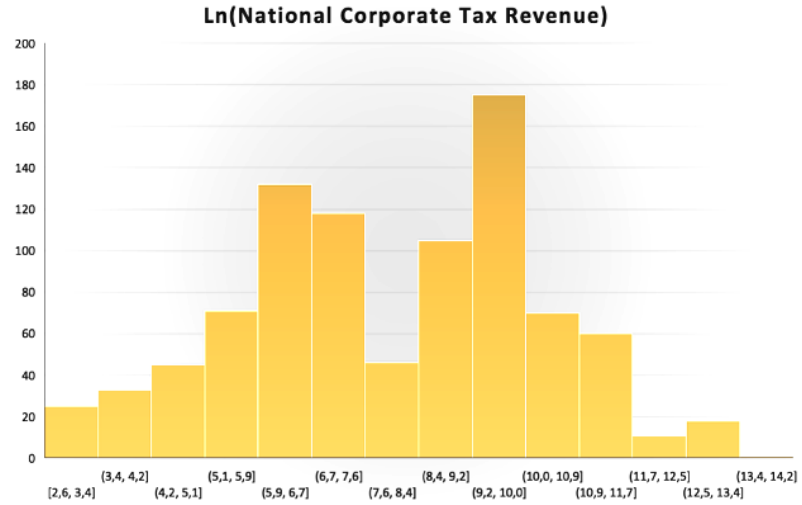


It can be seen on the chart that data has severe outliers. It demands to remove outliers from the dataset to obtain better results. This procedure was done using interquartile ranges. As a result, 4055 observations were left

The study uses a logarithmic transformation of the national corporate tax revenue variable. It is crucial to include a distribution chart for this variable too.

And distribution chart is presented in Figure 2.

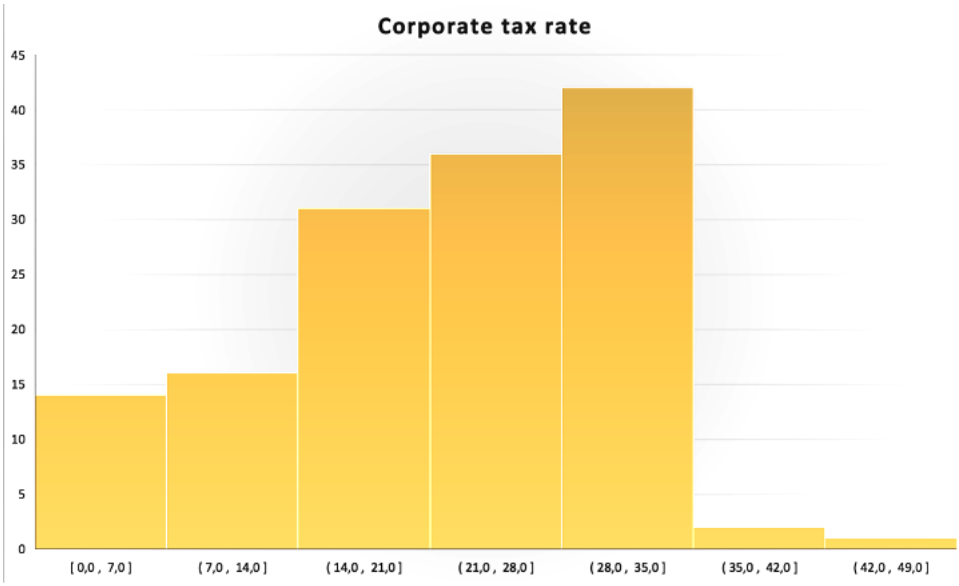
Figure 2. Distribution of Natural logarithm of national corporate tax revenue



Corporate tax rate data shows what percentage of profits corporations should pay to states. Different changes in Corporate tax rates among countries may affect MNCs on how they distribute income across different jurisdictions. We need to include corporate tax rates so that we can observe their separate effects on countries' taxes.

The corporate Tax Rate distribution chart depicts variations in corporate tax rates among the selected countries over the study period. It can be found in Figure 3.

