

# Journal of Tax Reform

T. 8, № 2

2022

Vol. 8, no. 2

Научно-аналитический журнал

Выходит 3 раз в год

Основан в 2015 г.

Scientific and Analytical Journal

Three times a year

Founded in 2015

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Федеральное государственное автономное образовательное учреждение высшего образования «Уральский федеральный университет имени первого Президента России Б.Н. Ельцина» (620002, г. Екатеринбург, ул. Мира, 19)

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Издание зарегистрировано в Федеральной службе по надзору в сфере связи, информационных технологий и массовых коммуникаций (Роскомнадзор). Свидетельство о регистрации средства массовой информации ПИ № ФС77-61465 от 10.04.2015 г.

## Founder and publisher

Ural Federal University named after the first President of Russia B.N. Yeltsin (19 Mira St., 620002, Yekaterinburg, Russian Federation)

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The Journal publishes original empirical and review articles elucidating administrative-managerial and economic problems in tax reform, as well as those discussing issues related to historical tax reform and practices for countering tax evasion.

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T. 8, № 2

2022

Vol. 8, no. 2

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### Do the Effective Tax Incentives Reduce Tax Revenues? Investigating the Paradox of Corporate Income Tax in Serbia

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#### ABSTRACT

The aim of this paper is to examine the impact of tax incentives as determinants of economic development on revenues from corporate income tax in Serbia. The study uses data from secondary resources of the Ministry of Finance for the period 2007–2018 by employing regression and factor analysis. The research includes 10 tax incentives that were used in Serbia in the analyzed period. The methodology of empirical verification involves the implementation of correlation analysis, regression analysis and factor analysis. We opted for the application of Principal Component Analysis (PCA) because this method extracts the important data in order to present a set of new variables called main components. The model obtained in this way formed the determined components of tax incentives as independent variables. The model considers tax incentives grouped into four components. The results of empirical research indicate that there is a positive impact of certain tax incentives on revenues from corporate income tax and proved the paradox of tax collection initiated by tax incentives. The model proved that tax incentives explaining the first component had a positive effect on revenues from corporate income tax. Namely, the incentives for investments, incentives exempting the taxpayer from paying corporate income tax for work training, professional rehabilitation and employment of disabled persons, as well as a reduction based on the elimination of double taxation have a positive effect on revenues from corporate income tax. The positive impact of tax incentives can be explained by their effectiveness. The results show that tax incentives policy must be defined in detail for the purpose of achieving the economic and social goals.

#### KEYWORDS

corporate income tax, tax incentives, tax revenues, economic development, corporate income tax reform

JEL H21, H25, G30, G38

УДК 336.226.1

### Снижают ли эффективные налоговые льготы налоговые поступления? Исследование парадокса корпоративного подоходного налога в Сербии

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#### АННОТАЦИЯ

В статье рассматривается влияние налоговых льгот на доходы от корпоративного подоходного налога в Сербии. В исследовании используются регрессионный и факторный анализ вторичных данных Министерства финансов Сербии за период 2007–2018 гг. В исследование включены 10 налоговых льгот, которые действовали в Сербии в анализируемый период. Методология эмпирической

верификации включает корреляционный, регрессионный и факторный анализ. Метод главных компонент был выбран, чтобы представить набор новых переменных, так называемых основных компонент. Полученная таким образом модель позволила сформировать определяемые компоненты налоговых льгот как самостоятельные переменные. Модель рассматривает налоговые льготы, сгруппированные в четыре компонента. Результаты эмпирических исследований свидетельствуют о положительном влиянии некоторых налоговых льгот на поступления от корпоративного подоходного налога и демонстрируют парадокс роста собираемости налогов в ответ на введение налоговых льгот. Модель доказала, что налоговые льготы, объясняющие первый компонент, положительно влияют на доходы от корпоративного подоходного налога. Данный компонент включает в себя: льготы для инвестиций, льготы, освобождающие налогоплательщика от уплаты корпоративного подоходного налога за профессиональную подготовку, профессиональную реабилитацию и трудоустройство инвалидов, а также снижение налога на основе исключения двойного налогообложения. Положительное влияние налоговых льгот можно объяснить их эффективностью. Полученные результаты показывают, что политика налоговых льгот должна быть детально определена для достижения экономических и социальных целей.

#### **КЛЮЧЕВЫЕ СЛОВА**

корпоративный подоходный налог, налоговые льготы, налоговые поступления, экономическое развитие, реформа корпоративного подоходного налога

### **1. Introduction**

Contemporary literature particularly emphasizes two goals that justify the existence of corporate income tax – collecting tax revenues and stimulating economic growth [1, p. 77]. Although the structure of the tax system greatly affects economic growth, corporate income tax can be a significant element in achieving this goal.

Corporate income tax contributes to the realization of economic goals with its important element – special tax treatment of taxpayers. In other words, the best way to stimulate economic growth with corporate income tax is by acting on the productivity of factors of production [2]. On that basis, the purpose of introducing corporate income tax incentives into the tax system of a country is to increase the overall economic activities.

The policy of tax incentives includes government measures and instruments in order to encourage growth and development as well as international competitiveness [3, p. 34]. According to Đurović Todorović et al. [4], corporate income tax is expected to achieve the development goals of macroeconomic policy, such as: stimulating economic growth, mitigating regional and sectoral economic disparities, improving the environmental condi-

tions, and improving international competition. It is estimated that these goals can be achieved through tax incentives. This is supported by the fact that, in the last two decades, tax incentives have been used as a measure to build competitiveness in a large number of tax systems. Therefore, tax incentives can be defined as benefits aimed at modifying a taxpayer's business environment with the ultimate purpose of increasing their investments.

In that context, China's economy stands out. In China, tax incentives have contributed to the investment rate being extremely high and one of the main drivers for the economic development of certain parts of China [5]. One of the theoretical explanations for such an outcome is that tax incentives can make tax competition less harmful because there is less pressure on corporate income tax rates [6].

Although they can make a country's tax system more competitive, tax incentives cannot eliminate disadvantages in the design of the tax system or some of the infrastructures such as legal, financial, or institutional. "The efficiency of tax incentives is directly related to the investment climate" [7, p. 7]. If a country has an inadequate tax structure, a poorly functioning legal system, or a high

level of corruption, these disadvantages should be addressed instead of providing additional relief to investors.

The specificity of tax incentives as a tax norm is that they lead to a decrease in revenues from corporate income tax. Since the state waives part of the potential revenues, they are also found in the literature under the name "tax expenditures" or "tax expenses" [8]. That is why their structure is approached with great reserve.

The effects achieved by tax incentives are very difficult to measure. They also lead to high administrative costs. All these reasons initiated theoretical suggestions that a good tax policy is based on broadening the tax base, that is, with a few special tax treatments as possible.

However, having in mind the numerous dilemmas related to corporate income tax, the theoretical suggestions and views were "shaken" by the "paradox of collection" [9]. Although the increase in corporate income tax collection was explained by various arguments, where the most emphasized one was the impact of tax rates, the policy of tax incentives opened a new dilemma of their impact on the collection of revenue from corporate income tax. Bearing in mind that globalization has made this instrument even more important, as countries have become similar in terms of the conditions they can offer in terms of tax obligations, tax incentives have received new attention, not only in terms of their design but also in order to improve the consistency of profit taxation systems. Given that taxes are part of operating costs, and that new international tax rules provided by Base Erosion and Profit Shifting on the introduction of a minimum income tax rate are being considered around the world, tax incentives can be an effective fiscal policy instrument.

As the effectiveness of tax incentives can be affected by many factors, ranging from inefficient tax administration to complex laws and opinions that can further complicate their implementation and affect the attraction of foreign direct investment, the performances of tax incentives will be analyzed in detail. Although the view of some authors in the literature is

that more restrictive tax incentives reduce the possibilities for tax evasion and other distortive effects that they initiate, dilemmas related to them should be considered before reaching conclusions.

Serbia, as well as other countries in the world, faced a crisis caused by the Covid 19 pandemic. The health sector required unplanned and unexpected expenditures, which had to be provided by the public sector. The sharp economic downturn in the world has led to an automatic reduction in public revenues, an increase in the budget deficit and, consequently, to borrowing by almost all countries. Given that governments are drafting potential reforms, tax incentives can be a vital instrument to influence financial and investment activities.

The main purpose of the study is to analyze the corporate income tax incentives through: (1) theoretical foundations and the most influential studies about the effectiveness of the tax incentives; (2) empirical estimations of the impact of tax incentives on revenues from corporate income tax in Serbia; (3) formulation of recommendations for successful tax reform.

Therefore, the aim of this study is to estimate the impact of tax incentives on revenues from corporate income tax and to provide guidelines for the implementation of potential tax incentive reforms. Our assessment should solve the corporate income tax incentives - revenues puzzle. The results of the work should create a basis for considering this policy in other countries as well.

In order to fulfil the aim of the study, the following hypothesis is tested.

*H1.* Tax incentives can increase the revenues from corporate income tax.

The paper is structured as follows. After the introduction, the main trends and characteristics of tax incentives are elaborated, followed by the literature review of the most influential studies about the effectiveness of the tax incentives. After this part, the data and methodology are presented, followed by the discussion of the empirical results. In the last part of the paper, the main findings of the research are presented along with the recommendations for the policymakers.

## **2. Literature review: Are CIT incentives an effective instrument of fiscal policy?**

In recent years, in the context of globalization, corporate income tax has become one of the important instruments of tax policy of the countries in competition for foreign capital [10, p. 99]. Corporate income tax, through tax incentives, influences investment decisions and property structure decisions and is one of the key components of the tax system with a strong influence on company decisions.

Although the tendency of some countries is to simplify this form of taxation while reducing the gap between the effective tax rate and the standard tax rate in order to maintain income, tax incentives have not lost their significance capital [11]. While some modern tax systems claim tax neutrality, some countries use the mechanism of tax incentives as a powerful tool for developing fiscal policy, but also as a tool for achieving economic and social goals. Many countries use tax incentives as one of the tax regulation tools and offer various forms of tax relief in order to attract foreign investors and stimulate economic growth. Given that there is a discrepancy in the opinions of theorists, the following is an overview of the literature where authors' views are supported by empirical evidence.

Before considering the literature, it is important to note that, despite the differences in attitudes, there is a consensus of researchers in this field. Their common position is that ineffective tax incentives can have a significant negative impact on budgetary revenues, especially in countries with medium or low national income. This can have even greater repercussions if tax policymakers notice that investors go to neighboring countries in the region driven by tax incentives. Then tax policymakers, guided by the competition policy, introduce additional tax incentives, as an ineffective instrument. For this reason, it is important to structure them with precision and with an evaluation of their effectiveness.

Renowned economist Michael P. Devereux, who has been dedicated to re-

searching corporate income taxes since 1998, has addressed the factors influencing a company's decision to invest in a competitive market. He was among the first economists to differentiate the effective rate as a significant factor in the implementation of investment decisions and began an analysis of the role of the effective tax rate which, in his opinion, has a significant effect on site selection capital [12]. In later papers, this economist points to a paradox that arises due to lower tax rates caused by tax breaks and increased tax revenues, and thus further emphasizes the importance of tax incentives. His theoretical views were followed by most theorists who had studied this phenomenon, as well as the methods of calculating the effective tax rate that Devereux and his associates had defined.

On the other hand, the views of the critics of such a policy also emerged. Given the empirical evidence present in some countries, the EU recommended the approximation of corporate income tax rates among its members by introducing a lower limit to reduce tax incentives [13, p. 133]. In other words, the EU expressed the tendency to increase the harmonization of tax systems and to achieve a more neutral tax system within the Union.

However, a discussion on the complete abolition of tax incentives has not yet opened, and members continue to apply this instrument with varying intensity. It is considered that their serious disadvantage is the fact that there are large losses of revenues from corporate income tax without creating benefits for the host country. However, these costs can be reduced if funds are found to encourage certain desired activities that would not be realized without incentives [14]. This means that incentives should be precisely linked to goals such as job creation, research and development, etc.

Opponents of tax incentives, who believe they can be effective in achieving fiscal, economic, and social goals, came to different conclusions. Investigating tax incentives in the area of corporate income tax, Zee et al. [15] concluded that the

justification for tax incentives should be limited to eliminating market failures, and those tax forms that lead to faster recovery from investment costs should be a priority in tax policymaking. Many countries in the world offer various incentives in the hope that they will attract investors and stimulate economic growth. However, there is evidence that calls into question the effectiveness of certain corporate income tax incentives, which suggests that they should be approved with great precaution. There are claims that tax incentives distort investment decisions and may be ineffective, as well as contribute to increasing levels of corruption in a country. Also, driven by tax competition, fearing that investors might choose neighboring countries with more favorable conditions, governments apply either tax incentives or lower tax rates.

However, ineffective tax incentives cannot compensate for the unfavorable business environment and can actually reduce government revenues in a destructive "race to the bottom" [16]. That is also proved in the regional tax competition example. The main drawbacks of the consolidated tax regime introduced in Russia in 2012, were increased losses in tax revenues caused by regional tax competition [17].

Kovač [18] pointed out that the effectiveness of tax incentives in attracting foreign direct investment comes only after creating a favorable investment climate, and according to this author, tax incentives are not considered a cost-effective instrument until this climate is established.

In the work by Ivanov et al. [19], the authors pointed out that the investment activity of a company largely depends on the life cycle of that legal entity and the sector in which it operates. Therefore, the impact of tax incentives depends on many variables. In addition, the results of the research conducted by these scientists showed that it is necessary to reform tax incentives in the Russian tax system. The researchers argued that the domestic practice of tax incentives does not meet the interest of Russia and it is not with the declared principles of economic development. Authors conclude that the policy of

tax incentives must be a "targeted" tool and not a unified approach.

On the other hand, many OECD member countries often use corporate income tax breaks to encourage investment. Many capital expenditure incentives increase the present value of depreciation and reduce the cost of capital, which ultimately provides a greater incentive to invest. The authors of [20] confirmed that the effects of the depreciation tax incentives are very substantial, especially for investment in structures. Authors of [21] concluded that a decrease in the tax rate increases manufacturing gross investment. Summers [22] presented the analysis of the influence of tax policy on capital accumulation and investment. The author analyzed the investment and distributional effects of tax incentives and concluded that through an adequate combination of tax policies it is possible to spur investment. The authors of [23] take into account the actual US tax system and estimate a simple linear investment function. They point out that the optimal rate of investment is a function of corporate tax rate and depreciation allowances.

There are examples of positive effects of tax incentives in the United States when the use of tax incentives after the financial crisis (Bonus depreciation deduction) was approved, in the post-crisis periods 2002-2004 and 2008-2017 [24, p. 361].

Azhar & Sharif [25] analyzed tax incentives and concluded that developing countries that used various tax incentives to attract resources benefited greatly from them. In Pakistan, during the period from 1959 to 1972, a tax relief scheme (introduced in Pakistan in April 1959) was used to increase the overall level of investment in the industrial sector and encourage industry in the less developed regions of the country.

Governments in developing countries typically adopt tax breaks to encourage investment and investigate tax incentives provided by corporate income taxes [26]. Therefore, investment promotion is an important goal of tax policy in both developing and industrialized countries.

Shah [27] concluded that governments are active in this matter, but little informa-

tion is available to policymakers in developing countries on how effective these measures are in achieving their goals.

Most researchers view tax incentives as an effective tool for developing the economy of some regions, sectors or specific industries of the country. Đurović Todorović et al. [28] pointed out the effects of tax incentives on the regional development of Serbia. They examined state aid provided by tax incentives, subsidies and soft loans. The results of their research showed a strong positive correlation between the gross domestic product and tax incentives, as well as the fact that they have a positive effect on unemployment.

Holland & Vann [29] proved that developing countries and countries in transition introduce incentives for various reasons. In some cases, incentives aim to compensate for disadvantages that investors may face, such as a lack of infrastructure, complex and outdated laws, or poor tax administration.

The effectiveness of using tax incentives varies in different business sectors and regions, and it is advisable to evaluate the effectiveness of the tools of sector or region based and target specific tax incentives [30].

The use of tax incentives is widespread, although the available empirical evidence on the effectiveness of such incentives is very inconclusive. Accordingly, one should not jump to conclusions about their effectiveness. There is no unified system for evaluating their effectiveness. One of the indicators that can be used in the analysis of the effectiveness of tax incentives is the tax revenue from taxpayers who benefit from tax incentives [31, p. 173]. If tax revenues show a tendency to grow, and the state achieves higher tax collection with tax incentives, then we can talk about their effectiveness.

There are many theorists who have examined the effects of tax incentives on achieving the economic goals of the state. The authors of [32] investigated how effective are tax incentives in attracting investment as one of the main economic goals of the state. Their study analyzed the dataset of over 40 Latin American,

Caribbean, and African countries for the period 1985–2004. The authors conclude the boosting effects of tax holidays in attracting investments.

Gordon & Li [33] pointed out the positive effects of tax incentives on local government activities in China. Bearing in mind that China has a federal system of government, the effects of tax incentives on the local level are crucial for the economic goals of China.

The research of [34] documented facts about the influence of tax incentives on economic activities. The authors noted that changes in tax incentives affect economic activities. The main contribution of this paper is the detected relationship between corporate tax incentives and economic activity across all U.S. countries.

Mauda & Saidu [35] confirmed the economic effects of tax incentives on listed companies in Nigeria. The authors noted that tax incentives can be useful to control and enhance economic activities in one country. According to them, governments should use fiscal policy and tax incentives whenever wants to trigger and increase economic activities [35, p. 22].

However, very few authors have examined their impact on tax revenues. Given that it is logical that tax incentives negatively affect the movement of corporate income tax revenues, a different conclusion would indicate a paradox. Tax incentives reduce revenues to the budget, and according to official statistics of the Russian Federal Tax Service, tax incentives in 2016 resulted in reduced revenues to the budget in the amount of almost 2 bln. rubles [30, p. 159].

The functionality of fiscal policies and their fundamental role in balancing are especially emphasized today, in the period of the current crises. And again, in academic circles that are considering solutions for economic recovery, the dilemmas of corporate income tax are opening up. One of them is related to the effectiveness of tax incentives. Tax incentives have great importance for ensuring the growth and productiveness of the economy because socio-economic development and modernization of the

subjects directly depend on effective tax regulation tools [30, p. 160].

Daniela et al. [36] point to important aspects of fiscal policy regarding the protection and development of the business environment. The wrong kind of fiscal policy can have a major impact on the economic growth and development of countries.

Stoilova & Patanov [37] had similar conclusions, pointing to the importance of fiscal policy in stimulating economic growth in Bulgaria.

To examine the effectiveness of corporate income tax incentives, and to provide a framework for potential reforms, we analyzed the impact of this macroeconomic instrument on corporate income tax revenue trends. Given that empirical analyzes do not provide a clear relationship between these two variables due to data that are non-transparent and problems that arise in relation to measuring the tax base [38], our assessment should create a picture of their effectiveness and solving the corporate income tax incentives – revenues puzzle.

### 3. Methods

The analysis of tax incentives in Serbia looks at tax incentives in the field of corporate income tax, which are of great importance for tax expenditures. The analysis was performed using secondary data obtained by the Tax Administration of the Ministry of Finance of Serbia. The research on the effective burden is based on the data from the records of the Tax Administration stated in the corporate income tax return form (PDP Form). Since the data on the types and amounts of tax incentives that are stated in the tax returns for the advance-final determination of corporate income tax are not transparent, their identification is of great importance for the analysis.