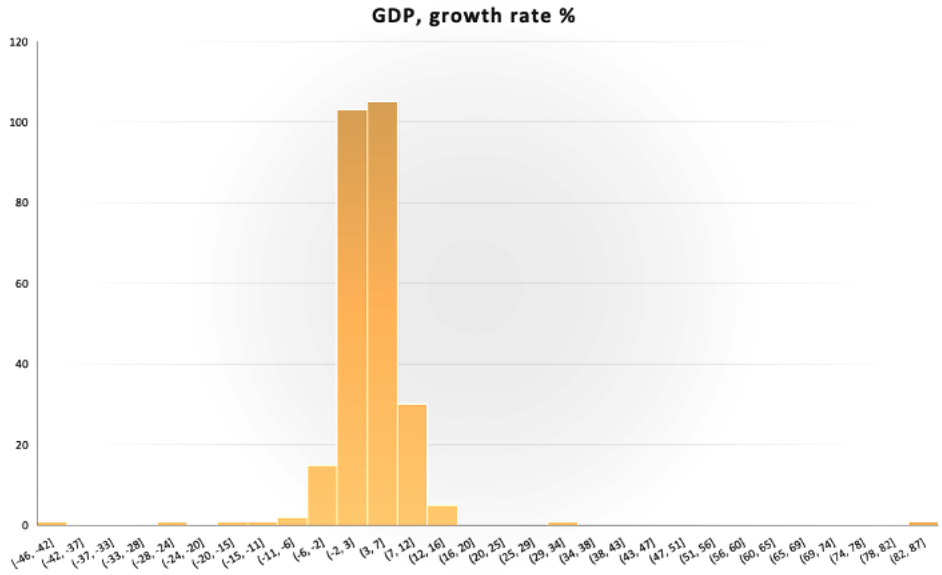
Figure 3. Distribution of Corporate Tax Rate



GDP annual growth rate is an economic performance measure that indicates how a country is doing. This represents the percentage change of annual GDP, which shows the total value of goods and services produced in a country. When the GDP growth rate is included, one can assess the broader economic implications of fiscal policy reforms on a national economy.

The GDP Growth Rate distribution chart shows the distribution of annual GDP growth rates for the countries in the dataset. It is shown in Figure 4.

Figure 4. Distribution of GDP growth rate



BEPS plan implementation dummy variable distinguishes between periods before and after the introduction of the BEPS initiative: by each country

Before BEPS implementation: Assigned 0.

After BEPS implementattions Assigned 1.

This variable helps evaluate the impact of BEPS measures on national tax revenues, indicating changes in tax dynamics following the implementation of BEPS guidelines.

The Tax haven status dummy variable categorizes countries based on their classification as tax havens or non-tax havens:

Tax haven: Assigned 1.

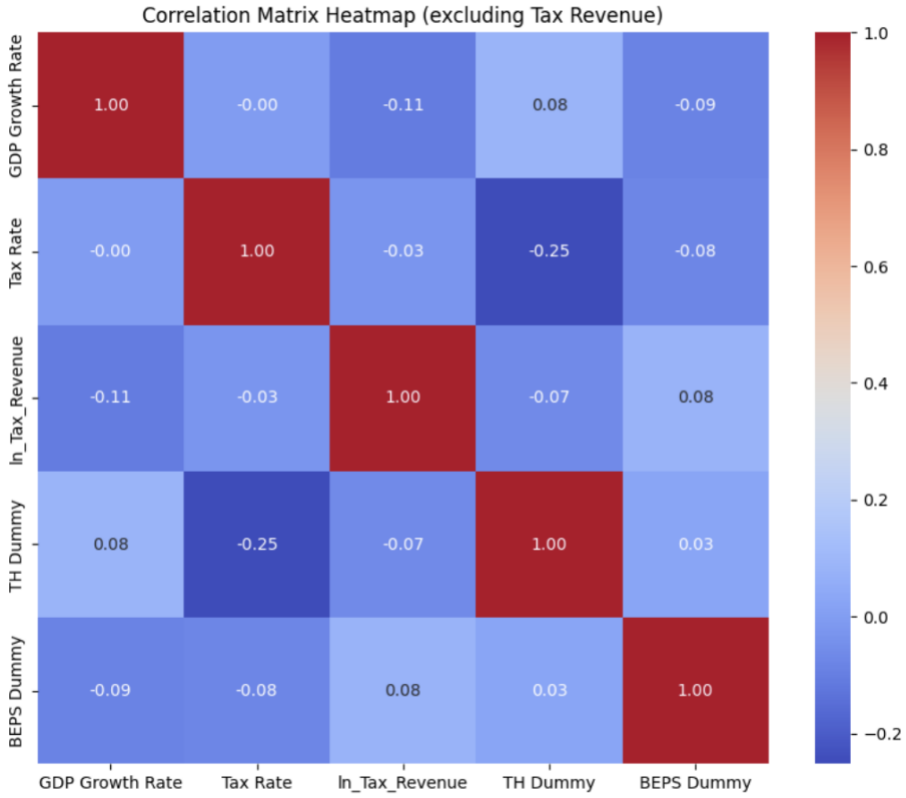
Non-Tax naven: Assigned 0.

This variable identifies jurisdictions known for their favorable tax regimes and facilitates the analysis of how BEPS implementation affects tax revenues differently across jurisdictions with varying tax policies and practices. In this research, 13 out of 91 countries are classified as tax havens according to the Tax Justice Network organization. However, this dummy cannot be used in our research as it is time-invariant for some countries. As it is decided to use a fixed effect model, such a variable cannot be used in analysis.

Given these variables, the dataset encompasses a total of 4,550 data points (part was removed as outliers and dummy for tax havens), calculated from the combination of 91 countries and the collection of annual data over 10 years (2012-2021). It provides for an analysis at the micro level of how measures to counter BEPS, tax policies, and national taxes are interrelated in different jurisdictions.

Figure 5 below is a correlation matrix depicting the relationship between variables selected for this study. A correlation coefficient in each cell in the matrix denotes the degree of relationship between any two variables. Varying from -1 to 1, when it is at 1, this turns out to be a perfect positive correlation. On the other hand, -1 will signal a perfect negative correlation, while 0 means no correlation. From this, it can be observed that all the variables share one level of moderate and low association since there is no variable highly related to the other. This is a highly desirable characteristic in regression since it suggests that the variables are providing varied and somewhat distinct information. It ensures the carried-out regression results are robust and valid and there are independent contributions by the variables, with little overlay from other variables.

Figure 5. Correlation matrix of the observed variables



The descriptive statistic table provides us with the total observations made, the mean, standard error, and standard deviation, in addition to both maximum and minimum values. All these statistics point in the direction of understanding the distribution and variance of the data and therefore set up the following regression analysis with relevant background for interpreting the results found.

The distribution charts provide visual insights into the variability and distribution of given variables critical to the study, setting the ground for regression analysis and interpretation of results.

The list of 91 countries chosen for the research as well as a list of tax haven countries are included in Appendix A.

CHAPTER 5. RESULTS

This chapter details the results of the analysis concerning the impact of the BEPS initiative on tax revenues accruing to domestic corporations. It assesses the relationship between the variables in the model and sheds light on the impact of implementing the BEPS measures in terms of tax revenue. These are discussed in the next subsections along with the implications for tax policy and economic performance.

Here are the coefficients with their respective significance levels for good model fit as specified above. All findings of this study emanate from a regression model, which has been developed integrating dummy variable for measurement of the effects arising out of BEPS implementation and fixed effects to account for individual country-specific characteristics. Table 3 hereby illustrates results derived from the regression analysis conducted on the dataset.