The empirical research also used relevant secondary data collected by accessing reports on the websites of the Statistical Office of Serbia<sup>1</sup> and the Ministry of Finance of Serbia<sup>2</sup>. Therefore, they represent second-

dary data that are valid, reliable, homogeneous, current and impartial.

The research includes tax incentives listed in Table 1, for which the Tax Administration of Serbia submitted quantitative data on the total amounts of tax incentives that were used in Serbia in the analyzed period from 2007-to 2018. These indicators will represent independent variables in the research and will be expressed in millions of dinars.

It is important to note that the research also includes tax incentives that were deleted from the Law on Corporate Income Tax<sup>3</sup>, but were available to taxpayers in accordance with the permitted period of use of these tax incentives. Bearing in mind that some of the tax incentives had a legally determined transferability, i.e., a legally deferred application, the analysis also includes tax incentives that are no longer provided by law.

The dependent variable will be the revenue from corporate income tax expressed in millions of dinars (CIT). Given that the sample in the Table 1 consists of 10 tax incentives, and that the analysis is performed over a period of 12 years (2007-2018), the analysis of the impact of tax incentives on CIT will be based on the analysis of several variables using the appropriate econometric tests and methods.

We opted for the application of Principal Component Analysis (PCA) because this method extracts the important data in order to present a set of new variables called main components<sup>4</sup>. Namely, since there is multicorrelation among predictors, instead of using individual predictors obtained by regression analysis, we will reduce the dimensionality through Factor analysis to draw conclusions. The task of Factor analysis is to describe the variance of variables that are observed using several factors, i.e., random variables, and which are grouped according to their correlations.

<sup>3</sup> Available at: <https://www.purs.gov.rs/sr/pravna-lica/pregled-propisa/zakoni/307/zakon-o-porezu-na-dobit-pravnih-lica.html>

<sup>4</sup> Available at: [https://knowledge4policy.ec.europa.eu/sites/default/files/jrc-competence-centre-composite-indicators\\_en\\_0.pdf](https://knowledge4policy.ec.europa.eu/sites/default/files/jrc-competence-centre-composite-indicators_en_0.pdf)

<sup>1</sup> Available at: <https://www.stat.gov.rs>

<sup>2</sup> Available at: <https://www.mfin.gov.rs>

Table 1

## Overview of independent variables

No.	Variable	Description	Symbol
1.	Article 45	Tax exemption in case of concession investment from payment of income tax on the income from the subject of concession	a45
2.	Article 46	Tax exemption of legal entities for vocational training, vocational rehabilitation and employment of disabled persons	a46
3.	Article 47	Amount of deduction for profits made in a newly established business unit in underdeveloped areas	a47
4.	Article 48	Reduction of accrued income tax on taxpayers who make investments in fixed assets owned by them	a48
5.	Article 48a	Reduction of the calculated tax on the realized profit of a taxpayer who makes investments in fixed assets in their own property mainly performing one of the activities mentioned in Article 48a	a48a
6.	Article 50a	Tax exemption for investing in fixed assets in the amount of more than 600/800 million or one billion dinars and additional permanent employment of at least 100 persons	a50a
7.	Article 51	Deduction of tax on the amount of income tax paid by operating in another country	a51
8.	Article 52	Deduction of income tax paid by a non-resident branch in another country on dividend income and withholding tax on dividends paid	a52
9.	Article 50b	Tax Exemption for Profits Made by a Taxpayer Engaged in an Underdeveloped Area	a50b
10.	Article 53a	Reduction of accrued tax by the amount of withholding tax paid by its non-resident branch in another country on interest, royalties, fees on the lease of real estate and movable property, and dividends that do not qualify for the application of Article 52.	a53a

Source: Prepared by the authors

Data: Ministry of Finance of the Republic of Serbia-Tax Administration

In this way, groups and variables will be obtained in groups that will be strongly correlated with each other, but weakly correlated with variables from other groups. Each of the obtained factors will represent a unique factor that affects a certain group.

On the example of tax incentives, this method was applied in order to transform the initial set of predictors, all tax incentives, into a new set. In that way, it is possible to reduce the dimensionality, which is achieved by reducing it to several predictors. Interpretability is also enabled, due to the limitation created by the application of this statistical tool.

This method made it possible to transform the initial tax incentives into a set of uncorrelated components. Based on the results, when the dimensionality was reduced, linear regression was performed, and significant predictors were

determined. In this way, an orthonomic database was determined in a large area of collected data. Accordingly, predictors which best explain the variability of corporate income tax revenues were identified.

The research has to be viewed with a certain reserve, since the analysis did not take into account other factors which could imply different findings. Hypothesis testing should contribute to a better understanding of the structure of tax incentives and provide a basis for tax policy reform in the area of corporate income tax.

Although tax systems around the world are constantly being reformed, it should be borne in mind that changes in the tax system and the basic elements of taxation take place in an environment interwoven with numerous contradictions. In a globalizing economy, in which a number of paradoxes are being considered, the

direction and priorities of corporate income tax reform should be based on analyses of its key elements.

The methodology of empirical verification involves conducting the following analyzes:

1. Correlation analysis, which will determine the relationship and strength of the relationship between tax incentives and corporate income tax revenues. In this way, the connection between the independent and dependent variables will be determined, but also the relations between the independent variables themselves.

2. Regression analysis, which will provide a model with the most correlated indicators, but which will not include all tax incentives as indicators of corporate income tax revenues.

3. Factor analysis, which will include all tax incentives and group them into factors. The grouping will be based on correlation analysis, where each obtained factor will be conceived from the indicators that have the strongest connection with that factor. Finally, by assigning a weight, the

factor load matrix will explain the overall model variance. The model obtained in this way will form the determined components of tax incentives as independent variables.

## 4. Results

### 4.1. Correlation analysis

Correlation analysis was performed using Pearson’s correlation coefficient. The results of the correlation analysis, which describe the relationship between tax incentives and CIT are shown in Table 2.

Pearson’s correlation coefficient indicates that there is a strong positive statistically significant correlation at the significance level of 5% between the tax incentives defined in Article 46 ( $r = 0.821, p < 0.05$ ), Article 50a ( $r = 0.847, p < 0.05$ ), Article 51 ( $r = 0.647, p < 0.05$ ) and Article 53a ( $r = 0.829, p < 0.05$ ) and CIT.

The results of the Pearson coefficient show that there is a strong negative statistically significant correlation between the tax incentive defined in Article 48 ( $r = -0.650, p < 0.05$ ) and CIT at the significance level of 5%. Other tax incentives did

Table 2

Matrix of Correlation with CIT

	a45	a46	a47	a48	a48a	a50a	a51	a52	a50b	a53a	CIT
a45	1	0.016 (0.960)	-0.194 (0.545)	-0.573 (0.052)	-0.251 (0.431)	-0.008 (0.981)	-0.013 (0.967)	0.242 (0.448)	-0.182 (0.572)	0.292 (0.358)	0.252 (0.429)
a46		1	-0.232 (0.468)	-0.366 (0.243)	0.461 (0.131)	0.920 (0.000)	0.563 (0.057)	0.354 (0.259)	-0.140 (0.665)	0.769 (0.003)	0.821 (0.001)
a47			1	0.124 (0.702)	-0.127 (0.695)	-0.177 (0.581)	-0.147 (0.648)	-0.414 (0.181)	-0.131 (0.685)	-0.412 (0.183)	-0.403 (0.194)
a48				1	0.371 (0.235)	-0.359 (0.252)	-0.236 (0.460)	0.034 (0.915)	0.256 (0.423)	-0.380 (0.223)	-0.650 (0.022)
a48a					1	0.482 (0.113)	0.560 (0.059)	0.658 (0.020)	0.299 (0.345)	0.483 (0.112)	0.209 (0.515)
a50a						1	0.708 (0.010)	0.528 (0.078)	0.024 (0.940)	0.876 (0.000)	0.847 (0.001)
a51							1	0.536 (0.072)	0.595 (0.041)	0.646 (0.023)	0.647 (0.023)
a52								1	0.215 (0.501)	0.713 (0.009)	0.369 (0.238)
a50b									1	0.139 (0.666)	0.002 (0.996)
a53a										1	0.829 (0.001)
CIT											1

Note: *p* values in ( )

not show a statistically significant degree of agreement with the dependent variable.

The results of Pearson's coefficient showed that significant levels of agreement can be distinguished among tax incentives. Therefore, the results of the analysis indicate that there is an intercorrelation between the predictors, and that it is not desirable to use individual predictors to examine the relationship between them. In other words, there is a multicorrelation between the predictors.

#### 4.2. Regression analysis

The study of the relationship between tax incentives and CIT will first be conducted on the basis of multiple regression, which is a technique of researching the relationship between independent variables and the dependent variable. Since the basis of regression analysis is a correlation, based on the determined degree of agreement between the analyzed variables, a model of regression analysis was created. Based on the regression, it is possible to investigate the interrelationships of the whole set of predictors in a more sophisticated way.

After all independent variables were entered and the appropriate type of multi-

ple regression analysis was used to detect statistically significant variables, a regression model was obtained. The results of the estimated regression model show that the obtained model explained 94.9% of the variance of the dependent variable.

The obtained regression model as a whole has a statistically significant predictive power (Sig. = 0.001). Based on the determined statistical significance of the model, the results of the regression analysis are shown in Table 4.

The results of the estimated regression model show that the tax incentives determined by Articles 47, 51, 52, 50b, and 53a of the Law on Corporate Income Tax are statistically significant to explain changes in CIT. The significance level obtained with this model is 1% ( $p = 0.001$ ).

The results of the regression model show a negative statistically significant relationship between the tax incentive defined in Article 47 of the Law on Corporate Income Tax (a47) and CIT. Namely, if the amount of incentives used by taxpayers pursuant to Article 47 of the Law on Corporate Income Tax increases by one million dinars, CIT will decrease by 305.34 million dinars, *ceteris paribus* ( $p < 0.05$ ).

Table 3

The predictive power of the model

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
	0.974	0.949	0.907	8968.01480

Dependent Variable: CIT

Predictors: (Constant), a47, a51, a52, a50b, a53a

Table 4

Estimated regression coefficients

Variables B	Unstandardized Coefficients		Standardized Coefficients	t	Sig.
	Std. Error	Beta			
1 (Constant)	44101.827	5976.758		7.379	0.000
a47	-0.00030534526595	0.00	-0.287	-2.646	0.038
a51	0.00037298688617	0.00	0.696	4.067	0.007
a52	-0.00003160422690	0.00	-0.527	-3.871	0.008
a50b	-0.00023503935836	0.00	-0.434	-3.343	0.016
a53a	0.00025534343653	0.00	0.697	4.139	0.006

Dependent Variable: CIT

Predictors: (Constant), a47, a51, a52, a50b, a53a

The results of the regression model show a positive statistically significant relationship between the tax incentive defined in Article 51 of the Law on Corporate Income Tax (a51) and CIT. Namely, if the amount of incentives used by taxpayers pursuant to Article 51 of the Law on Corporate Income Tax increases by one million dinars, CIT will increase by 372.98 million dinars, *ceteris paribus* ( $p < 0.05$ ).

The results of the regression model show a negative statistically significant relationship between the tax incentive defined in Article 52 of the Law on Corporate Income Tax (a52) and CIT. Namely, if the amount of incentives used by taxpayers pursuant to Article 52 of the Law on Corporate Income Tax increases by one million dinars, CIT will decrease by 31.60 million dinars, *ceteris paribus* ( $p < 0.05$ ).

The results of the regression model show a negative statistically significant relationship between the tax incentive defined in Article 50b of the Law on Corporate Income Tax (a50b) and CIT. Namely, if the amount of incentives used by taxpayers pursuant to Article 50b of the Law on Corporate Income Tax increases by one million dinars, CIT will decrease by 235.03 million dinars, *ceteris paribus* ( $p < 0.05$ ).

The results of the regression model show a positive statistically significant relationship between the tax incentive defined in Article 53a of the Law on Corporate Income Tax (a53a) and CIT. Namely, if the amount of incentives used by taxpayers pursuant to Article 53a of the Law on Corporate Income Tax increases by one million dinars CIT will increase by 255.34 million dinars, *ceteris paribus* ( $p < 0.05$ ).

Therefore, based on the results, a regression equation can be created where the variables are expressed in millions, as follows:

$$\begin{aligned} \text{CIT} = & 44101.827 - 305.34 \cdot a47 + \\ & + 372.86 \cdot a51 - 31.60 \cdot a52 - \\ & - 235.03 \cdot a50b + 255.34 \cdot a53a + \varepsilon. \end{aligned} \quad (1)$$

The conducted analysis points to further empirical tests, before reaching final conclusions about the analyzed predic-

tors. Therefore, it is necessary to conduct an appropriate analysis in which all independent predictors will be included. Further implications of independent predictors are represented by factor analysis.

### 4.3. PCA analysis

The analysis standardized the range of continuous initial variables, i.e., all tax incentives in the period from 2007-to 2018, in order to conduct further statistics. Then, the described statistical technique was performed – an analysis of the main components (Table 5). The standard approach for PCA involves data analysis based on a data set. The analysis determines the linear combination of components with maximum variance. The values of the variables obtained by the analysis of the principal components are called the result factor and can be geometrically interpreted as projections of the observations about the principal components [39].

The results shown in the Table 5 give the resulting factor (F1, F2, F3, F4) and indicate a poor arrangement of the source variables. Namely, there is no dominant source variable that would explain the last factor F4. A large number of variables belonged to the first factor, while no variables belonged to the fourth factor. In order to achieve the result of this method, in which each variable reads a high value of one factor, while its values for other factors are negligible, it is necessary to rotate to a simpler structure than the obtained one.

Since the factor model has several representations with the same statistical properties, in order to obtain a matrix of factor loads that will simplify the interpretation of the analyzed factors, factor rotation was performed. Orthogonal factor rotation implies that the coordinate axes remain uncorrelated. The motive of rotation has often been compared in the literature with the motive of a scientist who sharpens his focus under a microscope in order to see the object of observation more precisely and better. After the factor rotation, the load matrix shown in the Table 6 was obtained. The PCA took a large set of data and identified a new optimal basis for re-expressing the data. Thus, the values of the compo-

nents obtained by decomposing the individual value are presented as follows.

The results show that each of the factors is now explained by defined variables. The first factor is explained by the tax incentives defined in Article 50a ( $r = 0.973$ ), Article 46 ( $r = 0.949$ ) and Article 53a ( $r = 0.798$ ). The second factor is explained by the tax incentives defined in Article 48 ( $r = 0.885$ ), Article 45 ( $r = -0.775$ ) and Article 48a ( $r = 0.758$ ). The third factor is explained by the tax incentives defined in Article 47 ( $r = -0.782$ ) and Article 52 ( $r = 0.758$ ). The fourth factor is explained by the tax incentives defined in Article 50b ( $r = 0.957$ ) and Article 51 ( $r = 0.705$ ).

Below is a table indicating the percentage of explanations. The results in Table 7 show the explained variance obtained by the principal components method.

The first factor explains 35,330% of the variance of the dependent variable. The second factor explains 18,659% of the variance of the dependent variable. The third factor explains 17,685% of the variance of the dependent variable. The fourth factor explains 15,766% of the variance of the dependent variable. In total, the model explained 87,440% of the variance of the dependent variable. Therefore, the matrix of factor coefficients can be represented as follows (Table 8).

Table 5

	Component Matrix			
	Component			
	F1	F2	F3	F4
a53a	0.938	-0.187	-0.047	-0.054
a50a	0.905	-0.116	0.366	0.034
a51	0.818	0.226	-0.027	0.480
a46	0.817	-0.206	0.451	-0.092
a52	0.758	0.161	-0.369	-0.307
a48a	0.655	0.586	0.079	-0.261
a48	-0.289	0.843	-0.019	-0.364
a45	0.144	-0.708	-0.513	0.025
a50b	0.249	0.608	-0.444	0.575
a47	-0.401	0.120	0.568	0.367

Extraction Method: PCA  
4 components extracted

Table 6

	Rotated Component Matrix			
	Component			
	F1	F2	F3	F4
a50a	0.973	-0.041	0.115	0.086
a46	0.949	-0.042	0.087	-0.108
a53a	0.798	-0.184	0.472	0.163
a48	-0.367	0.885	0.080	0.058
a45	-0.050	-0.775	0.422	-0.071
a48a	0.521	0.617	0.365	0.246
a47	-0.062	0.128	-0.782	-0.019
a52	0.433	0.137	0.758	0.220
a50b	-0.077	0.167	0.097	0.957
a51	0.665	-0.029	0.105	0.705

Extraction Method: PCA  
Rotation converged in 6 iterations.

Table 7

Component	Total Variance Explained					
	Extraction Sums of Squared Loadings			Rotation Sums of Squared Loadings		
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	4.366	43.662	43.662	3.533	35.330	35.330
2	2.108	21.076	64.737	1.866	18.659	53.988
3	1.267	12.667	77.404	1.769	17.685	71.674
4	1.004	10.036	87.440	1.577	15.766	87.440
5	0.712	7.124	94.564			
6	0.231	2.309	96.873			
7	0.201	2.014	98.887			
8	0.091	0.912	99.799			
9	0.017	0.174	99.973			
10	0.003	0.027	100.000			

Extraction Method: PCA

Table 8  
Component Score Coefficient matrix

	Component			
	F1	F2	F3	F4
a45	-0.136	-0.417	0.292	0.030
a46	0.351	0.045	-0.120	-0.201
a47	0.149	0.031	-0.562	0.088
a48	-0.120	0.492	0.178	-0.088
a48a	0.120	0.360	0.161	-0.039
a50a	0.331	0.012	-0.134	-0.057
a51	0.145	-0.111	-0.170	0.462
a52	-0.015	0.103	0.450	-0.020
a50b	-0.154	-0.079	-0.047	0.711
a53a	0.174	-0.073	0.150	-0.004

Extraction Method: PCA

Based on the coefficient matrix, we see that Articles 46 and 50a have the largest contribution in the first factor, while the contribution of Article 53a is smaller. For the second factor there is a uniform influence of all members. When it comes to the third factor, there is also a uniform influence of all members in its explanation. In the fourth factor, there is a greater contribution of Article 50b compared to Article 51.

After identifying the predictors, the analysis of their impact on the dependent variable can be performed. The relation-

ship between CIT and the observed predictors, whose impact is observed through four main components, i.e., factors F1, F2, F3, and F4, was analyzed by multiple linear regression analysis. Using the regression analysis, we obtained a regression model that analyzes the impact of all tax incentives, i.e., factors that are explained by tax incentives. By analyzing the individual relationships of each factor with the dependent variable, the predictive model of linear regression was determined. To investigate the impact of tax incentives on the dependent variable, the following basic model of linear regression is estimated:

$$CIT = \alpha + \beta_1F1 + \beta_2F2 + \beta_3F3 + \beta_4F4 + \varepsilon, (2)$$

where CIT - corporate income tax revenue, F1 - factor represents the first component, F2 - factor represents the second component, F3 - factor represents the third component, F4 - factor represents the fourth component and  $\varepsilon$  - standard statistical error.

This model explained 86.7% of the variance of the dependent variable, which proves the adequacy of the model (Table 9).

The obtained regression model as a whole has a statistically significant predictive power (Sig. = 0.003). Based on the determined significance, the results of the regression analysis are shown in Table 10.