Table 3. OLS regression outcomes

	Coeficcient estimate (St.Error)	**P-value**
CTR	0.0047 (0.0027)	0.3545
GDPGR	0.0216 ()	<0.05
BEPSD	0.12 ()	<0.05
Observations **R square** **Residual standard error**	786 0.1304 0.6973	-
Note	-	Estimates are statistically significant, except CTR

The following section interprets the coefficient estimates and their magnitude in the regression model to describe how changes in independent variables relate to the changing national corporate tax revenues.

The estimated coefficient for the CTR variable is 0.0047, thus suggesting that, in the model of estimation, a rise of 1 unit in the corporate tax rate yields an increase of about 0.47% in the national corporate tax revenues. The magnitude of this suggests a low but important impact of CTR on the inflows of tax revenues. However, the very high p-value of 0.3545, far above 0.05, indicates this effect is statistically insignificant.

The coefficient of GDPGR is 0.0216. That is, the 1-unit or equivalently 1% increase in GDP growth is associated with a 2%-increase in tax revenues. Though statistically small, such a positive effect from economic growth on collections of taxes is not negligible in magnitude. This coefficient had a p-value close to 0, which is way below the threshold level set at 0.05. Thereby, an indication of association is assured between GDP growth and tax revenues.

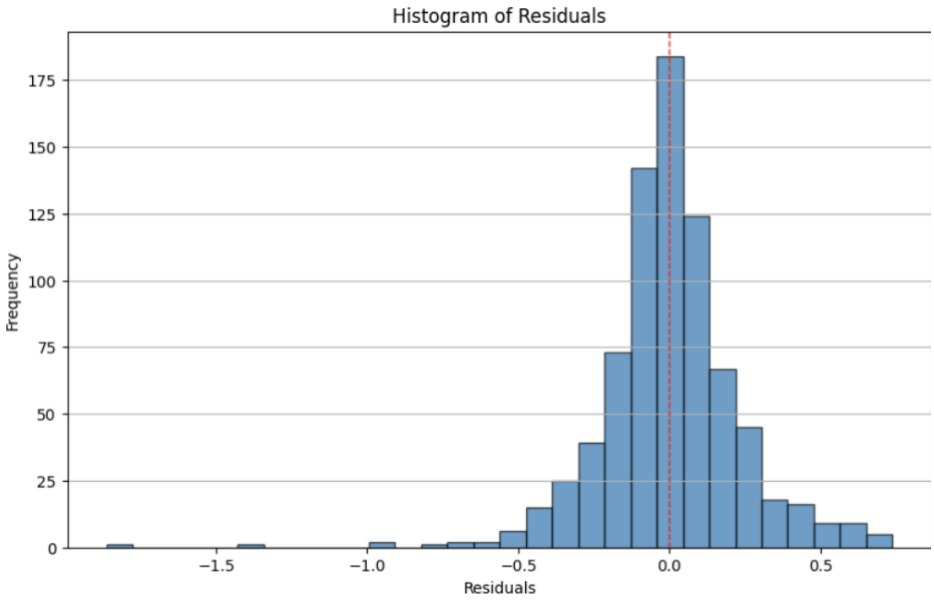
The coefficient of BEPSD is 0.1284, but the correct interpretation of the dummy variable in the model requires exponentiating the coefficient, then subtracting one, and lastly multiplying by 100: in other words, there is an increase of tax revenues of about 13.7% when BEPS plan implementation takes place, that is, when BEPSD changes from 0 to 1. The effect size, therefore, also evidences that countries have increased tax revenues because of the BEPS measures. This is further reinforced by an extremely small p-value close to 0, showing that the effect of the implementation of BEPS is not just large but also statistically significant.

Of particular encouragement was that the p-value for the BEPS dummy variable fell way below the 0.05 threshold, meaning the main variable in the research had statistical significance. Giving these relations a lot of robustness and reliability, such importance throws a lot of light on how the impact of the independent variables on national corporate tax revenues can be interpreted. Statistical significance will mean that the results from the research are valid because the result is a product of real effects, not random variability.

An R-squared value of 0.1304 is also from the model. This means that only 13.04% of the variance in national corporate tax revenues is explained by the independent variables from the model. This fact is a negative indicator for this research, however, not catastrophic. Average estimated residual standard error: the average absolute vertical distance between the actual values and the regression line, estimated to be 0.6973. Hence a better fit of the model would imply that.

In Figure 6, the histogram of residuals from the regression model is approximately normal. For OLS regression, normally distributed residuals are key to the validity of statistical tests to test coefficients for significance. In addition, the normality of residuals suggests that the model presented above is well-specified—no major issues of omitted variables or non-linearity. All this further instills confidence in the robustness of the results of the regression.

Figure 6. Regression residual histogram



Some interesting observations arise from the results of regression analysis that should be elaborated on. First, the impact of the rate of GDP growth would be non-linear on the tax revenue. In part, this occurs because the tax base expands with the economy; but in that process, aggregate economic activity spawns so much more taxable income that revenues rise disproportionately as a consequence.

Second, the results outline that the BEPS plan implementation has a great positive effect on states' tax revenues. In countries that had implemented the BEPS plan, national tax revenues rose on average by 13.7%. What this really means is that these BEPS measures were quite effective in reducing the scale of tax avoidance and raising tax revenues, especially in the countries that were most vulnerable to corporate tax abuse.

Results in this chapter suggest that the regression model is not fully significant in explaining, with econometric robustness, the multiplicative influence of corporate tax rates and GDP growth on national tax revenue. This usefulness of the model for policy purposes given the issues of corporate tax evasion and improvement of national revenue streams is further demonstrated by a statistically significant positive impact brought about by the implementation of the BEPS plan. The model does provide considerable insight into the determinants of national tax revenues, but at the same time, it points to the problems associated with this model as it explains only 13% of the variance.

While the current model deals adequately with research questions and adds value to the academic literature, simultaneously it grounds potentially promising research studies. In other words, further refining tax haven classification and including a couple of new ones might enhance the goodness-of-fit and relevance of the model much more. The current research results provide a basis for deepening understanding in relation to the interaction of tax policies and economic growth in impacting national tax revenues, which is an indication that future studies will be based on this area of public finance.

CHAPTER 6. CONCLUSIONS AND RECOMMENDATIONS

This research aimed to evaluate the impact of the OECD BEPS plan on the national tax revenue level through a regression model. The paper used data from different jurisdictions related to corporate tax rates, GDP growth rates, and implementation of the BEPS plan. The model was thus developed to explain the impacts of such variables on the revenues acquired from taxes, hence the concept gave an inclusive understanding of various factors affecting revenue acquisition. More precisely, the central focus was the impact brought about by the adoption of the BEPS program that was represented by the dummy variable.

One of the most crucial remarks is the substantial positive effect of implementing the BEPS plan on national tax revenues. Revenues increased by an average factor of 13.7% for countries that implemented the BEPS measures. This immense scale attests efficiency of the BEPS Plan in enhancing better and more assured collection of tax revenues while at the same time, lessening corporate tax avoidance. The positive coefficient associated with the BEPS Action Plan suggests that it has been successful in preventing tax avoidance and getting revenues, which in turn gives relevance to the structure and aims.

This is crucial research for understanding and appreciating the impact of the OECD BEPS project on world taxation systems and its long-term consequences. These findings, which will be related to the spillover effects of adopting BEPS Action items on domestic revenues, are important knowledge in understanding the other effects it will portend for companies and nations. Such knowledge is central to firms competing in this changed tax landscape and to policy-makers who commit themselves to better international tax policy outcomes.

For businesses, the BEPS Plan sets an extremely complex tax environment, where room for aggressive tax planning is considerably narrower. International businesses will have to reevaluate their tax strategies with regard to increased attention and higher tax liabilities. Companies should pay attention to improvements in their internal processes of tax compliance and become aware of the ongoing changes in international tax legislation.

For policymakers, the implementation of the BEPS Plan acted as a great indicator of their work in international tax reform. These programs need to be continued and further developed, especially the new BEPS 2.0 plan and its underpinning pillars. Remaining loopholes should be plugged in, and more work should be done to make the tax systems more transparent so that these benefits accrue over a longer period. With such positive results, there is evidence of the need for continuous commitment to make global tax practices perfect.