The predictive power of the model

Table 9

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
	0.931 <sup>a</sup>	0.867	0.791	13422.7401029

Dependent Variable: CIT

Predictors: (Constant), F1, F2, F3, F4

Source: Authors' calculations

Estimated regression coefficients

Table 10

Model B	Unstandardized Coefficients		Standardized Coefficients	t	Sig.
	Std. Error	Beta			
(Constant)	60486.883	3874.811		15.610	0.000
F1	23765.089	4047.108	0.810	5.872	0.001
F2	-12004.103	4047.108	-0.409	-2.966	0.021
F3	5467.595	4047.108	0.186	1.351	0.219
F4	2882.255	4047.108	0.098	0.712	0.499

Dependent Variable: CIT

Predictors: (Constant), F1, F2, F3, F4

The Table 10 shows a model that considers the tax incentives grouped as components F1, F2, F3, and F4 as independent variables. The impact of tax incentives on CIT was analyzed. The results of the analysis show that components F1 and F2 have a statistically significant contribution to the predictive power of the regression model. The estimated values of the regression coefficients, shown in Table 10, can be expressed in the equation that follows:

$$\begin{aligned} \text{CIT} = & 60486.883 + \\ & + 23765.089 \cdot F1 - 12004.103 \cdot F2 + \\ & + 5467.595 \cdot F3 + 2882.255 \cdot F4 + \varepsilon. \end{aligned} \quad (3)$$

The results of the evaluated model show that two independent variables in the model have a statistically significant effect on the dependent variable. Based on the estimated results of the regression model, we can conclude that there is a positive effect of one analyzed factor on CIT (F1) and a negative effect of one analyzed factor (F2). Other factors are not predictors with significant impact.

The results of the research on the analyzed sample of 10 tax incentives in Serbia in the period from 2007-to 2018 indicate that the hypothesis was confirmed. In other words, the positive impact of tax incentives on the collection of revenues from corporate income tax was proved.

The model proved that tax incentives explaining the F1 component had a positive effect on CIT ( $p < 0.001$ ), while individual tax incentives explaining the F2 component had a negative statistically significant impact on CIT ( $p < 0.05$ ). Given that the first factor, or component F1, was explained by the tax incentive defined in Article 50a, the tax incentive defined in Article 46 and the tax incentive defined in Article 53a, we can conclude that these incentives have positive effects on CIT. Namely, incentives for investments (a50a), incentives exempting the taxpayer from paying corporate income tax for work training, professional rehabilitation and employment of disabled persons (a46), as well as a reduction based on the elimination of double taxation (a53a) have positive effects on CIT. The second factor, i.e., component F2, was explained by the tax

incentives defined in Article 48, Article 45 and Article 48a. Since these tax incentives were abolished, the loss of income on this basis was limited. Namely, the tax incentives defined in Article 45 relate to tax exemptions for concessional investments, while the tax incentives defined in Articles 48 and 48a are related to tax credits by which the state reduces the tax to taxpayers who make investments in fixed assets. Tax credits could be transferred for a maximum of 10 years, and their effects are noticeable even after their deletion from the current law. As for the tax incentives that explain the components F3 (Sig = 0.219) and F4 (Sig = 0.499) are concerned, they had a positive effect on CIT, but their impact is not statistically significant.

The positive effect of tax incentives, or the paradox caused by tax incentives, can be explained by the fact that the policy of effective tax incentives is very important. A large number of tax incentives initiate a large number of controls based on their use and a large administration. This creates a problem of tax evasion, on the one hand, but also less collection of revenue from corporate income tax on the other hand. The empirical analysis of the annual data of the Ministry of Finance of Serbia, which were analyzed by Đurović Todorović et al. [40] showed that the number of tax inspectors and the number of controls with irregularities had a positive, statistically significant impact on the volume of tax evasion in Serbia. Generally speaking, tax incentives in Serbia, in addition to the fact that the possibility of their choice is significantly narrowed, there are active tax incentives that have a positive effect on the collection of CIT and thus contribute to solving the general problem of tax collection.

## 5. Discussion

Although the Serbian tax system has been subject to numerous reforms with a tendency to attract as many foreign investors as possible and create a favorable business environment for domestic investors, the abolition of the previous tax incentives and the introduction of the new ones has affected CIT and created the image of an unstable tax policy.

Regarding tax incentives, it is important for successful reform that the country does not use tax incentives to reduce the visibility of the disadvantages of its tax system, as well as not to use them as a protection against the tax incentives active in neighboring countries [41]. Therefore, tax incentives must be thoroughly defined and set in the direction of achievable economic and social goals of a certain country.

If a country has a policy of reducing unemployment, development of a certain sector of the economy, economic development, development of information, production, encouragement of research and development, it is necessary to select and analyze the effectiveness of the tax incentives through which these goals could be achieved. The collection of tax revenues should be facilitated in such a manner that the corporate income tax system consists of a number of tax incentives that would not create the high costs of training the tax authorities for their administration.

The degree of fiscal pressure implies the costs of corporate income tax, but also includes the costs that taxpayers would have in connection with the interpretation of the provisions of the Law on Corporate Income Tax. Although tax incentives are seen as a tax policy that simplifies capital flows, such a view should not be accepted for granted. The fact that certain tax incentives lead to tax evasion speaks in favor of that. Namely, if there is frequent abuse of tax incentives in one country, if there is a wide range of discretionary powers of the tax administration, if there is a certain level of corruption and frequent changes in regulations, the collection system will be endangered.

Also, if there is a non-synchronization of tax incentives, an unstable and unfair tax system that causes uncertainty, such a policy will not lead to capital flows. For these reasons, it is necessary to examine the effects of all tax incentives on the variables that are crucial in creating an effective tax policy that leads to a competitive position of our country in the global market. Tax policymakers need to take into consideration both international rules and the control capacities of their tax authori-

ties. In this way, taking into account all the above frameworks, the tax system will be focused on the ultimate goal-achieving economic growth and development.

Based on the results obtained in the empirical research, the tax incentives defined in Articles 51 and 53a of the Law can have positive effects on the collection of CIT. These tax incentives were obtained by regression analysis, while the positive effects of tax incentives 53a, 46 and 50a on corporate income tax revenues were proven by factor analysis and the principal components method. The tax incentive defined by Article 46 of the Law on Corporate Income Tax, according to which taxpayers are exempt from paying income tax if they enable work training, professional rehabilitation and employment of disabled people, is part of our country's social policy.

The positive side of this tax incentive is solving the problem of special categories of the population with the problem of employment. The disadvantage of this tax incentive is, explicitly, its abuse. Therefore, the state, with these tax exemptions, should perform detailed control and administration. In the area of investment tax incentives, empirical results have shown a positive effect of Article 50a on CIT.

Positive effects on the collection of corporate income tax have been noted in the special incentives provided by Serbian legislation to residents in order to eliminate double taxation of profits they make outside the borders of our country. These tax incentives are defined in Articles 51 and 53a. In this way, residents are encouraged to export and do business outside the country, while, on the other hand, they have a positive impact on the collection of CIT. Negative effects on CIT are identified in Article 52, which is also linked to the policy of eliminating double taxation of profits made in another country, with the reduction or tax credit being linked to intercompany dividends and not to the profit of permanent business units of a resident taxpayer.

Therefore, based on the results of this study, it is proposed to reconsider the reform or abolition of this article. The

proposal for the introduction of new tax incentives should be based on new technology and the support of research and development [30; 42; 43]. Since the tax incentives related to tax credits which were aimed at stimulating not only new technologies, but also underdeveloped areas, have been abolished in the Serbian tax system, the current incentives for research and development should be analyzed in more detail.

These incentives can be more than favorable for the investment climate in our country. Also, Article 48a, which had positive effects on economic growth and development because it was focused on long-term goals of economic policy, was abolished. Therefore, the proposal for the introduction of new tax incentives is justified.

## 6. Conclusion

This study aims to estimate the impact of tax incentives on revenues from corporate income tax and to provide guidelines for the implementation of potential tax

incentive reforms. Bearing in mind the results, the hypothesis was confirmed. In other words, the positive impact of tax incentives on the collection of revenues from corporate income tax was proved, which indicates the existence of a paradox.

Considering the results and factors that may affect the general economic climate in Serbia, the analysis of tax incentives can greatly contribute to achieving the desired level of tax competitiveness. Also, the political stability and efficiency of the legal system should not be left out. These aspects are the prerequisites for the corporate income tax instruments to affect its balance sheet yield, fairness and economic growth.

The research underlines that the policymakers must evaluate the effectiveness of tax incentives to improve the taxation policy. Theoretically, work on the investment climate through tax policy and tax incentive instruments provides the basis for further research that is necessary, but they should not be the only aspects of state intervention to stimulate economic growth.

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### Acknowledgments

This research was financially supported by the Ministry of Education Science and Technological Development of the Republic of Serbia (Contract No. 451-03-68/2022-14/200371 and Contract No. 451-03-68/2022/14).

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### For citation

Đurović Todorović J.N., Đorđević M.S., Ristić Cakić M.B. Do the Effective Tax Incentives Reduce Tax Revenues? Investigating the Paradox of Corporate Income Tax in Serbia. *Journal of Tax Reform*. 2022;8(2):108–126. <https://doi.org/10.15826/jtr.2022.8.2.111>

### Article info

Received June 14, 2022; Revised July 15, 2022; Accepted August 4, 2022

### Благодарности

Это исследование было поддержано Министерством образования, науки и технологического развития Республики Сербия (контракт № 451-03-68/2022-14/200371 и контракт № 451-03-68/2022/14).

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### **Для цитирования**

Đurović Todorović J.N., Đorđević M.S., Ristić Cakić M.B. Do the Effective Tax Incentives Reduce Tax Revenues? Investigating the Paradox of Corporate Income Tax in Serbia. *Journal of Tax Reform.* 2022;8(2):108–126. <https://doi.org/10.15826/jtr.2022.8.2.111>

### **Информация о статье**

Дата поступления 14 июня 2022 г.; дата поступления после рецензирования 15 июля 2022 г.; дата принятия к печати 4 августа 2022 г.

Original Paper

<https://doi.org/10.15826/jtr.2022.8.2.112>



### Estimation of Profit Taxation Effect on Russian Companies' Investments

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#### ABSTRACT

Lack of investments in fixed assets which stimulate economic growth is one of the problems of the modern Russian economy. According to the main hypothesis of the research, that corporate profit taxation decreases companies' investment level, we aimed to assess the level of impact of profit taxation on investments in fixed assets. To test the hypothesis, we estimate the empirical investment equation, using the indicator of tax burden as one of the factors affecting investment. The theoretical basis of the research is the neoclassical cash-flow model. The marginal effective tax rate (METR) was used as an indicator of the tax burden. The empirical equation was estimated using a random effects model on the panel microdata, which includes financial statistics of 4,000 Russian companies for the period 2014–2018. The sample companies represent 78 regions of Russia and about 50 types of economic activity. We assumed heterogeneous effect of profit taxation and estimated the model separately for each of the three groups of companies differing in the degree of financial constraints. According to the results obtained, for the entire sample, for the entire period under review, we observe a negative impact of the marginal effective rate on the level of investment, significant at the 1% level. In aggregate, if the marginal effective tax rate falls by 1 percentage point, the investment level will increase by 0.05 percentage points. We obtained the following main results: profit taxation has a significant negative effect on the level of investment for companies that are not financially constrained, and the effect is not observed for financially constrained companies; younger companies are more sensitive to changes in profit taxation. However, general sensitivity of investment to profit taxation is quite modest.

#### KEYWORDS

Investment, profit taxation, tax burden, effective marginal tax rate, loss carry forward, financial constraints.

JEL H25, H32, C13

УДК 336.226.12

### Оценка влияния налогообложения прибыли на инвестиции российских компаний

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#### АННОТАЦИЯ

Одной из самых острых проблем современной российской экономики является низкий уровень инвестиционной активности бизнеса. Согласно неоклассической теории инвестиций, низкая инвестиционная активность российских

компаний может объясняться высокой налоговой нагрузкой. В данной работе оценивается масштаб влияния налогообложения прибыли на инвестиции в основные фонды. Основная гипотеза заключается в том, что налогообложение прибыли снижает уровень инвестиций. Теоретической основой исследования является неоклассическая модель потоков денежных средств. В качестве индикатора налоговой нагрузки для эмпирической оценки инвестиционной функции использовалась предельная эффективная ставка налога (METR), которая представляет собой ставку налога на предельную единицу прибыли и позволяет оценить влияние налогообложения прибыли на интенсивное развитие компании, в том числе на наращивание инвестиционной активности. Эмпирическое уравнение оценивалось с помощью модели случайных эффектов на панельных микроданных по финансовым показателям 4000 российских компаний за период 2014-2018 гг. В предположении о неоднородности эффекта налогообложения прибыли, модель оценивалась отдельно для трех групп компаний, различающихся степенью финансовых ограничений. Получены следующие основные результаты: налогообложение прибыли оказывает значимое отрицательное влияние на уровень инвестиций компаний, не ограниченных в финансовых ресурсах; инвестиции финансово ограниченных компаний оказываются не чувствительны к изменению налоговой нагрузки; более молодые компании чувствительнее к изменениям в налогообложении прибыли. Однако общая чувствительность инвестиций к налогообложению прибыли достаточно умеренная.

#### КЛЮЧЕВЫЕ СЛОВА

инвестиции, налогообложение прибыли, налоговая нагрузка, предельная эффективная ставка налога, перенос убытков прошлых периодов, финансовые ограничения

### 1. Introduction

One of the most acute problems of the modern Russian economy is the low level of business investment activity. Investments in fixed assets are necessary in order to stimulate economic growth. One of the possible incentive factors could be a reduction in the level of taxation of corporate profits, since according to the neoclassical theory of investment, taxation of corporate profits increases the cost of capital resources and, accordingly, capital return requirements, which negatively affects investments in fixed assets [1; 2].

According to the World Bank, the total effective rate of all taxes and contributions levied on firms (in % of profits) in Russia exceeds 45% (as of the beginning of 2020), which is significantly higher than the level in the OECD countries and the countries of Europe and Central Asia. Thus, it can be assumed that the high level of tax burden is the reason for the low level of investment activity of Russian companies.

The purpose of this work is to assess the level of impact of profit taxation on investments in fixed assets. Thus, the main

hypothesis of the research is that corporate profit taxation decreases companies' level of investment.

To test the hypothesis, we estimate the empirical investment equation, using the indicator of tax burden as one of the factors affecting investment. Most authors use macro-level, regional or, rarely, industry-level data to estimate the investment equation. In this research we use company-level microdata, which allows us for the additional variation in tax burden. The empirical problems that we consider are the choice and calculation of profit tax burden indicator and accounting for companies' heterogeneity in the degree of financial constraints.

The paper is structured as follows: in the "literature review" section we present the experience of solving the problems in estimating tax effects on investments; in the next section we describe specific methods and data used; in the "results and discussion" section we present the results of empirical investment equation estimation and interpret it; in the last section we make concluding remarks.

## 2. Theoretical basis

One of the most challenging problems in assessing the impact of profit taxation on the behavior of companies is the choice tax burden indicator. In most empirical studies authors usually use the following corporate income tax indicators:

- legally established income tax rate (statutory tax rate – STR);
- average income tax rate (ATR);
- average effective income tax rate (AETR);
- marginal effective income tax rate (Marginal ETR – METR).

The statutory corporate income tax rate is the simplest indicator, but at the same time also the least accurate. This indicator is not applicable in cross-country studies, because it does not consider the specifics of determining the tax base. In addition, the profit taxation system usually includes many various benefits, deductions, etc., which are not considered in the legally established income tax rate. Since the corporate income tax rate is a stable indicator over time, it is almost impossible to use it for in-country research.

The average corporate income tax rate and the effective corporate income tax rate are the result of applying two different approaches to calculating the empirical indicator of profit taxation: the backward-looking approach and the forward-looking approach [3].

The average corporate income tax rate is based on historical data and is calculated as the ratio of accrued income tax to profit before tax. For example, in the work [4] the issue of the impact of profit taxation on the investment activity of companies in Russia is investigated. The average rate was used to evaluate the tax burden at the regional level.

The variation of the rate is provided by the presence of various tax benefits: accelerated depreciation [5–7], investment tax credit [8], tax loss carryforward [9] and other tax deductions [10].

However, best indicator to assess the impact of taxation on the investment behavior of companies the is still the effective corporate income tax rate.

The effective corporate income tax rate is based on an assessment of the potential future profitability of investment projects (investments in capital). The effective tax rate shows how much taxation reduces the return on investment. At the same time, the average effective tax rate is an indicator on average for all investments, and the marginal effective tax rate is an indicator for an additional unit of investment. In other words, the marginal effective tax rate shows how much taxation increases the pre-tax rate of return required by investors to reach the break-even point [11]. It can also be said that the marginal effective tax rate is the tax rate per marginal unit of profit (~per additional ruble of profit).

The method of calculating the effective tax rate is based on the cost of using capital, introduced in [2]. The method of estimating the effective tax rate itself was introduced in the study [12]. The method was improved by including in the calculations various types of assets, sources of financing and methods of depreciation (including various benefits, such as accelerated depreciation or investment tax credit) [13–15].

In [16], an attempt was made to estimate the marginal effective tax rate on microdata, and the authors also estimated the elasticity of the tax base at the marginal effective tax rate. In [17], they propose a unified approach to the assessment of the marginal effective tax rate, which is used by OECD specialists. The authors of the study [18] include labor taxes and indirect taxes in the assessment of the marginal effective tax rate and examine the influence of the presence of monopoly power on the determination of the marginal effective tax rate.

So, the average effective tax rate allows us to assess the impact of the tax system on investment projects that bring economic rent. Like the usual average tax rate, the average effective tax rate is more suitable for assessing the impact of profit taxation on the extensive development of a firm (for example, the choice of jurisdiction for a branch of an international company) [17].

The marginal effective tax rate, in turn, allows us to assess the impact of profit taxation on the intensive development of the firm, including incentives to increase investment activity [19]. Thus, for the purposes of the current study, the most appropriate empirical indicator of profit taxation is the marginal effective corporate income tax rate. However, the calculation of this indicator requires precise data on companies' asset and finance structure, especially on microlevel.

On the other hand, the authors of many theoretical papers note that if the capital structure of a firm changes slightly, and the tax system is arranged in such a way that benefits do not affect the tax base (only the rate), then the marginal effective tax rate differs slightly from the average corporate income tax rate [20]. The most common benefit affecting the tax base is the tax loss carryforward. In this regard, it is this benefit that can be considered the main factor in the existence of differences between the marginal effective rate and the average corporate income tax rate in Russia. The marginal effective rate is calculated further based on this conclusion.

Another challenge is to choose other factors, that affect investments, so-called control variables. Various studies identify several factors that, under certain conditions, can affect the level of investment. In [21], the authors consider an extended formulation of the model with the possibility of debt financing. The model introduces the probability of bankruptcy and the loan rate, which depend on the volume of borrowings. The authors conclude that the equilibrium level of investment negatively depends on the debt burden of the firm.

The authors of [22] investigate the impact of financial constraints on the investment behavior of firms within the framework of the cash flow model. The costs of external financing are introduced into the model. The authors conclude that investments are positively related to the stock of the company's own funds.

In several other works, special indices were used as indicators of the presence of financial constraints in firms. For example,

the KZ index in [23], which considers both the parameters of the difficulty of attracting external financing and the parameters of the availability of own funds. The authors of the study [24] propose a WW index, which is supplemented by industry indicators. The study [25] uses the HP index, which is based on the size and age of the company. The parameters of these indices were evaluated on samples in which there were companies that obviously have financial constraints. Thus, many authors note the importance of factors of accessibility of investment sources, i.e. factors of financial constraints of companies, which determines, among other things, the cost of using capital.