The approach developed in the current study will definitely be useful for future research which will study the impact of the OECD BEPS 2.0 project. This new framework comprises two pillars regarded as indispensable for dealing with the present problems of taxation. The first pillar refers to the reallocation of taxing rights to the countries where business is conducted, while the second introduces an ultimate minimum rate of tax worldwide to prevent base erosion and profit shifting. The regression methodology applied together with the analytical techniques developed within this study might give important insights regarding the effectiveness of these initiatives for practical implications to global tax frameworks and national income. Furthermore, detailed research on how different countries implement and adjust to BEPS 2.0 might uncover certain central contrasts in their responses and levels of effectiveness and further deepen the understanding of the changes in the international tax environment.

Further, country-based studies may provide insight into how those jurisdictions implement and put changes in BEPS 2.0 provisions into practice. Countries will put into operation differential measures with varying degrees of stringency based on respective economic conditions, taxation systems, and compliance abilities. Such work will be highly valued for the actual challenges and successes facing countries in implementing BEPS actions, with a focus on the granularity of implementation and consequential impacts on tax revenues.

In this regard, such a study on the implication of digitalization and advancement in technology in developing tax avoidance practices may even offer greater insight into the nature of contemporary international tax systems. It is therefore of interest to find out how

exactly digital tools and innovations impact tax behavior and compliance as companies increasingly leverage technology to perfect their tax affairs. Therefore, future research might seek to investigate how data analytics and machine learning are used both to identify and counteract tax avoidance practices.

In summary, this study indeed underlines the comprehensively positive impact of the BEPS plan on countries' tax revenues, while underlining its efficiency in a better means of collecting taxes and counterbalancing corporate tax avoidance. Such results confirm not only the efficiency of BEPS initiatives but also demonstrate the need for elaboration and strengthening of further international tax policy with respect to overcoming the emerging challenges. These results are very critical and will give a good baseline for further studies in this field for the policymakers with an interest in restructuring tax systems, as well as for enterprises that are trying to navigate through an ever-changing labyrinth of global taxation. This research can be useful for reference in strategic planning and further development of international tax policies.

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APPENDIX

LISTS OF COUNTRIES

List 1. List of nations chosen for the research

Antigua and Barbuda

Argentina

Armenia

Australia

Austria

Barbados

Belgium

Belize

Brazil

Bulgaria

Burkina Faso

Cabo Verde

Cameroon

Canada

Chile

China (People's Republic of)

Colombia

Congo

Costa Rica

Côte d'Ivoire

Croatia

Czechia

Democratic Republic of the Congo

Denmark

Dominican Republic

Egypt

Estonia

Eswatini

Finland

France

Gabon

Georgia

Germany

Greece

Honduras

Hong Kong, China

Hungary

Iceland

Indonesia

Ireland

Israel

Italy

Jamaica

Japan

Kazakhstan

Kenya

Korea

Latvia

Lithuania

Luxembourg

Malaysia

Maldives

Malta

Mauritania

Mauritius

Mexico

Mongolia

Morocco

Namibia

Netherlands

New Zealand

Nigeria

Norway

Panama

Papua New Guinea

Paraguay

Peru

Poland

Portugal

Samoa

Senegal

Seychelles

Sierra Leone

Singapore

Slovak Republic

Slovenia

South Africa

Spain

St Lucia

Sweden

Switzerland

Thailand

Togo

Trinidad and Tobago

Tunisia

Türkiye

Ukraine

United Kingdom

United States

Uruguay

Viet Nam

List 2. List of Tax Haven countries from Corporate Tax Haven Index

1. Costa Rica
2. Estonia
3. Hong Kong
4. Hungary
5. Ireland
6. Latvia
7. Luxembourg
8. Malta
9. Mauritius
10. Netherlands
11. Panama
12. Seychelles
13. Switzerland