However, several more modern works [26; 27] note the imperfection of indicators of financial constraints of firms. In particular, it is important to understand that financial constraints can not only directly affect a firm's investment decisions, but also change its sensitivity to changes in other factors. In addition, some factors, such as the debt-to-capital ratio and the individual interest rate, may be endogenous in relation to the level of investment, i.e. for example, if a firm finances most of its investments with debt, with an increase in investments, there will be an increase in the level of debt, and, as a result, other things being equal, an increase in the average interest rate on the firm's borrowings.

Thus, one of the possible approaches to solve some of the emerging empirical problems is to divide the initial sample into groups according to the parameters responsible for the financial constraints of the firm. After that, the model is evaluated separately for each selected group, and the grouping parameters are excluded from the equation. For example, in [28] the result was obtained that small-sized firms are almost twice as sensitive to changes in the marginal effective tax rate due to changes in depreciation than large firms.

Some studies note the importance of such factors as the volume of investments in other industries [29], uncertainty [30], information asymmetry [31], the choice of the source of investment financing [32]. However, given the availability and struc-

ture of the data, it is not possible to assess the impact of these factors.

So, according to the literature review, the most appropriate indicator to assess the impact of taxation on the investment behavior of companies is the marginal effective tax rate. In certain conditions this indicator can be calculated based on the average corporate income tax rate. To account for companies' heterogeneity in the access to financial resources, the one should divide the initial sample into corresponding groups. We use these conclusions in the next section and describe specific methods and data of the research.

### 3. Method and Data

The theoretical basis of the work is the neoclassical theory of investments and the cash-flow model of Jorgenson [1; 2]. According to this model, the optimal level of capital that a firm chooses positively depends on the parameters of the production, the company's revenue, and negatively on the marginal cost of using capital, which in turn is determined by the alternative cost of capital (the level of income that could be obtained without acquiring an additional unit of capital). The higher the cost of using capital, the higher the tax burden on the income that a unit of capital brings. In other words, the cost of using capital depends on the marginal effective tax rate. In turn, net investments (excluding recovery investments) determine the change in the company's capital.

Thus, investments, as a change in capital, will depend on changes in revenue and the marginal cost of using capital, including the marginal effective tax rate. The basic specification of the empirical equation of the investment of firm  $I$  in the period  $t$  in this case looks like this:

$$\frac{I_{i,t}}{K_{i,t}} = \beta_1 \cdot \frac{\Delta pQ_{i,t}}{pQ_{i,t}} + \beta_2 \cdot METR_{i,t} + \beta_3 \cdot X_{i,t} + \theta_t + \mu_i + \varepsilon_{i,t}, \quad (1)$$

where  $I_{i,t}/K_{i,t}$  - investments relative to capital;  $\Delta pQ_{i,t}/pQ_{i,t}$  - relative change in revenue;  $METR_{i,t}$  - marginal effective income tax rate;  $X_{i,t}$  - a set of control variables, which include factors of the cost of

using capital that change over time. For example, the lower the cost of using capital, the higher the return on capital. Therefore, it would be reasonable to include in the equation the return on assets at the end of the previous period;  $\theta_t$  - fixed time effects that include factors common to all firms, but changing over time;  $\mu_i$  - fixed firm effects that include factors that do not change over time;  $\varepsilon_{i,t}$  - a random error of the model.

#### 3.1. Description of the data

To evaluate the obtained empirical specification, panel microdata was collected on the financial statements of 4000 Russian companies for the period 2014-2018. Data on companies was obtained from the SPARK database<sup>1</sup>. The sample companies represent 78 regions of Russia and about 50 types of economic activity (according to OKVED-2). The sample contains the following financial reporting indicators:

- assets - an indicator of the company's total (equity and debt) capital (K);
- deferred tax assets;
- deferred tax liabilities;
- revenue - (pQ);
- profit (loss) before taxation;
- current income tax;
- net profit (loss);

In addition, the sample contains data on the age of the company, return on assets, the due diligence index (shows the probability that the firm is a "fly-by-night" or "one-day" company) and the financial risk index (reflects the probability of the company's insolvency). The last two indicators are calculated by the SPARK system.

The Table 1 shows some descriptive statistics of the resulting sample.

Let's look at how the key variables of the empirical specification were calculated:

- $\Delta pQ_{i,t}/pQ_{i,t}$  - increase in the "Revenue" indicator compared to the previous period;

- $I_{i,t}/K_{i,t}$  - the ratio of the change in the indicator "Assets" to assets at the end of the previous period.

<sup>1</sup> SPARK database. Available at: <http://www.spark-interfax.ru/>

The value of the company's assets was chosen as the indicator responsible for capital (a variable that allows moving to a single scale in the empirical equation). An alternative to this indicator is the indicator of the company's Fixed assets. However, the importance of physical capital may differ significantly depending on the type of activity of the company, and therefore the indicator of the company's assets seems to be a more relevant choice.

It is necessary to consider in more details how the indicator of the marginal effective interest rate was calculated.

### 3.2. The marginal effective interest rate

As noted earlier, under certain conditions, the marginal effective income tax rate can be calculated based on the average tax rate, taking into account certain adjustments. Considering the specifics of Russian tax legislation, the most important adjustment is the adjustment for transferable losses, the absence of which can lead to significant discrepancies between the marginal effective and average income tax rates (for more information

about changes in legislation regarding the regulation of tax loss carryforward and the effects of this rule, see [33]). Consider the following example (Table 2).

The table above describes two cases with a 50% loss transfer limit (in accordance with current legislation, the restriction was introduced on January 1, 2017). In the first case, the company has a significant accumulated loss exceeding the size of its current profit. Then the additional unit of profit in calculating the tax base will also be reduced by 50% due to the losses carried over, and the marginal income tax rate will not differ from the average. In the second case, the accumulated loss is less than 50% of the company's current profit. Then the additional unit of profit when calculating the tax base will not be reduced, and the marginal rate will be higher than the average.

Thus, let  $\tau$  be the "base" rate (taking into account benefits), and  $\gamma$  be the loss transfer limitation coefficient, then:

- If the accumulated losses are greater  $EBT \cdot \gamma$ , to  $ATR = MTR = (1 - \gamma) \cdot \tau < \tau$ ;
- If the accumulated losses are less  $EBT \cdot \gamma$ , to  $ATR < MTR = \tau$ .

Table 1  
The average values of some indicators for the sample of companies under consideration

Indicators	2014	2015	2016	2017	2018
The age of the company, years	12	13	14	15	16
Revenue, million rubles	461.99	519.58	596.76	677.70	791.42
Assets, million rubles	417.83	491.36	577.33	666.19	764.87
Current income tax, million rubles	4.01	5.09	6.82	8.73	12.05
Carryforward losses, million rubles	-19.74	-37.42	-50.35	-52.90	-72.77
Investments (change in capital), million rubles	31.35	28.34	32.47	37.36	35.85

Source: calculations of the authors of the study.

Table 2  
A numerical example with a limit of 50% for tax loss carryforward

Indicators	Case 1 (Accumulated loss = 50)		Case 2 (Accumulated loss =10)	
	X	$x + \Delta$	x	$x + \Delta$
Profit before tax (EBT)	40	41	40	41
Losses reducing the tax base	20	20,5	10	10
Tax base	20	20,5	30	31
Income tax	4	4.1	6	6.2
Average Rate (ATR), %	10	10	15	15
Marginal Rate (MTR), %	10		20	

Source: compiled by the authors of the study.

The Table 3 shows an example based on real data.

Thus, due to the presence of transferable losses incurred in 2016, the marginal income tax rate in 2017 differs from the average.

To correct this discrepancy, data on accumulated losses of the companies included in the sample were collected. If the company had accumulated losses, then the tax base (Profit before tax indicator) decreased by the amount of  $\min(0.5 * \text{Profit before tax}; \text{Accumulated loss})$ . Further, the Current income tax indicator was adjusted for deferred tax assets and liabilities ( $\text{Current income tax} - \Delta \text{Deferred tax assets} + \Delta \text{Deferred tax liabilities}$ ). To obtain an indicator of the marginal effective income tax rate, the adjusted income

tax was related to the adjusted tax base (Figure 1).

According to Figure 1, there is a fairly significant variation in the marginal income tax rate for companies in the sample with certain peaks in the area of zero and maximum rates.

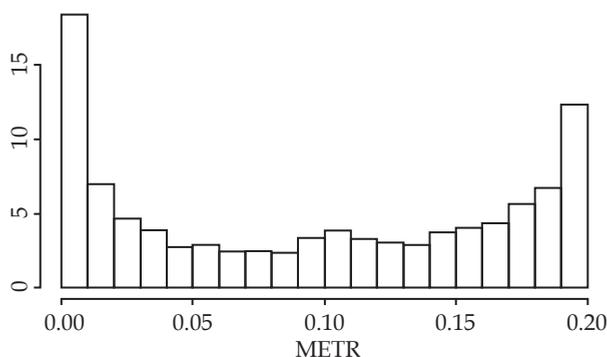
Thus, due to the panel data structure and the need to take into account time effects and individual effects of companies, panel data models will be used to evaluate the equations. From the point of view of theory, since the sample of companies considered in this paper is a random sample from the general number of Russian companies, the most appropriate model would be with a model with random effects with the inclusion of fictitious variables of time periods.

Table 3

**An example of the existence of differences between the average and marginal income tax rates**

LLC	2014	2015	2016	2017	2018
Revenue, rubles	1,301,901,000	1,395,373,000	1,283,247,000	1,486,830,000	1,654,942,000
Profit before taxation, rubles	243,551,000	283,165,000	-49,614,000	107,713,000	209,123,000
Current income tax, rubles	47,827,000	46,764,000	4,668,000	9,175,000	34,425,000
Profitability before taxation, %	18.7	20.3	-3.9	7.2	12.6
Profitability after taxation, %	15.0	16.9	-4.2	6.6	10.6
ATR, %	19.6	16.5	-	8.5	16.5
MTR, %	19.6	16.5	-	15.79	16.5

Source: compiled by the authors of the study.



**Figure 1. Frequency distribution of the marginal effective income tax rate for the sample companies in 2018**

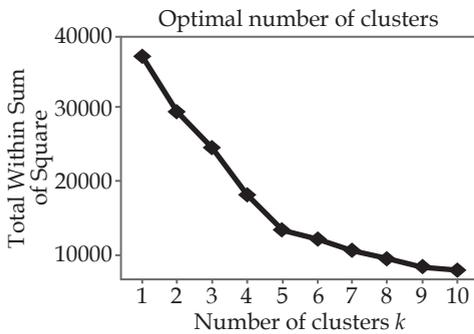
Source: calculations of the authors of the study

**3.3. Clustering of observations**

Before proceeding to the evaluation of the model equation, it is necessary to divide the sample companies into groups according to factors related to the financial constraints of the companies.

Based on the theoretical literature discussed above, we selected 4 key indicators for clustering companies: age (years), size (value of assets), due diligence index (shows the probability that the company is a “one-day firm”) and financial risk index (probability of insolvency of the company). For clustering, the corresponding indicators were standardized (reduced by the average value and divided by the standard deviation) in order to eliminate the scale effect.

Clustering was carried out on the basis of the k-means method. The number of clusters was selected based on two criteria: reduction of intra-group variance and economic interpretability of clusters. The choice was made in favor of 5 clusters.



**Figure 2. The sum of intra-group sums of squares depending on the number of clusters**

Source: calculations of the authors of the study

According to Figure 2, the addition of more than 5 clusters significantly reduces intra-group variation. On the other hand, the economic interpretability of clusters is falling.

Table 4 shows the results of dividing the sample of companies into clusters.

Thus, 5 clusters of companies were obtained. Cluster 3 includes the so-called one-day firms. Usually, such firms are created not for the purpose of conducting real economic activity, but for the purpose of implementing various schemes for the redistribution of funds, often illegal from the point of view of tax legislation. In any case, the study of the investment behavior of such firms is not of particular interest. The second cluster includes large companies. Obviously, the effect of changing the marginal tax rate on the investment behavior of large corporations will differ from the corresponding effect for the average company. Large corporations have more tax optimization schemes available and we can expect less sensitivity of investments of large companies to changes in the marginal tax rate. However, due to the small number of the resulting cluster, it is difficult to obtain quantitative estimates of the studied effect.

Next, the results of the evaluation of the empirical model for clusters 1, 4 and 5 will be presented. According to Table 4, it can be assumed that the group of “Old middle-sized” and “Reliable middle-sized” are not limited in funding, because they have low IDO and IGF values. The “Risky middle-sized” group, on the contrary, should be considered as limited in funding.

Table 4

**The result of clustering of the sample of companies under consideration by the k-means method**

Number of cluster	Size	IGF	IDO	Age	Number of employees	The name of the cluster
1	-0.08	-0.48	-0.24	1.03	3151	Old middle-sized
2	12.47	0.69	-0.28	-0.68	32	Large
3	-0.26	0.52	5.33	-0.87	209	One-day
4	0.03	1.63	-0.03	-0.20	1978	Risky middle-sized
5	-0.04	-0.49	-0.08	-0.69	3815	Reliable middle-sized

Note: IGF - financial risk index; IDO - due diligence index. The cells represent the average values of the standardized corresponding indicators.

Source: calculations of the authors of the study.

#### 4. Results and discussion

Empirical equation (1) was evaluated using a random effects model for selected groups of observations. The equation also included an indicator of the marginal effective tax rate with a lag in 1 period. It is assumed that investment decisions may be made with a delay, and therefore the marginal effective rate of the previous period may be decisive.

In addition, as noted earlier, starting from 2017, in Russia the tax loss carryforward had been limited to 50% of the current period's profit. In conditions of limited benefits, the effect of changes in the marginal effective interest rate may become more pronounced starting in 2017. In this regard, the model was separately evaluated for the entire sample and for the period from 2017 to 2018. In addition, it allows you to evaluate the stability of the conclusions over time. The evaluation results are presented in Table 5.

According to the results obtained, for the entire sample, for the entire period under review, we observe a negative impact of the marginal effective rate on the level of investment, significant at the 1% level. Moreover, the effect is observed both for the bet in the current period and for the lag of the bet. In aggregate, if the marginal

effective tax rate falls by 1 percentage point, the investment level will increase by 0.05 percentage points. At the same time, the results are preserved separately for the period 17-18, the effect of reducing the tax rate becomes more pronounced, especially the effect of the current rate. Control variables, such as revenue growth and return on assets, do not have a particularly significant effect when evaluating the entire sample.

Model estimates separately for groups without financial constraints, i.e. for "Old middle-sized" and "Reliable middle-sized", correspond to estimates for the entire sample in terms of the impact of the marginal effective rate. The cumulative effect of a 1 percentage point drop in the tax rate for the "Old middle-sized" is 0.044 percentage points of growth in the level of investment for the entire period, and 0.068 percentage points for 17-18 years. For "Reliable middle-sized" - 0.082 percentage points and 0.106 percentage points, respectively.

Thus, for reliable, younger firms, the effect of changing the marginal effective tax rate is more pronounced. In other words, younger companies are more sensitive to changes in the tax rate. This may be due to the greater flexibility of young companies and a more active investment

Table 5  
The results of the evaluation of the empirical model using a model with random effects.  
The dependent variable is the ratio of investments to capital

Indicators	Full info		Old middle-sized		Risky middle-sized		Reliable middle-sized	
	Whole period	17-18 yy.	Whole period	17-18 yy.	Whole period	17-18 yy.	Whole period	17-18 yy.
METR	-0.03***	-0.045***	-0.024***	-0.048***	-0.002	0.004	-0.058***	-0.077***
METR(-1)	-0.02***	-0.02***	-0.02***	-0.02**	0.01	0.01	-0.024***	-0.029***
Revenue growth	3e-09	-8e-010	3e-09***	3e-09***	-3e-09	-4e-08**	1e-08	6e-08
ROA(-1)	0.0005	0.0004*	0.06***	0.08***	0.004*	-7.6e-05	0.0003**	0.0003**
Temporary effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Number of observations	25495	13134	8689	4298	5221	2749	10557	5518
Logarithm of likelihood	17910	8011	9279	4370	2792	1240	7927	4132

Note: \* denotes significance at the 10 percent level; \*\* denotes significance at the 5 percent level; \*\*\* denotes significance at the 1 percent level.

Source: calculations of the authors of the study.

policy. In addition, it is possible to note a positive significant impact of return on assets on investments for both groups under consideration, but for “Reliable middle-sized” companies it is less pronounced.

Also, the level of investment of “Old middle-sized” firms has a weak significant positive impact on revenue growth, it can be concluded that older companies are more focused on changes in demand, which reflects changes in revenue, and non-tax factors of the cost of using capital. For younger firms, all capital cost factors are important. This may be due to the fact that older firms have a better tax optimization system.

As for the “Risky middle-sized” firms, the evaluation of the model for this group does not reveal a significant impact of the marginal effective tax rate on their investment behavior. “Risky middle-sized” companies are financially limited, i.e. they do not have the opportunity to finance existing investment projects. In this case, indicators that affect the return on investment (such as METR) do not have a significant impact on the level of investment. Moreover, this effect is stable both for the entire sample period and for the period of 17–18 years.

In all the results shown in Table 5, binary variables of time periods were used as control variables to account for time effects. The exclusion of these variables does not lead to significant changes in the evaluation results, i.e. the results are resistant to the inclusion of these variables.

## 5. Conclusion

From the point of view of the theory, corporate income tax is not optimal, because it distorts the decisions made by the firm, including investment decisions. When deciding whether to introduce or change an income tax, government officials should compare the benefits, such as replenishing budgets and financing government projects, and the costs of collecting of income tax.

In this paper, an attempt was made to assess the scale of the distorting effect of profit taxation on investment decisions of

firms in Russia. For this purpose, an empirical model was built and evaluated on the data.

According to existing research, the most accurate empirical indicator of the tax burden for assessing the impact on investment decisions is the marginal effective income tax rate. It is necessary to consider the company’s capital structure, depreciation rules for various types of capital, investment tax credits and other benefits. However, under certain conditions, the marginal effective rate can be calculated based on the average rate, which was done in the framework of this article. The reason for such an approach is limitations in the availability of data. Micro-level data on the capital structure and tax benefits of companies in Russia are not publicly available.

The latest publications note the need to consider the availability of financing when assessing the investment behavior of firms. In this case, one of the possible solutions may be to divide companies into groups with varying degrees of financial limitations. In this paper, groups without financial constraints were identified – “reliable middle-sized” and “old middle-sized” companies, as well as a group with restrictions – “risky middle-sized” companies.

Thus, based on model estimation for various groups, the following conclusions can be made:

- in general, profit taxation do have negative effect on companies’ level of investment in fixed assets, which confirms the main hypothesis;

- the marginal effective corporate income tax rate has a significant negative impact on the level of investments of firms that are not limited in financial resources;

- financially limited companies do not have the opportunity to finance existing profitable investment projects and any available funds will be used to increase investments regardless of the tax rate, i.e. the marginal effective corporate income tax rate does not have a significant impact on their investment behavior;

- younger firms are more sensitive to changes in the marginal effective corpo-

rate income tax rate, and older firms are more focused on changes in demand for products;

- the cumulative change in the level of investments relative to the company's assets in response to a one-time change in the marginal effective corporate in-

come tax rate by 1 percentage point is in the range from 0.044 percentage points to 0.106 percentage points, i.e. the effect is quite moderate. Nevertheless, the effect is consistently significant for young firms, which should be considered for tax policy's purposes.

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### Acknowledgements

The article has been funded through the state target to the Russian Presidential Academy of National Economy and Public Administration.

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**For citation**

Belev S.G., Matveev E.O., Moguchev N.S. Estimation of Profit Taxation Effect on Russian Companies' Investments. *Journal of Tax Reform. 2022;8(2):127–139*. <https://doi.org/10.15826/jtr.2022.8.2.112>

**Article info**

Received April 22, 2022; Revised June 17, 2022; Accepted July 25, 2022

**Благодарности**

Статья подготовлена в рамках государственного задания Российской академии народного хозяйства и государственной службы при Президенте Российской Федерации.

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**Для цитирования**

Belev S.G., Matveev E.O., Moguchev N.S. Estimation of Profit Taxation Effect on Russian Companies' Investments. *Journal of Tax Reform. 2022;8(2):127–139*. <https://doi.org/10.15826/jtr.2022.8.2.112>

**Информация о статье**

Дата поступления 22 апреля 2022 г.; дата поступления после рецензирования 17 июня 2022 г.; дата принятия к печати 25 июля 2022 г.

Original Paper

<https://doi.org/10.15826/jtr.2022.8.2.113>



### Tax Revenue Impact on Economic Growth in Nigeria: ARDL Bounds Test and Cointegration Approach

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#### ABSTRACT

The paper aims to explore how the introduction of an electronic tax system impacts on economic growth in Nigeria. The neoclassical growth theory and Technology Acceptance Model (TAM) was used in the study. Based on diagnostic tests, Autoregressive Distributed Lag bounds test regression model was adequately created. The quarterly secondary data of Central Bank of Nigeria and tax statistics data were divided into two periods for analysis: from 2011q<sub>1</sub> to 2015q<sub>3</sub> pre-electronic tax period (pre-e-tax) and from 2015q<sub>4</sub> to 2020q<sub>4</sub> post-electronic tax period (post-e-tax). In pre-e-tax in the long-run, education trust fund revenue strongly enhances economic growth, company income tax and stamp duty are moderate revenue earners for economic growth, while petroleum profit tax revenue have moderate negative impact on economic growth. Value added tax and capital gain tax revenues insignificantly decreases in economic growth in the same period. In post-e-tax in the long run, value added tax, petroleum profit tax, and capital gain tax insignificantly decreases economic growth, while company income tax, education trust fund, and stamp duty insignificantly enhance it. For pre-e-tax revenue in the short-run, education trust fund strongly decreases economic growth, value added tax and petroleum profit tax had insignificant positive influence, while company income tax, capital gain tax, and stamp duty had no impact. For post-e-tax revenue in the short-run company income tax had no influence, value added tax had moderate negative impact, petroleum profit tax had a strong positive impact, education trust fund, capital gain tax, and stamp duty had strong negative impact on economic growth. To optimize the relationship between tax structure and economic growth, tax evasion, corruption, and tax avoidance should be checked.

#### KEYWORDS

economic growth, economic development, Nigeria, pre-e-tax tax revenue, post-e-tax tax revenue, autoregressive distributed lag bounds test regression model

JEL H25

УДК 338.12

### Влияние налоговых поступлений на экономический рост в Нигерии: тест ARDL и коинтеграционный подход

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#### АННОТАЦИЯ

В статье исследуется влияние внедрения электронного налогообложения на экономический рост в Нигерии. Используется неоклассическая теория роста и модель принятия технологий. На основе диагностических тестов построена адекватная регрессионная модель с авторегрессионным распределенным лагом. Квартальные данные Центрального банка Нигерии и данные налоговой

статистики разделены для анализа на два периода: до внедрения электронного налогообложения (с 1-го квартала 2011 г. по 3-й квартал 2015 г.) и после внедрения электронного налогообложения (с 4-го квартала 2015 г. по 4-й квартал 2020 г.). В долгосрочном периоде, до внедрения электронного налогообложения доходы от целевого фонда образования значительно повышали экономический рост, налог на прибыль компаний и гербовый сбор являлись умеренными источниками экономического роста, в то время как налог на нефтяную прибыль оказывал умеренное негативное влияние на экономический рост. Доходы от налога на добавленную стоимость и налога на прирост капитала незначительно снижали экономический рост в тот же период. В долгосрочном периоде, после внедрения электронного налогообложения налог на добавленную стоимость, налог на нефтяную прибыль и налог на прирост капитала незначительно снижали экономический рост, в то время как налог на прибыль компаний, целевой фонд образования и гербовый сбор незначительно повышали его. В краткосрочном периоде до внедрения электронного налогообложения целевой фонд образования существенно снижал экономический рост, налог на добавленную стоимость и налог на нефтяную прибыль оказывали незначительное положительное влияние на экономический рост, в то время как налог на прибыль, налог на прирост капитала и гербовый сбор не оказывали никакого влияния на экономический рост. В краткосрочном периоде, после внедрения электронного налогообложения направления влияния на экономический рост следующие: налог на прибыль не оказывает влияния; налог на добавленную стоимость оказывает умеренное негативное влияние; налог на прибыль от продажи нефти оказывает значительное положительное влияние, а целевой фонд образования, налог на прирост капитала и гербовый сбор оказывают значительное негативное влияние. Для оптимизации взаимосвязи между налоговой структурой и экономическим ростом предложено контролировать уклонение от уплаты налогов, коррупцию и обход налогов.

#### **КЛЮЧЕВЫЕ СЛОВА**

экономический рост, экономическое развитие, Нигерия, налоговые поступления до электронного налогообложения, налоговые поступления после электронного налогообложения, регрессионная модель авторегрессионного теста с распределенным запаздыванием

### **1. Introduction**

The machinery and procedures for implementing a good tax system in Nigeria is undergoing reformation. The policy makers are grappling with the quests for effective tax administration for collecting adequate tax revenue and particularly, curbing large scale corrupt practices prevalence in tax administrative system, avoidance and evading tax payment, non-compliance with relevant tax laws, and so forth (see Angahar & Alfred [1], Chiamaka et al. [2]).

On another hand, tax experts and administrators are advocating for technology driven taxing system to minimize the menaces associated with tax challenges in Nigeria. Some reforms have been taken so far such as taxpayers' identification number introduced in February 2008; automated tax system made to facilitate tracking of tax positions; e-payment sys-

tem in 2015 meant to enhance smooth payment procedures and reduce the incidences of tax touts among others. It is believed that technology adoption will advance tax administration because, technology has influenced lives in many ways, and it continue to change the way of doing things (see Chiamaka et al [2]).

A country tax system is a major determinant of other macroeconomic indexes, particularly, the level of economic growth (EcG) and economic development (EcD). While some earlier studies found strong positive association between taxation and EcG (see for example, Keho [3], Jalata [4], Okoli, Njoku & Kaka [5], Ugwunta & Ugwanyi [6], Ugochukwu & Azuibike [7], Ali et al. [8], Egbunike et al. [9]). Other previous studies shows that tax has significant negative influence on EcG from Edame & Okoi [10], Delessa [11].

Jens et al. [12] studied 21 OECD countries data between 1971–2004 and found that corporate taxes has been harmful to the economy. Hungerford [13] found that tax has no impact on economic growth when the USA experienced from the end of WWII in 1945 to 2011 was examined.

Electronic tax system is the integration of information technology into tax administration for enforcement of core tax processes such as electronic registration, filing of tax returns and payment, as well as education and information to taxpayers and general maintenance of database (from Wasao [14], Chiamaka et al. [2]). It provides adequate tax records for easy communication of information and efficiently minimize cost of administration due to submission of tax returns on a paperless environment (see Oseni [15] Chiamaka et al. [2]). Embracing e-tax payment system is assumed to fetch increased tax revenue and in turn increase EcG. It is also expected to facilitate voluntary compliance (Oseni [15]), and its convenience can serve as key driver for e-filing adoption.

Literature relating e-tax system to economic growth are seemingly scanty. Most study is about the relationship between economic growth and taxation but not on e-tax and economic growth. For this reason, the researcher infers on the implication of how compliances to e-tax will contribute to revenue generation and consequently on economic growth.

Scholars' views are that economies where tax revenues significantly form major part of their revenue, they have long deployed electronic tax system in far back years (see Ofurun et al. [16]). Thus, the purpose of e-taxation in current time is to improve revenue collection and consequently economic growth. Modern tax administrators' main objectives are to facilitate voluntary compliance by taxpayers, providing adequate tax records for ease of communication of information, and efficiently minimizing cost of tax revenue collection (Oketa et al. [17]).

E-tax system provide more than these main objectives. The upshot of it is that e-tax system should generate more revenue over manual tax system that is cum-

bersome. The system increases transparency, limit the opportunity for corruption since it limits direct contact between taxpayer and tax administrators, is less costly, takes lesser time to comply with and easier for firms and individuals to file returns and pay their taxes (for example see Ofurun et al. [16], Oketa et al [17]).

Furthermore, particularly in economies where tax corrupt practices are enormous, such as tax avoidance, tax evasion, non-compliance with relevant tax laws, poor record keeping, and collusion with tax administrators, which are setbacks and challenges to tax revenue generation are likely to reduce and effectively, better-off tax revenues see Oketa et al. [17], Angahar & Alfred [1]. The conveniences associated with e-tax is a driver of its acceptance and consequently expected increase in tax revenues.

Therefore, tax effectiveness as a tool for promoting EcG remain inconclusive, as several studies show mixed impact of taxes on EcG. Furthermore, extant studies have not compared manual-tax system to e-tax system in Nigeria but the study by Olaoye & Atilola [18] that examined e-tax payment effect on revenue generation, and they found insignificant positive differences between pre- and post-VAT revenue in Nigeria. Given the case that studies have shown that countries such as Brazil and Mexico that have pursued tax digitalization have increased their tax revenue, there is need to transform the tax administration system and framework through digitalization and automation. Particularly that digitalization of tax collection and its administration is important to ensure greater transparency of the tax system and widening of the tax base.

*The main objective* of this research is to evaluate the pre- and post-e-tax revenue relationship with EcG in Nigeria. The results from this study are expected to be useful as a recommendation for government fiscal policies formulation. The remaining section of this study is structure as follows: theoretical framework, empirical review, methodology and hypotheses, results presentation, discussion, and recommendation.

*Hypotheses:* (1) the researcher expects taxes to contribute to economic growth and (2) that pre- and post-e-tax revenues have significant impact on economic growth.

## 2. Theoretical framework

Various framework has been used to investigate the relationship existing between taxation and EcG. The neoclassical growth theory and technology acceptance model (TAM) is used in this study.

Harrod [19] and Domar [20] were first to alleged that long-term growth is exogenously determined by saving rate. This theory was extended by Solow [21] and Swan [22] when technical variable was introduced and which is distinct from both labour and capital, and which varies with time as driver of growth. The neoclassical growth theory states that economic growth is a function of three factors: labour, capital and idea, and technology. The theory supposed that the differences in the pace of technological changes between countries are said to explain much of the variation in growth rate that we see. If so, we expect positive changes in use of technology to collect taxes to better off revenue collection which should culminate into EcG. Thus, neoclassical growth theory can be employed to explain pre- and post-e-tax period impact on EcG.

Davis & Davis [23] propounded the TAM. Davis & Davis [23] developed and validated new scales for perceived usefulness and perceived ease of use of new technology. Perceived usefulness and perceived was hypothesized to be a fundamental driver of users' acceptance of new technology. The study found that perceived ease of use may be a causal antecedent to a parallel, direct determinant of system usage. In the context of this study, if TAM relate the acceptance of e-tax and voluntary payment by taxpayer, which is one of the expected advantages of e-tax, then we expect e-tax-revenue and subsequently EcG to increase. Thus, TAM is useful as a framework to study pre- and post-e-tax revenue impact on EcG.

## 3. Empirical review

Nguyen et al. [24] examined the effects of individual, corporate and consumption taxes in the UK between 1973–2009. The study concluded that cuts to income taxes had significant positive effects on real GDP.

Similarly, Cloyne et al. [25], Ljungqvist et al. [26], and Mertens & Olea [27] concluded that reduction in tax rate increases real GDP and of course, better EcG. Increase in VAT on the other hand, have significant negative influence on EcG based on data from 51 countries over the period 1970-2014 used to examined VAT effect on EcG from Gunter et al. [28].

Awa [29] researched tax revenue relevance as a driver of EcG in emerging market economy using data extracted from Central Bank of Nigeria (CBN) over the period 2008-2018. The result is that PPT and CIT has significant positive association with EcG in Nigeria while VAT has inverse influence on EcG in Nigeria.

Denis [30] showed that VAT is not effective as a revenue earner in an examination of VAT impact on GDP in Nigeria.

However, Unegbu & Iretin [31], Izedonmi & Okunbor [32], Nasiru et al. [33], Asaolu et al. [34], and Bingilar & Preye [35] found that VAT has significant positive influence on EcG in Nigeria.

Omesi & Akpeekon [36] examined effect of CGT on EcD in Nigeria from 2011–2016 using secondary data extracted from CBN and FIRS. The study shows that CGT has significant positive impact on EcD in Nigeria. However, Kumai [44] examined CGT effects on total tax revenue and EcG in Nigeria for the period 2005–2018. The study shows that CGT has insignificant positive influence on total tax revenue/EcG in Nigeria.

In a study that examined the bearing between ETF and development of tertiary institution in Nigeria from 2009–2017, it was shown that ETF depicted significant positive relationship with staff training. This implies a positive relationship with EcG Nagbi & Micah [37].

Similarly, Ordu & Nkwoji [38] found that education tax revenue has a significant positive association with EcG in

an examination of education tax revenue impact on EcD in Nigeria over the period 2006–2017.

Furthermore, Inyiama & Nwankwo [39] examined CIT and tertiary education tax on Nigeria GDP. The study shows that CIT and ETF significantly and positively affects Nigeria GDP.

Onwuka & Orji [40] studied SD revenue effect on EcG in Nigeria. The study employed OLS on time series data collected from CBN, FIRS and National Bureau of Statistics (NBS). It was found that SD revenue has significant positive impact on EcG in Nigeria.

Ideh [41] examined tax revenue influence on EcD in Nigeria and found that PPT has insignificant negative association with EcD.

However, Asaolu et al. [34] shows that PPT has significant positive association with EcG in Nigeria. Asaolu et al. [34] examined the association between tax revenue and EcG in Nigeria. The study shows that CIT has inverse relationship with EcG.

On the contrary, Osho et al. [42] found that CIT has strong positive effect on GDP in Nigeria in an examination of CIT impact on GDP in Nigeria.

Chigbu & Njoku [43] analyses the association between tax and the Nigerian economy proxy with GDP. The study shows that CIT, PIT, PPT, and VAT has weak positive impact on EcG, individually.

Chiamaka et al. [2] examined electronic tax system impact on internally generated revenue in Nigeria. Electronic tax registration, electronic filing of tax revenue, an electronic payment of tax was used as proxy for electronic tax system. It was based on quantitative cross-sectional survey data from 94 valid responses. It shows that electronic tax payment does not significantly impact on internally generated revenue.

Olaoye & Atilola [18] studied e-tax payment effect on revenue generation in Nigeria. The study reported insignificant positive difference between pre and post VAT revenue with t-statistics and p-value of 0.520 and 0.012, respectively.

#### 4. Methodology

This study used quarterly secondary data of CBN Statistical Bulletin (real GDP) and FIRS tax statistics/report for the period 2011q<sub>1</sub> to 2020q<sub>4</sub> (quarterly actual collection from FIRS Planning, Research, and Statistics Department for VAT, CIT, PPT, ETF, CGT, and SD). Personal income tax is collected by States in Nigeria. Gathering and collating the actual quarterly figure was challenging for this study. Hence it was not included in the study's analysis. The data was divided into two period for analysis: from 2011q<sub>1</sub> to 2015q<sub>3</sub>, pre-electronic tax period (pre-e-tax) and from 2015q<sub>4</sub> to 2020q<sub>4</sub>, post-electronic tax period (post-e-tax), which correspond with when electronic tax system was introduced in Nigeria.

The study's data, a time series data is characterized by irregular fluctuations, seasonality and increasing or decreasing trend, and as such, they may be stationary or non-stationary. Thus, their mean, variance and covariance may change, or it may not change with a specified time respectively. Thus, Augmented Dickey-Fuller (ADF) and Philip-Perron (PP) unit root tests was employed to test the data unit root status. A known weakness of ADF and PP unit root tests is potential structural breaks challenges in the series. Unit root test will fail to reject the unit root hypothesis if the series has a structural break. On this basis, the Clemente and Montane Reyes methods was used for testing the existence or not of structural breaks. Should there be a structural break, the data will be differenced to make changes so that a stationary data is obtained before any analysis. The null hypothesis that the series has a unit root with structural break(s) was tested against the alternative that there are stationary with break(s).

The study's model was created using value of quarterly GDP as a proxy for dependent variable (EcG), while VAT, CIT, PPT, ETF, CGT, and SD are independent variables. Structural break(s) introduces uncertainty as to the true order of integration of the variables. Thus, the study will include an interactive dummy variable (DV) compiled as the product of dummy variable (pre-structural break = 0,

while post-structural break = 1) and GDP (proxy for EcG) if there is a structural break in GDP. The variables are presented in Table 1.

Where there is structural break, the Autoregressive Distributed Lag (ARDL) bounds test model is preferred for the study's analysis. ARDL bounds test yields valid results regardless of whether the underlying variables are  $I(0)$  or  $I(1)$ , or a combination of both. F-statistics and Wald tests was used to examine the null hypothesis of no cointegration among the variables in the ARDL bounds test. The estimated F-statistics value is compared with the two sets of upper- and lower-bounds critical values. The null hypothesis of no cointegration is rejected if the F-statistics value is higher than the upper- and lower-bound critical values. The conclusion is indecisive if it lies between the two critical values. On the other hand, if the F-statistics value is lower than the critical values, the null hypothesis of no cointegration is accepted.

The study's model is specified as follow:

$$EcG_t = \alpha_0 + \alpha_1 VAT_t + \alpha_2 CIT_t + \alpha_3 PPT_t + \alpha_4 ETF_t + \alpha_5 CGT_t + \alpha_6 SD_t + \alpha_7 DV_t + \varepsilon_t,$$

where  $EcG$ ,  $VAT$ ,  $CIT$ ,  $PPT$ ,  $ETF$ ,  $CGT$ ,  $SD$ , and  $DV$  are defined in Table 1;  $\alpha_0$  = constant term;  $\alpha_1$  to  $\alpha_7$  = independent variables coefficients;  $\varepsilon$  = model error term, and  $t$  = quarterly time.

However, interactive dummy variable term ( $\alpha_7 DV_t$ ) will be excluded from the model in the absence of a structural break.

The study will examine the variables statistical distribution, correlation, lag se-

lection, unit root, and some assumptions of classical normal regression to ensure goodness of fit of the model. The diagnostic checks include heteroskedasticity test, serial correlation tests, normality test, and cumulative sum of recursive residuals of square (CUSUMSQ). If the estimated coefficients are unstable though, cointegration is present, the obtained regression results will be unreliable. Thus, CUSUMSQ was employed to examine the residuals of the estimated error correction models to test for parameter constancy.

## 5. Results presentation

### 5.1. Clemente and Montane Reyes structural break test

Clemente and Montane Reyes structural break test confirmed the presence of structural break in 2013q<sub>3</sub> (pre-e-tax) and 2018q<sub>1</sub> (post-e-tax), respectively (Figure 1). Thus, effect of structural break was incorporated in the series by interacting it with GDP the proxy for EcG (see Table 1).

### 5.2. Paired sample t-test (differences in millions of Naira)

Table 2 present the paired sampled  $t$ -statistic on the subtraction order of pre-e-tax from post-e-tax. Based on the subtraction other, the EcG mean value of post-e-tax is higher than that of the pre-e-tax by 1,736,150. The  $t$ -statistics and  $p$ -value is 4.1646 and 0.0002, respectively. It implies a significant positive difference between post- and pre-e-tax EcG, connoting that post-e-tax has a strong positive effect on EcG in the examined period.

Table 1

**Variables, Measurement and Sources**

Variables	Symbols	Measurement	Source
Economic growth	$EcG$	Log of quarterly GDP	CBN Statistical Bulletin
Value added tax	$VAT$	Actual quarterly VAT	FIRS
Company income tax	$CIT$	Actual quarterly CIT	FIRS
Petroleum profit tax	$PPT$	Actual quarterly PPT	FIRS
Education tax fund	$ETF$	Actual quarterly ETF	FIRS
Capital gain tax	$CGT$	Actual quarterly CGT	FIRS
Stamp duty	$SD$	Actual quarterly SD	FIRS
Interactive dummy variable	$DV$	Structural break dummy*Quarterly GDP	Compiled by researcher

Source: Compiled by researcher 2022

Table 2 also revealed that post-e-tax VAT, CIT, CGT, and SD mean revenue are higher than those of pre-e-tax by 89.490, 72.993, 2.950, and 6.114, respectively. Their respective t-statistics and p-values are 5.7257 and 0.0000, 1.9742 and 0.0561, 0.8051 and 0.4288, and 1.793 and 0.0881.

The result infers that there is a significant positive difference between post and pre-e-tax, for VAT at 1% level, for CIT at 10% level and for SD at 10% level,

respectively, and insignificant positive difference between post and pre-e-tax for CGT revenue. On the other hand, mean revenue of post-e-tax PPT and ETF are less than those of pre-e-tax by 222.766 and 0.182, respectively. It suggests that while post-e-tax has significant negative effect on PPT revenue (-4.3121, 0.0001), post-e-tax has an insignificant negative influence on ETF revenue (-0.0121, 0.9904).

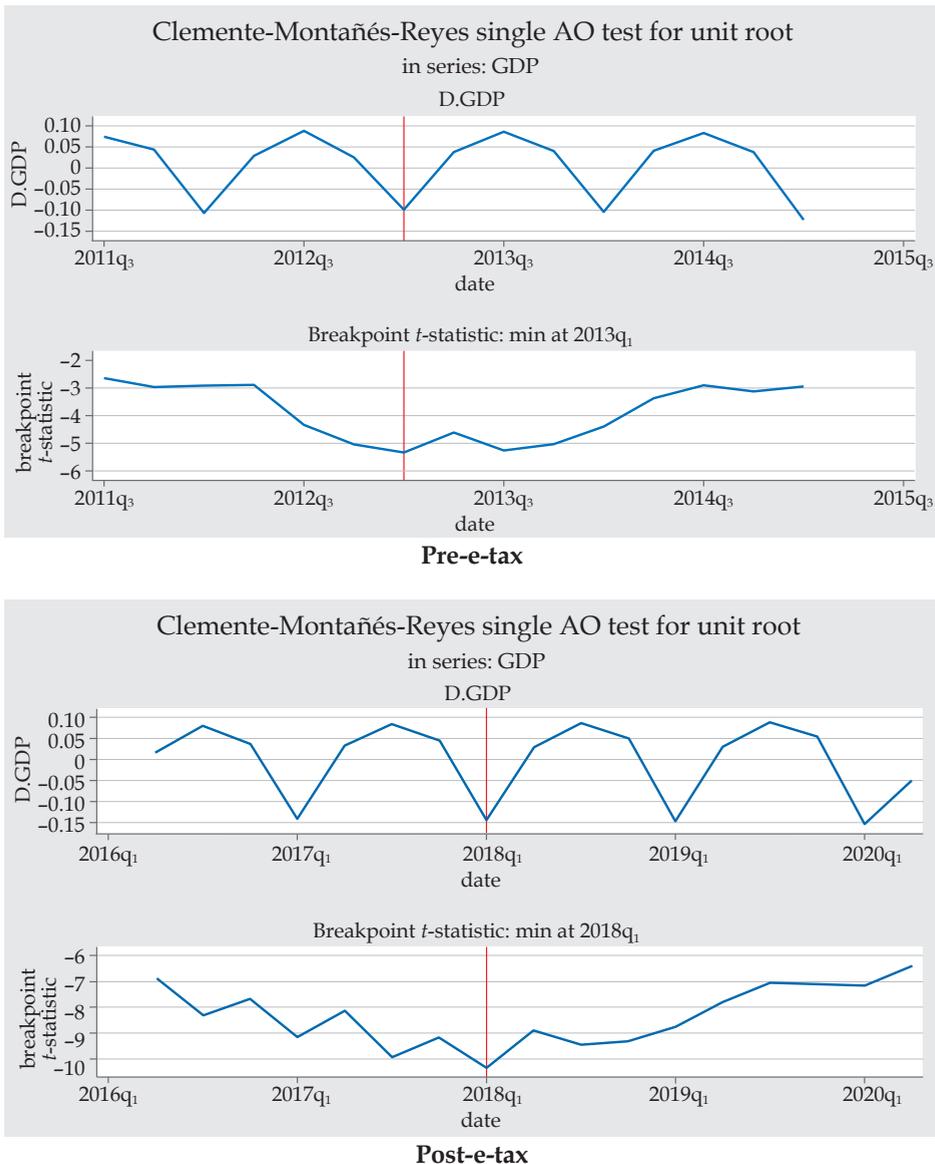


Figure 1. Clemente-Montañés-Reyes Unit Root Test with Single Structural Breaks  
 Source: Researcher using data from FIRS (see Table 1)

**5.3. Correlation matrix**

Correlation matrix is presented in Table 3.

In pre-e-tax, the correlation between EcG and the independent variables are positive except that between PPT (-0.658\*), and CGT (-0.121) which are negatively correlated to EcG. VAT (0.695\*), CIT (0.512\*), PPT (-0.658\*), ETF (0.468\*), SD (0.586\*), and DV (0.885\*) are correlated with EcG at 5% significance level while CGT (-0.121) is insignificantly correlated to EcG. The correlations are moderate with VAT, CIT, PPT, ETF and SD, strong with DV but weak with CGT.

Among the independent variables, we have strong correlation between VAT and DV (0.764\*), and PPT and DV (-0.833\*), moderate correlations between VAT and CIT (0.386), VAT and PPT (-0.653), VAT

and SD (0.453), CIT and PPT (-0.377), CIT and ETF (0.402), CIT and CGT (0.416), CIT and DV (0.506\*), and SD and DV (0.484\*). The other correlations are weak.

In post-e-tax, EcG has positive correlation with all independent variables. The correlation is moderate with CIT (0.307), and DV (0.532\*) but weak with VAT (0.270), PPT (0.169), ETF (0.271), CGT (0.168), and SD (0.234). Among the independent variables, the correlation between VAT and SD (0.933\*), VAT and DV (0.804\*), and SD and DV (0.766\*) are strong. In both pre- and post-e-tax, the strong correlation is likely to create multicollinearity challenges. However, ARDL Bounds test regression will automatically stop the executed regression command should there be a multicollinearity challenge.

Table 2

**Paired Sampled t-Test**

Variables	Paired Differences (Millions of Naira)		t	Welch's df	Sig. value
	Mean	Std Dev.			
Pair1 Post-e-tax EcG - pre-e-tax EcG	1736150	416882.2	4.1646	38.2624	0.0002
Pair2 Post-e-tax VAT - pre-e-tax VAT	89.490	15.630	5.7257	23.2923	0.0000
Pair3 Post-e-tax CIT - pre-e-tax CIT	72.993	36.973	1.9742	35.6864	0.0561
Pair4 Post-e-tax PPT - pre-e-tax PPT	-222.766	51.661	-4.3121	36.4901	0.0001
Pair5 Post-e-tax ETF - pre-e-tax ETF	-0.182	15.052	-0.0121	39.6738	0.9904
Pair6 Post-e-tax CGT - pre-e-tax CGT	2.950	3.664	0.8051	23.5382	0.4288
Pair7 Post-e-tax SD - pre-e-tax SD	6.114	3.410	1.7930	20.0666	0.0881
Pair8 Post-e-tax DV - pre-e-tax DV	1.74e+07	270188.400	62.5338	20.0000	0.0000

Source: compiled by researcher, 2022

Table 3

**Spearman's correlation**

Variables	Pre-e-tax								Post-e-tax							
	EcG	VAT	CIT	PPT	ETF	CGT	SD	DV	EcG	VAT	CIT	PPT	ETF	CGT	SD	DV
EcG	1.000								1.000							
VAT	0.695*	1.000							0.270	1.000						
CIT	0.512*	0.386	1.000						0.307	0.397	1.000					
PPT	-0.658*	-0.653*	-0.377	1.000					0.169	0.442*	0.413	1.000				
ETF	0.468*	0.165	0.402	0.009	1.000				0.271	-0.008	0.570*	0.227	1.000			
CGT	-0.121	-0.247	0.416	-0.068	-0.025	1.000			0.168	-0.064	0.457*	0.078	0.310	1.000		
SD	0.586*	0.453	0.161	-0.297	0.232	-0.161	1.000		0.234	0.933*	0.283	0.507*	0.013	-0.191	1.000	
DV	0.885*	0.764*	0.506*	-0.833*	0.202	-0.058	0.484*	1.000	0.532*	0.804*	0.500*	0.478*	0.118	0.094	0.766*	1.000

Source: compiled by researcher

\* = correlated at 5% significant level

**5.4. Diagnostic tests/checks**

**Lag selection.** Table 4 presents the lag selection for unit root tests that included DV in the model. It shows the AIC, HQIC, and SBIC selection-order criteria results. Lags 3 and lags 4 was selected (the least value of AIC, HQIC, and SBIC with *p*-value < 0.05) for pre- and post-e-tax unit root test for the variables, respectively.

**Unit root.** ADF and PP unit root tests result is presented in Table 5. They shows the variables has combined stationarity at I(0) and I(1) in both pre- and post-e-tax, and at 5% critical value (-3.600) which suggests that ARDL bounds test model could be used for the study’s analysis. Note that in all cases of stationarity,

MacKinnon approximate *p*-value for *Z*(*t*) were < 0.05.

**ARDL Bounds Test Cointegration.** Pesaran/Shin/Smith [45] ARDL bounds test for cointegration was used to test for levels relationship base on the SBIC criteria (table 6). In the models with DV, F-statistics is 13.66 and 25.7 for pre- and post-e-tax, respectively. In the model without DV, F-statistics is 14.21 and 20.74 for pre- and post-e-tax, respectively. The F-statistics value are greater than the lower and upper critical value at 1 % in all four models. Therefore, there is cointegration among the variables in the long run for all models. And thus, ARDL Bounds test model was employed for the study’s analysis.

Table 4

Selection-order criteria								
Pre-e-tax (Sample: 2012q <sub>1</sub> -2015q <sub>4</sub> ; No of obs. = 15)								
Lag	LL	LR	Df	P	FPE	AIC	HQIC	SBIC
0	-393.167				2.3e+13	53.489	53.4849	53.8666
1	.	.	64	.	-4.9e-20*	.	.	.
2	3286.68	.	64	.	.	-422.223	-422.284	-416.559
3	3504.06	634.77*	64	0.000	.	-464.541*	-464.602*	-458.877*
Post-e-tax (Sample: 2015q <sub>4</sub> -2020q <sub>4</sub> ; No of obs. = 17)								
Lag	LL	LR	Df	P	FPE	AIC	HQIC	SBIC
0	-514.14				6.6e+16	61.4283	61.4673	61.8204
1	-274.468	479.34	64	0.000	1.8e+08*	40.7609	41.1117	44.2898
2	3454.18	7457.3	64	0.000	.	-390.374	-389.711	-383.708
3	3876.89	845.42	64	0.000	.	-440.105	-439.442	-433.439
4	4018.33	282.88*	64	0.000	.	-456.745*	-456.082*	-450.079*

Source: compiled by researcher, 2022

Table 5

	Pre-e-tax					Post-e-tax				
	Augmented Dickey-Fuller		Phillip-Perron		Decision	Augmented Dickey-Fuller		Phillip-Perron		Decision
	I(0)	I(1)	I(0)	I(1)		I(0)	I(1)	I(0)	I(1)	
EcG	-1.027	-0.865	-6.231*	-6.675*	<b>I(0)</b>	-1.356	-2.218	-5.211*	-5.546*	<b>I(0)</b>
VAT	-1.227	-2.231	-2.595	-7.107*	<b>I(1)</b>	-1.815	-0.009	-0.907	-5.114*	<b>I(1)</b>
CIT	-1.583	-3.593	-9.680*	-12.164*	<b>I(0)</b>	-0.502	-2.092	-3.844*	-8.215*	<b>I(0)</b>
PPT	-2.029	-3.373	-2.599	-4.404*	<b>I(1)</b>	0.359	-1.715	0.099	-5.807*	<b>I(1)</b>
ETF	-0.915	-4.412*	-5.503*	-9.898*	<b>I(0)</b>	-1.723	-3.692*	-8.161*	-8.954*	<b>I(0)</b>
CGT	-1.867	-2.111	-4.771*	-9.006*	<b>I(0)</b>	-3.801*	-3.266*	-3.910*	-6.479*	<b>I(0)</b>
SD	-2.152	-1.059	-3.866*	-6.651*	<b>I(0)</b>	-3.021	-3.234	-5.031*	-16.661*	<b>I(0)</b>
DV	-1.846	-1.795	-2.024	-3.973*	<b>I(1)</b>	-1.831	-1.661	-2.014	-4.223*	<b>I(1)</b>

Source: compiled by researcher 2022

**Diagnostic checks.** The study’s various diagnostic checks result is presented in table 7. *Durbin’s alternative test for auto-correlation/serial correlation* shows that the null hypothesis of no serial correlation cannot be rejected (p-values of 0.0846 and 0.9574 for pre- and post-e-tax, respectively for models with DV and p-value of 0.6246 and 0.2667 for pre- and post-e-tax, respectively for models without DV; are > 0.05).

The *White’s test for Homogeneity of variance* p-value for the 4 model test results are > 0.05. It suggests residuals are homoscedastic for all models in pre- and post-e-tax. *Jarque-Bera (JB) normality test* p-values for all models in pre- and post-e-tax period are greater than 0.05. The study fails to reject null hypothesis in all JB tests. Thus, the series are normally distributed based on JB normality test for all models in pre- and post-e-tax.

The normality of the variables was further conformed using *Skewness and*

*Kurtosis normality test.* The tests show that the models are normally distributed: their p-value > 0.05 in pre- and post-e-tax. Thus, Skewness and Kurtosis jointly reaffirmed normality of the series by the JB normality test.

*Ramsey RESET test* was also carried out to ascertain if the series has omitted variables. All Ramsey RESET test p-values are greater than 0.05 for pre- and post-e-tax. The diagnostic test results suggest the models will be well fitted.

**Testing for parameter stability.** The models long-run parameter stability was tested using CUSUMSQ to ensure that the estimated coefficients are stable (Figure 2a, 2b, 2c, and 2d). CUSUMSQ null hypothesis is all coefficients are stable. The plot of the CUSUMSQ stays within the 5% critical bounds in all cases. Thus, all coefficients for with DV and without DV for pre- and post-e-tax period are stable.

Table 6

**Pesaran/Shin/Smith ARDL bounds test for cointegration:  
Critical value (0.1 – 0.01), F Statistic, Case 3.**

With DV: Pre-e-tax: F = 13.66; post-e-tax: F = 25.7									
	(1 0)	(1 1)	(1 0)	(1 1)	(1 0)	(1 1)	(1 0)	(1 1)	Decision
	L_1	L_1	L_05	L_05	L_025	L_025	L_01	L_01	There is levels relation
K_7	2.03	3.13	2.32	3.50	2.60	3.84	2.96	4.26	
without DV: pre-e-tax: F = 14.21; post-e-tax: F = 20.74									
	(1 0)	(1 1)	(1 0)	(1 1)	(1 0)	(1 1)	(1 0)	(1 1)	Decision
	L_1	L_1	L_05	L_05	L_025	L_025	L_01	L_01	There is levels relation
K_6	2.12	3.23	2.45	3.61	2.75	3.99	3.15	4.43	

Source: Researcher 2022

Table 7

**Diagnostic checks**

	p-values of models that included DV		p-values of models that excluded DV	
	Pre-e-tax	Post-e-tax	Pre-e-tax	Post-e-tax
Durbin’s alternative test for serial correlation	0.0846	0.9574	0.6246	0.2667
White’s test for heteroskedasticity	0.6081	0.3303	0.2074	0.2362
Jarque-Bera test for Ho: normality	0.8283	0.9084	0.9513	0.2161
Skewness/Kurtosis tests for normality	0.9179	0.9454	0.9702	0.0730
Ramsey RESET test for omitted variables	0.8590	0.2680	0.8867	0.2264

Source: compiled by researcher 2022

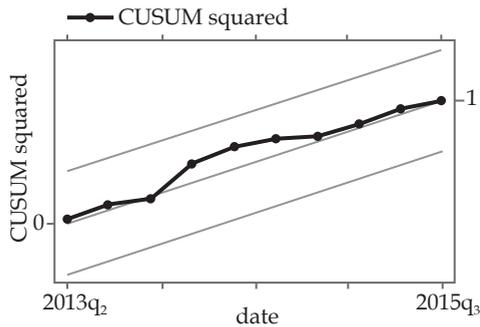


Figure 2a. Pre-e-tax CUSUMSQ with DV  
Source: Researcher 2022

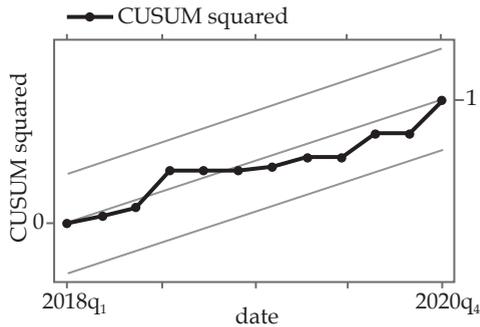


Figure 2b. Post-e-tax CUSUMSQ with DV  
Source: Researcher 2022

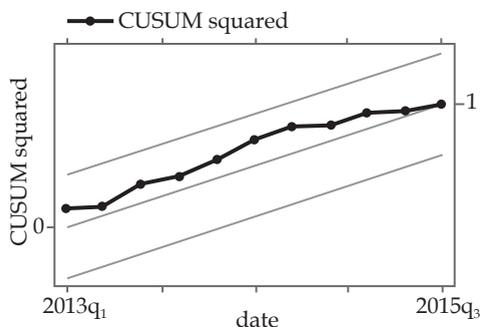


Figure 2c. Pre-e-tax CUSUMSQ without DV  
Source: Researcher 2022

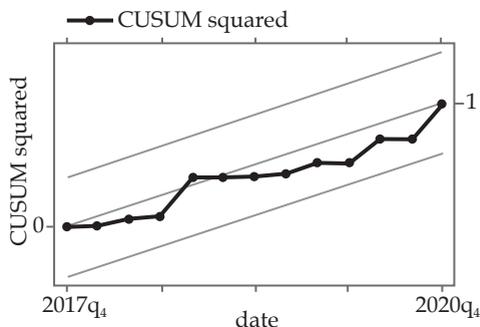


Figure 2d. Post-e-tax CUSUMSQ without DV  
Source: Researcher 2022

**5.5 ARDL Bounds test Regression results: Pre-e-tax and post-e-tax (column A & B) compared**

This study’s series has structural break: in pre-e-tax 2013q<sub>3</sub> and in post-e-tax 2018q<sub>1</sub> (see Figure 1). It is a known fact that the conventional unit root tests can yield misleading results when the data series exhibits shocks, and with break in a series, bounds test will yield inconsistent results. This has prompted having four models: two models that introduced break (DV) in column A and B and two models without DV in column C and D (see Tables 8a & 8b). Table 8a that incorporated shock effects are adopted for the study’s analysis.

The regression results for pre- and post-e-tax for with DVs are presented in Tables 8a while pre- and post-e-tax for without DV are presented in Table 8b.

Generally, their adjustment coefficients are negative indicating they have long-run equilibrium relationship among the variables at 1% level of significance. It suggests that their previous errors will be speedily corrected in the current period. As noted above, the results in Table 8b are adopted for the study’s analyses. In pre-e-tax, the explanatory variables explained 88.66% of variation in EcG while they explained 92.73% variation in EcG in post-e-tax. The speed of adjustment to economic shock is faster in post-e-tax (147.99%) than in pre-e-tax (61.69%).

**a. Long-run.** VAT has insignificant negative association with EcG in both pre-(-0.00373, 0.110) and post-e-tax (-0.00046, 0.116). In pre-e-tax, CIT have positive impact on EcG at 10% significant level (0.00044, 0.060) but insignificant positive impact in post-e-tax (0.00015, 0.252). PPT

has significant negative association with EcG in pre-e-tax (-0.00023, 0.040) at 5% level but insignificant negative impact in post-e-tax (-0.00009, 0.299). ETF has a strong direct impact on EcG in pre-e-tax (0.00284, 0.020) at 5% level but with an insignificant positive impact in post-e-tax (0.00038, 0.323). CGT has insignificant inverse relationship with EcG in both pre- (-0.00402, 0.251) and post-e-tax (-0.00009, 0.845). SD coefficient has a moderate direct bearing with EcG in pre-e-tax (0.05811, 0.061) at 10% level and a strong direct bearing with EcG in post-e-tax (0.00593, 0.045) at 5% level. Effect of moderated

dummy variable (DV) on EcG in pre-e-tax is insignificantly positive (0.00316, 0.219) while in post-e-tax, the effect of DV on EcG is strong and positive (0.00474, 0.035) at 5% level.

**b. Short run.** VAT first difference coefficient has an insignificant positive influence on EcG in pre-e-tax (0.00084, 0.225) but a moderately negative association with EcG in post-e-tax (-0.00226, 0.062) at 10% level. The study finds no association between first difference of CIT in pre- and post-e-tax. The coefficient of first difference of PPT in pre-e-tax is insignificantly positive (0.00012, 0.130) but significantly

Table 8a

Regression Results for with DV								
D.EcG	Pre-e-tax (column A)				Post-e-tax (column B)			
	ARDL (1,1,0,1,1,0,0,0) Regression Results				ARDL (1,1,0,1,1,1,1,1) Regression Results			
	Coef.	Std. Err.	t	p	Coef.	Std. Err.	t	P
Adj								
EcG								
L1.	-0.61688	0.15888	-3.88	0.008	-1.47992	0.27032	-5.47	0.003
LR								
VAT	-0.00373	0.00199	-1.87	0.110	-0.00046	0.00024	-1.90	0.116
CIT	0.00044	0.00019	2.32	0.060	0.00015	0.00012	1.30	0.252
PPT	-0.00023	0.00009	-2.62	0.040	-0.00009	0.00008	-1.16	0.299
ETF	0.00284	0.00090	3.14	0.020	0.00038	0.00035	1.10	0.323
CGT	-0.00402	0.00317	-1.27	0.251	-0.00009	0.00044	-0.21	0.845
SD	0.05811	0.02521	2.30	0.061	0.00593	0.00223	2.65	0.045
DV	0.00434	0.00316	1.37	0.219	0.00474	0.00166	2.86	0.035
SR								
VAT								
D1.	0.00084	0.00062	1.35	0.225	-0.00226	0.00094	-2.40	0.062
CIT								
D1								
PPT								
D1	0.00012	0.00007	1.75	0.130	0.00082	0.00023	3.56	0.016
ETF								
D1.	-0.00089	0.00019	-4.79	0.003	-0.00202	0.00030	-6.70	0.001
CGT								
D1.					-0.00231	0.00063	-3.67	0.014
SD								
D1					-0.00911	0.00336	-2.71	0.042
DV								
D1					-0.00266	0.00254	-1.05	0.342
_cons	10.5156	2.58959	4.06	0.007	17.5183	4.54276	5.44	0.003
				$R^2 = 0.9600$ ; Adj. $R^2 = 0.8866$				
				Root MSE = 0.0243				
					$R^2 = 0.9809$ ; Adj. $R^2 = 0.9273$			
					Root MSE = 0.0258			

positive (0.00082, 0.016) at 5% level in post-e-tax. ETF first difference recorded a strong inverse association with EcG in both pre- (-0.00089, 0.003) and post-e-tax (-0.00202, 0.001) at 1% level. There are no first difference association between CGT, SD, and DV and EcG in pre-e-tax. But in post-e-tax, first difference of CGT (-0.00231, 0.014) and SD (-0.00911, 0.042) coefficient has a strong inverse relation with EcG at 5% level while DV has insignificant negative bearings with EcG (-0.00266, 0.342).

**6. Discussion**

The study’s emphasis is to explore how pre-e-tax revenue and post-e-tax revenue influence on EcG. That is the process whereby the country’s real national and per capita income increases over a long period of time. Firstly, the model

is well fitted given the diagnosis checks and post estimations sturdiness. In this study, where there is an economic shock, post-e-taxes adjust faster than in pre-e-tax.

In the long run, the association between VAT and EcG in pre- and post-e-tax did not support the study’s expected significant relationship. The result support Denis [30] that reported VAT is not an effective revenue earner for boosting EcG. In the short-run, post-e-tax VAT coefficient depicts that increase in VAT will moderately decrease EcG. The negative associations suggest that an increase in VAT revenue will retard EcG in both pre- and post-e-tax in the long-run, and post-e-tax in the short-run which support the argument that VAT leads to an economy’s real sector collapse as it probably causes increase in prices of vatable goods and services Awa [29].

Table 8b

**Regression results for without DV**

D.EcG	Pre-e-tax (column C)				Post-e-tax (column D)			
	ARDL (1,0,0,1,1,0,0) Regression Results				ARDL (1,0,1,1,1,1,0) Regression Results			
	Coef.	Std. Err.	t	p	Coef.	Std. Err.	t	P
Adj								
EcG								
L1.	-0.63991	0.15342	-4.17	0.003	-1.20505	0.26180	-4.60	0.002
LR								
VAT	-0.00190	0.00121	-1.57	0.155	0.00013	0.00018	0.75	0.473
CIT	0.00042	0.00016	2.56	0.034	0.00026	0.00016	1.74	0.121
PPT	-0.00028	0.00008	-3.48	0.008	6.35e-06	0.00007	0.09	0.929
ETF	0.00284	0.00087	3.28	0.011	0.00099	0.00053	1.85	0.102
CGT	-0.00206	0.00289	-0.71	0.497	0.00039	0.00063	0.61	0.556
SD	0.05834	0.02084	2.80	0.023	-0.00058	0.00052	-1.12	0.297
SR								
CIT								
D1.					-0.00018	0.00015	-1.20	0.263
PPT								
D1.	0.00010	0.00007	1.44	0.187	0.00021	0.00011	1.90	0.094
ETF								
D1.	-0.00090	0.00019	-4.70	0.002	-0.00111	0.00027	-4.10	0.003
CGT								
D1.					-0.00088	0.00053	-1.67	0.134
_cons	10.73142	2.50496	4.28	0.003	19.88045	4.35419	4.57	0.002

$R^2 = 0.9420$ ; Adj. $R^2 = 0.8767$   
Root MSE = 0.0253

$R^2 = 0.9545$ ; Adj. $R^2 = 0.8919$   
Root MSE = 0.0315

The result fails to support earlier studies that show VAT have weak positive impact on EcG. Chigbu & Njoku [43], strong positive impact on EcG (Unegbu & Iretin [31] Izedonmi & Okunbor [32], Nasiru et al. [33], Asaolu et al. [34], Bingilar & Preye [35]), and strong negative influence on EcG Gunter et al. [28].

The result shows that in the long run, an increase (decrease) in CIT revenue will attract increase (decrease) in EcG. The CIT revenue positive influence on EcG is weak in pre-e-tax but insignificant in post-e-tax. However, CIT revenue has no impact on EcG in pre- and post-e-tax in the short-run.

The results neither support earlier reported strong positive association between CIT and EcG see Awa [29] and Osho et al. [42], nor inverse relationship between CIT and EcG Asaolu et al. [34]. Only the pre-e-tax result in the long-run supports Chigbu & Njoku [43] that found weak positive influence of CIT on EcG. The result suggests that in the long-run, CIT revenue weakly attracts EcG in pre-e-tax but trivially attracts EcG in post-e-tax.

In both pre- and post-e-tax in the long-run, an increase (decreases) in PPT revenue causes decrease (increase) in EcG. The long-run, result fails to corroborate earlier studies that reported that PPT have strong positive impact on EcG (Awa [29], Asaolu et al. [34]) nor weak positive influence of PPT on EcG Chigbu & Njoku [43]. The insignificant negative bearing between PPT revenue and EcG in post-e-tax in the long-run is supported by Ideh [41] that show similar result. In the short-run, post-e-tax PPT revenue significant positive impact on EcG supports Awa [29] and Asaolu et al [34] that recorded comparable result. The results suggests that in post-e-tax, increasing PPT may likely better EcG in the short-run but worsen it in the long-run. Furthermore, the strength of negative impact is strong in pre-e-tax but insignificant in post-e-tax.

In the long-run, an increase in ETF revenue has a strong inclination to increase EcG in pre-e-tax but will insignificantly increase EcG in post-e-tax. In the short-run, increase in ETF revenue in pre- and post-e-tax strongly cause EcG to fall. The pre-e-tax ETF revenue impact on EcG

in the long-run support earlier studies that recorded significant positive association between ETF and EcG (Nagbi & Micah [37] and Inyama & Nwankwo [39].

However, the strong negative association between ETF and EcG in the short run in this study did not support similar reviewed studies. The result depicts that in the long-run, ETF revenue significantly and insignificantly enhance EcG in pre- and post-e-tax, respectively. While in the short-run, ETF is not healthy to EcG in pre- and post-e-tax.

The result shows that in the long-run, increasing CGT revenue insignificantly weakens EcG in pre- and post-e-tax and did not support study's expectation of significant impacts. In the short-run, CGT revenue has no impact on EcG in pre-e-tax but an increase(decrease) in CGT revenue will significantly decrease (increase) EcG. The results fail to support Omesi & Akpeekon [36] that shows that CGT has a strong positive influence on EcG, nor Kumai [44] that shows CGT has insignificant positive association with EcG. The result suggests that in post-e-tax increasing CGT revenue insignificantly and significantly decreases EcG in the long-run and short-run, respectively.

The result of the long-run relationship shows that increase in SD revenue will moderately boost EcG in pre- and post-e-tax. In the short-run, SD revenue has no impact on EcG but shows that an increase in SD revenue will moderately cause a drop in EcG. While the long-run results contradict the notion that SD is universally recognized as one of the most inefficient and harmful taxes, and which is a barrier to economic growth see Fiona [46], the post-e-tax result in the short-run corroborated the notion. Thus, SD revenue moderately boost EcG in the long-run but retards EcG in post-e-tax in the short-run.

## **7. Conclusion**

The researcher suggests expanding the VAT base to possibly increase VAT revenue and EcG rather than increasing VAT rate. Given the weak positive association between CIT and EcG in post-e-tax, the study recommends stimuli for attracting

unlisted firms to be listed and to discourage tax avoidance and evasion.

This study's result shows a decrease from a strong negative association in pre-tax to an insignificant negative impact in post-e-tax. Probably, with some efforts to minimize PPT tax avoidance and evasion, and strengthening tax administration, PPT may reverse to positively influence EcG in post-e-tax, all things being equal. Since ETF is assessed alongside with CIT and PPT, perhaps, incentives for attracting unlisted firms to be listed and discouraging tax avoidance and evasion by listed firms that pay CIT and PPT will enhance ETF revenue positively on EcG.

The study's result suggests CGT revenue does not significantly support EcG in Nigeria. Perhaps, a reduction in CGT rate will probably better EcG. In view, the result suggests that SD base and rate may be increased to support EcG. This is with caution since a high tax rate coupled with weak tax administration will lead to widespread tax evasion through under declaration and tax avoidance. To optimize the relationship between tax structure and EcG, tax evasion, corruption, and tax avoidance should be checked. On the other hand, government should be transparent on the management use of collected revenue.

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### For citation

Emudainohwo O.B., Ndu O.M. Tax Revenue Impact on Economic Growth in Nigeria: ARDL Bounds Test and Cointegration Approach. *Journal of Tax Reform*. 2022;8(2):140–156. <https://doi.org/10.15826/jtr.2022.8.2.113>

### Article info

Received February 22, 2022; Revised May 25, 2022; Accepted July 16, 2022

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### Для цитирования

Emudainohwo O.B., Ndu O.M. Tax Revenue Impact on Economic Growth in Nigeria: ARDL Bounds Test and Cointegration Approach. *Journal of Tax Reform*. 2022;8(2):140–156. <https://doi.org/10.15826/jtr.2022.8.2.113>

### Информация о статье

Дата поступления 22 февраля 2022 г.; дата поступления после рецензирования 25 мая 2022 г.; дата принятия к печати 16 июля 2022 г.

Original Paper

<https://doi.org/10.15826/jtr.2022.8.2.114>



### Determinants of Value Added Tax in Oman

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#### ABSTRACT

Value Added Tax (VAT) system started to implement only in the year 2018 in Gulf Corporation Councils countries. The main purpose of this study is to understand to a great extent the determinants of VAT in Oman by using a qualitative approach. The research survey has used purposive sampling techniques to select a group of individual accountants who are working in a small and medium sized business. The study has considered respondents' basic knowledge in accounting and experience by adopting a qualitative approach and selected 26 respondents as sample size involving semi-structured interviews. The findings suggested that there is a positive impact on determinants of VAT (VAT law, VAT awareness, and VAT impacts) with the implementation of VAT in Oman. The study highlights the broad scope of VAT in Oman specially to remove VAT ambiguity among citizens. The study identified not only citizens believes on VAT but also each set of interviewees' responses can be understood in different ways. The paper provides a path for strategic insights and practical thinking by software providers, accountants, managers, governments, and the general public. The study has shown that the majority of the respondents did not exactly know about the overall scope of VAT, intra sales and purchase between countries, input tax, output tax, and zero tax. Determinants of VAT law, VAT awareness and VAT impacts are not well understood, especially by micro, small and medium enterprises. But the majority of the respondents were ready to accept and agree that VAT impacts Oman's GDP significantly.

#### KEYWORDS

Value Added Tax, VAT law, VAT awareness, VAT impacts, Oman

JEL H25, K34

УДК 336.226.3

### Детерминанты налога на добавленную стоимость в Омане

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#### АННОТАЦИЯ

Система налога на добавленную стоимость (НДС) начала внедряться в странах-членах Совета сотрудничества арабских государств Персидского залива в 2018 г. Целью данного исследования является определение отношения к внедрению НДС в Омане. В исследовании использован качественный метод полуструктурированного интервью. Для проведения исследования проведена целенаправленная выборка группы индивидуальных бухгалтеров, работающих в малом и среднем бизнесе с учетом их базовых знаний в области бухгалтерского учета и опыта работы. Для интервью было выбрано 26 респондентов. Полученные результаты свидетельствуют о положительном влиянии внедрения

НДС в Омане на выбранные детерминанты налога (закон об НДС, осведомленность о НДС и воздействие НДС). В исследовании подчеркивается, что широкая сфера применения НДС в Омане способствует устранению неопределенности в отношении налога. Исследование выявило не только то, как респонденты относятся к НДС, но и то, что ответы каждого из опрошенных могут быть поняты по-разному. Исследование предоставляет информацию, которая может использоваться для стратегического понимания и практического использования поставщиками программного обеспечения, бухгалтерами, менеджерами, правительством и широкой общественностью. Исследование показало, что большинство респондентов не совсем точно знают об общей сфере применения НДС, налогообложении продаж внутри страны и покупок между странами, входном налоге, выходном налоге и нулевом налоге. Выбранные детерминанты налога (закон об НДС, осведомленность об НДС и воздействие НДС) не очень хорошо понятны, особенно микро-, малым и средним предприятиям. Однако большинство респондентов высказали готовность принять и согласиться с тем, что НДС оказывает значительное влияние на ВВП Омана.

#### **КЛЮЧЕВЫЕ СЛОВА**

налог на добавленную стоимость, закон об НДС, осведомленность об НДС, влияние НДС, Оман

### **1. Introduction**

Gulf Corporation Councils (GCC) economies are depending mostly on the export of oil as their main revenue. Especially, Coronavirus pandemic and shutdown measures have plunged the global economy into a severe contraction. Value Added Tax (VAT) helps the GCC economy to cope with the recession and oil price collapse in the present economic situations. As a measure, it is important to know about VAT laws and their effective implementation by any developing country. VAT is the tax that is ultimately paid by the consumers on their consumption of the product and is considered as a tax on consumption. Hence it is also important to know VAT impacts in the society as well as VAT awareness among citizens. Therefore, using the results of this study helps the effective implementation of VAT in a country. So remarkably, we see that increased initiation to implement VAT in GCC countries since the year 2018.

VAT sometimes known as goods and services tax, or general sales tax is a type of tax that is assessed incrementally. It is levied on the price of a product or service at each stage of production, distribution, or sale to the end consumer. VAT system was implemented in many countries long ago, but it started to implement only in the year 2018 in GCC countries [1].

Out of the six GCC countries, Bahrain, Kuwait, Oman, Qatar, Saudi Arabia, and the United Arab Emirates, have signed the agreement paving the way for the introduction of VAT throughout the GCC in 2018. Out of this, 4 countries including Oman (at the time of the current study) yet to be introduced VAT. Despite extensive and comprehensive literature on this issue, there is controversy over the results of researchers that makes it tough to draw a united conclusion. Hence, reviewing, combining, and assessing the associated literature appears to be necessary for testing the reliability and generalizability of findings.

The main posed issue in this study is the presence of contradictory results in conducted studies on determinants of VAT which make the general conclusion difficult. However, a wide range of examinations are conducted on the determinants of VAT issues declared in their study and expressed that there is a significant relationship between determinants (VAT law, VAT awareness and VAT impacts of VAT) and VAT in Oman.

Beebejaun [2] highlighted some issues based on Organization for Economic Cooperation and Development's (OECD) and South African laws that may be useful to Mauritius prospective investors when drafting regulations on the imposition of VAT on foreign suppliers of digital services under the VAT Law.

Thottoli [3] analysed the different barriers faced by businesses in implementing compliance standards, with a special focus on Oman. As there are no taxes imposed on firms and individuals in the UAE, tax awareness had the great influence on Muslim business operators' attitudes throughout the post-VAT implementation era [4]. According to [5, 6], the repercussions of legacy difficulties for some critical VAT design issues are significant.

Based on the literature, the countries in GCC have faced several difficulties and challenges in the effective implementation of VAT and its awareness among citizens. For example [7] noticed that the participants in their study do not accept the implementation of VAT in Bahrain because they think that this will increase the price of the goods and services and will not improve the welfare of people in Bahrain. Alsharari [8] showed that legacy issues are important in their implications for some key VAT design issues. There are declining economies around the world, especially in Oman and other GCC countries in the last year due to novel coronavirus and lockdown has resulted from the price reduction in crude oil due to the decline in Gross Domestic Product.

The language barrier between taxpayers and the authorities, as well as differences between English-language and Arabic rules and guidance is complicating matters for many [9]. They recommended that there are notable challenges and problems faced by GCC countries including Oman for effective implementation of VAT which require attention and intervention by researchers and scholars. Oman, as a context of this study, has the implementation of VAT in the year 2021.

Thus, the set of problems and challenges mentioned above epitomizes a call for researchers to study and understand the determinants of VAT in Oman and the need of searching for issues among Oman as a whole.

The main purpose of this study is to understand to a great extent the determinants of Value Added Tax (VAT) in Oman by using a qualitative approach.

This research has developed the following hypotheses:

$H_1$ : New VAT law has considered as a determinant of VAT in Oman.

$H_2$ : VAT awareness has considered as a determinant of VAT in Oman.

$H_3$ : VAT impacts has considered as a determinant of VAT in Oman.

The remains of this paper are systematized as reviewing the related Literature review. Next, the Methodology is followed by discussions and implications. Finally, the paper includes the conclusions, limitations, and future research.

## 2. Literature Review

Implementation of VAT in Oman requires to know regulatory compliance, VAT registration compliance, VAT training for employees, output assessment, and post-implementation assistance. These are influences that try to remove ambiguity on practical implementation and give confidence to regulatory authorities, organizations, and citizens. Large-scale VAT implementation in the initial stage is not practical. Law enacting compulsion of VAT registration needs to consider organizations' turnover. As an initial stage of VAT implementation, the authority has to decide specific product under VAT law. Oman VAT laws pose countries reputational and financial risks.

Significant importance of VAT determinants (such as VAT law, awareness, and impacts on VAT in Oman) has motivated to review and study these factors separately.

### 2.1. VAT law and VAT in Oman

VAT is an indirect tax that has to be levied on goods and services. It is considered that a good tax system should have a balance between income tax and consumption taxes. Intra sales and purchase transactions between GCC member states have signed GCC VAT agreement. There is no GCC VAT applicable to the products which export outside the GCC country.

In United Arab Emirates (UAE), the export of products (goods/services) to countries outside GCC territory are not attract VAT in UAE. Hence the supplier

can claim the input tax credit on input if at all they use it. The concept of zero-rated VAT exempt tax is two different sections of the VAT law. To claim VAT exemption some companies, need to submit their tax return and or to show that the VAT has been taxed at zero percent. Every country has to implement domestic VAT laws and regulations.

Oman appears ready to adopt the recommendations of the International Monetary Fund (IMF) and put in place a tax system that will stabilize revenue and VAT and corporate income tax are considered. A VAT Framework Agreement, that functions like the VAT directive in the European Union (EU), has been agreed upon [10; 11].

There would need an agreement on VAT imposition on product and treatment of inter GCC supplies [12]. 24-Oct-2018 UAE established a federal tax authority (by decree) responsible for collecting and administering VAT in the country [13].

The EU has the longest and most extensive experience in operating a harmonized VAT system in a common market and as a result, a basic knowledge of the EU VAT is likely to be of assistance to policymakers in designing a common VAT framework for the GCC [14].

Broad principles that need to be complied with in their VAT Laws, though it is of key importance that Kuwait has entered into around 70 double taxation avoidance agreements [15]. Through reviewing previous literature about VAT law in Oman, it is provided that various academic studies were focused on the effect of VAT law in GCC.

## 2.2. VAT awareness and VAT in Oman

As an initial stage of VAT implementation, awareness of VAT computerization and other related aspects should be familiar to organizations and citizens. Awareness may include, knowing VAT applicable products, VAT exemption, VAT percentage, VAT calculations, VAT registration of companies, double taxation avoidance, VAT credit, knowledge of VAT software, VAT return. Most relevant factors such as sales tax, VAT, excise

duty, etc. were contributed to the effectiveness of improved services through computerized government services in the organization [16].

The E-government online method decreases the complicity of traditional tax methods [17]. Government, healthcare education, financial services are exempt from VAT [18]. Health and education sectors are exempt from VAT [15]. VAT is a single rate of VAT that is applied uniformly across all goods and services in the economy [19].

In the high-income GCC states, economic planners have examined the merits of placing higher VAT levels on luxury goods rather than those used by low and middle-income consumers [20]. VAT will be imposed not only on most domestic supplies of goods and services across each GCC country but also on purchases made from unestablished suppliers, which currently are untaxed [21].

One of the key elements in the establishment of a GCC VAT is the determination of a compulsory threshold for the registration of VAT taxpayers. Small traders with annual gross sales/turnover below a VAT registration threshold are exempted from tax [22].

Turkey signed agreements on avoidance of double taxation and reciprocal promotion and protection of investments with Bahrain, Oman, Saudi Arabia, and the UAE to facilitate bilateral and regional trade and boost commercial relations [23].

Taxable supplies and imports exceed AED 375000 per annum, a threshold limit for mandatory VAT registration [24]. VAT input tax on the purchase of taxable goods or services that have been paid and collected by VAT entrepreneurs is considered as VAT credit and can be credited with output tax in computing the VAT payable on the respective VAT return period [25].

With the application of VAT in the UAE, there is a need for updated software to cope with the new tax systems, as businesses did not have such software and technology due to the country not imposing taxes on businesses [26]. Customized accounting software can be used for better practice in accounting and auditing [27; 28].

A business that successfully implemented information communication technology in their accounting and auditing shows efficiency and effectiveness in business operational performance [29; 30]. A system of VAT is a summary tax system, whereby the seller of goods is required to file returns at the end of a certain period. In contrast, GST is a system that is based on the transaction [31]. The above-mentioned reviews were indicated various opposing explanations were suggested about VAT awareness and VAT in Oman.

### **2.3. VAT impacts and VAT in Oman**

Impacts of successful implementation of VAT in countries such as, boost to government, increased global competitiveness, increased accountability, improved advancement in business, adoption of information and communication technology, better organization operational efficiency, development of infrastructure facilities, social, environmental benefits to the economy and increased scope of consultancy services. Saudi Arabia introduced VAT in 2018 in order to diversify government revenues, shifting away from reliance on oil markets [32].

The introduction of new taxes, VAT, improves government tax revenue [33]. To increase productivity and competitiveness, it is necessary to maintain and continuously improve the business climate and reduce remaining barriers to foreign trade and investment [34].

The UAE offers lucrative opportunities for foreign investment and the strengths of the country include its easy access to oil resources, low energy costs, a willingness to diversify the economy and a high purchasing power, no direct taxation and low level of VAT, good-quality business climate [34].

VAT environment to optimize private sector development, improve transparency and accountability [35]. Businesses must identify the wider impact of the VAT on their business operations and adapt to comply [36].

The tax system will result in adopting innovative administrative procedures

to keep pace with the latest developments [37]. VAT implementation would contribute to improving the administrative efficiency of the tax system at large through coordination with the tax on commercial and industrial profits as well as coordination in the field of indirect taxation among states [38].

VAT generates economic growth, which helps the government to provide better infrastructure, health care facilities, transportation, etc. [37]. A system where distributional concerns are handled via income tax and social benefits, and that the VAT rate should be uniform across all goods [39].

The contribution of VAT to the growth of the economy and identify the reasons for implementing the VAT in the Kingdom of Bahrain and outline the effects, benefits, and challenges of doing so [40]. VAT will serve as a new source of employment with the creation of employment opportunities for men and women in VAT consultancies, thus generating a new industry of employment for oil-based economies<sup>1</sup>. Varied previous studies in line with VAT impacts in GCC has provided.

### **3. Research Methodology**

The research has used purposive sampling techniques to select a group of individual accountants who are working in a small and medium sized business, required for this survey. Research survey was administered in the month November 2020. Oman has VAT implementation on April 2021.

During this period, Omani business owners, accountants, consumers, and general public were in ambiguity that has occurred when there is lack of clarity or uncertainty about new VAT regime.

Thus, determinants of VAT law in Oman were relevant topics for Omani business accountants, owners, and consumers and the survey included respondents such as people who are accountants, owners and consumers. Each respondent spread over different small and medium

<sup>1</sup> Available at: <https://www.khaleejtimes.com/business/vat-inuae/is-vat-more-of-a-burden-for-women-than-men>

business accountants or owners whose activities stretched geographically throughout Oman. To provide the estimation method, this current study used a purposive sampling technique to choose the required interviewees for the survey [41].

The study has considered respondents' basic knowledge in accounting and experience by adopting a qualitative approach and selected 26 respondents, which are chosen as the target respondents, as sample size involving semi-structured interviews. The rationale behind chosen targeted respondent is because of these group has to get ready to adopt and implement VAT in their business. The respondents were asked to make the assumptions on VAT law, VAT awareness and VAT impacts, while filling up the questionnaire. The respondents participated in the survey and showed keen interest in the whole process.

### 3.1. Survey and interviews

The preliminary survey was designed to realize potential candidates for the semi structured interviews and were included demographic questions. Below Table 1 shows that there are 24 (92.3%), 22 (84.6%), 17 (65.4%) of respondents were accountants, Omani, and Male respectively; and 2 (7.4%), 4 (15.4%), 9 (34.6%) respondents were business owners, Non-Omani, and female respectively.

After, the interview was followed by five in-depth structured open-ended ques-

tions. Each interview starts with a general understanding of VAT law considering the respondent's general knowledge and scope of value-added tax (e.g. "Give us your understanding on VAT Law in General"). This initial question helps the respondents themselves in a situation that aids them to think about the VAT law in Oman. Followed by this, other questions such as (e.g. "Do you know Value Added Tax Law in Oman?"; "Tell us your level of VAT Self-awareness"; Are there any impacts in society/business after successful implementation of VAT in Oman?", etc.) were included. Finally, the interview would use to evaluate the respondents thought about the overall VAT regime in Oman.

## 4. Results and discussion

### 4.1. Determinants of Value Added Tax in Oman

The current study was carried out to discuss determinants of VAT in Oman that were categorized into three VAT determinant strategies: VAT law, VAT awareness, and VAT impacts on value-added tax in Oman. Some of the recent studies in the field of VAT law, VAT awareness, and VAT impact [42-49] to validate the results of the method analysis, in the second interview phase, the participants were requested to state on general understanding about VAT law. Most of the interviewees (23 out of 26) were knows the meaning of value-added tax and it will bear ultimate-

Table 1

Interview Respondents			
Details	Respondents	Number	Percentage
Present Position	Accountants	24	92.3%
	Business Owners	2	7.4%
Total		26	100%
Details	Respondents	Number	Percentage
Nationality	Omani	22	84.6%
	Non-Omani	4	15.4%
Total		26	100%
Details	Respondents	Number	Percentage
Gender	Male	17	65.4%
	Female	9	34.6%
Total		26	100%

ly by the consumer. The interviewees indicated that the tax collected under VAT law will be an additional income for the government, consequently enhancing better economic conditions.

In contrast, the other 3 interviewees expressed that they don't even know the meaning of value added tax. Above all, none of the interviewees knows about Intra sales and purchases between countries; Input tax; Zero tax, and VAT exemption. On this point, the majority of interviewees merely replied that "I don't know". It is crucial to understand VAT-related terms of a concept such as intra sales and purchase between countries; input tax; VAT exemption and, zero tax to describe and understand the application of VAT. This is in line with the opinion of [38, 50]. The intra GCC linked transactions (purchase/sale of goods or services) in the future will be followed similar as intra-European Union transactions [17].

During the third phase of the interview, the participants were requested to state on Value Added Tax regulations in Oman. Eight out of twenty-six interviewee knows the VAT percentage as 5%. The remaining Eighteen respondents were not replied. Some of the respondents, P1 pointed that "The administrative authority for value-added tax in Oman imposed a 5% tax on goods and services while exempting some goods and services from tax, [...]" and P2 "The date for the application of this tax is 180 days after the date of publication of this decree in the Official Gazette so that the Sultanate will join the 160 countries that implement the value-added tax around the world, [...]", P8 opined "[...] but perhaps the tax may be added to a list of goods and products with the aim of achieving interests that are not only financial. For example, the added tax on soft and sweet drinks with the aim of reducing their use [...]" P14, "[...] to support the economy of the country [...]" and P16, "[...] Oman will follow the VAT practices of UAE/KSA [...]". Seven interviewees merely replied that, "I don't know about VAT law of Oman". P6 mentioned that "[...] no detailed release of VAT regulations [...]". Thus, VAT laws and regulations are one of the determinants of VAT.

This result is consistent with some of the previous studies [31, 9, 17] now VAT regulations taxpayers have been provided with a full set of rules that benefit stakeholders to understand their obligations and the impact of VAT on their business.

During the fourth phase of the interview, we had asked them about their level of VAT self-awareness, some of them were concluded P1, "[...] very simple awareness [...]"; P3, "[...] all consumption goods and services for any residents (tourists are exempted) [...]"; P5, "[...] VAT started with products which damage health such as cigarettes and alcohol. It will continue to cover unhealthy products but basic products of living in Oman will be exempted [...]"; P8, "[...] I do not know, but the added tax is calculated in different ways to suit all parties. Some companies may be exempt from this type of tax based on the services they provide to the state or based on their contribution to projects that benefit the state [...]"; P9, "[...] minimum knowledge [...]"; P13, "[...] the added value is greatly profitable for the state, and our current society is in great need of it [...]"; P14, "[...] most valuable product has more applicable of increasing the VAT [...]"; P16, "[...] unable to answer since, ruled and guidelines are yet to be announced in Oman [...]"; P19, "[...] It will exclude from the tax basic food commodities, health care, education, financial services, home rentals, supplies of crude oil, petroleum products, and natural gas [...]"; P20, "[...] a percentage added to the consumption value, except for several items that are not included [...]"; P21, "[...] the value-added tax is an "indirect" tax whose value is borne by the final consumer, while the supplier (taxable) calculates and collects the tax and pays it to the tax authority. it is also considered a tax on consumption that will be applied in the sultanate at a basic rate of 5% [...]"; P25, "[...] I do not know, but the added tax is calculated in different ways to suit all parties. some companies may be exempt from this type of tax based on the services they provide to the state or based on their contribution to projects that benefit the state [...]" and P26, "[...] 5% on non-essential goods [...]".

Thus, VAT awareness among citizens is one of the other determinants of VAT. This result is supported with some

of the earlier studies [51] pointed that education programs create awareness of laws and [52] noted it is also important to have good basic knowledge in taxation and awareness of how legislation impacts companies.

Later in the fifth phase of the interview, interviewees were asked about the impacts in society or business after successful implementation of VAT, 14 interviewees out of 26 were positively responded. For instance, P1, “[...] the value-added tax will lead to an increase in government revenues, which will contribute to the development of government projects, such as infrastructure, health, and social services [...]”; P4, “the Omani GDP will increase due to the imposition of this tax, but there is a possibility that the purchasing power decreases, and thus the gross domestic product will decrease [...]”; P5, “[...] support government budgets, minimize expenditure in the health sector and will contribute to reducing public debt. It may improve consumption culture [...]”; P8, “[...] the beauty of applying the value-added tax is that its goal is not only a financial return. Rather, adding them is based on other goals, including reducing the long-term consumption of some harmful products [...]”; P9, “[...] yes it could be helpful but only if the money used in the right places [...]”; “[...] certainly, its effects will become evident after a while in terms of job opportunities, projects, infrastructure, and the economy in general [...]”; P13, “[...] it has somewhat positive effects, resulting in increased income for the state and citizens, and improved business progress and efficiency as well [...]”; P19, “[...] the application of the value-added tax will have a positive impact on the economic and social development and on the international competitiveness of the Sultanate, as the financial resources obtained from it will contribute to building a sustainable economy for future generations, and it will also contribute to improving public services and continuing the development of infrastructure in the future [...]”; P20, “[...] a positive impact on the internal and external economy of Oman [...]”, and P21, “[...] it is expected that the value-added tax will provide an additional resource for the state’s public finances to ensure the conti-

nued quality of public services, and it will also support the achievement of the Sultanate’s goals to reduce dependence on oil and other hydrocarbon products as main sources of its revenue [...]”. Another 9 out of 26 were negatively responded, where P2, “[...] for the society it might decrease the consumption, however it’s a good thing for the government to increase its revenue [...]”. This is in line with what has been by [53].

The two of the business owners, (P3 and P6), has expressed negatively, P3, “[...] well it discourages consumption [...]”; P6, “[...] the index will be negative because domestic spending is already low, will decrease further, and purchasing power will decrease due to high prices, low pensions, and the lay-off of many employees from their jobs, such as early retirement [...]”.

Other interviewees, P7, “[...] from my point of view, the consumer’s purchasing power will be affected, meaning that he will reduce purchases that are covered by taxes, or he will go to buy the product from neighboring countries [...]”; P11, and P17 “[...] it affect local production [...]”; P16, “[...] whilst the burden of VAT could get shifted where there are corresponding credits yet, there could be cases where the VAT burden cannot be shifted. Regardless of the extent of incidence, the costs are likely to go up [...]”; P18, “[...] it has implications for raising the prices of all materials, forcing merchants to raise the prices of citizens and residents [...]”; and P24, “[...] it will add another burden on the citizens [...]”. Only one accountant, P15, responded that “[...] should not be any impacts, especially when the percentage of VAT is not too high [...]”. Another 2 out of 26 were expressed that they don’t have enough knowledge to answer the question. Consequently, VAT impacts on society and citizens are another determinant of VAT. This result is supported by some of the earlier studies [54]; [55] states that after successful implementation as a result of a growing base and increasing VAT compliance, VAT revenue and GDP increased in all member states.

In the last phase of the interview, were asked about their comments and acceptance of the VAT which can be summarized as Table 2 below:

Table 2

VAT Acceptance		
Acceptance	Number	Percentage
Acceptance without condition	13	50.0%
Acceptance with condition	11	42.3%
Not answered	2	7.7%
<b>Total</b>	<b>26</b>	<b>100%</b>

Thirteen out (50%) twenty-six respondents were ready to accept VAT in Oman without any condition, expressed P25, “[...] it is very good and most countries need it to diversify sources of income and control consumer distraction for some products and to attract their attention to other home-made products [...]” and P12, “[...] good because it will contribute to improving the country’s economy and thus improving per capita income [...]”. Another eleven interviewees are ready to accept with condition. The views of some of this category of interviewees, P1, “[...] good to accept as long as the percentage is proportional to the income of individuals [...]” and P2, “[...] it is good to have but it must be having some criteria that could fit both the rich and the poor people [...]”. The remaining two respondents were not answered.

Generally, the outcome of the semi-structured interviews remained consistent with and validated the qualitative findings observed which support that all determinants of VAT (VAT law, VAT awareness, and VAT impacts) had a substantial impact on Value Added Tax in Oman.

### 5. Implications

The current study has highlighted potential implications for the successful implementation of VAT. Most importantly, the findings enhance value-added tax and accounting literature. Moreover, the study provided an affecting discussion among citizens about VAT in Oman i.e., determinants of VAT, VAT law, VAT awareness, and VAT impacts. This would contribute to the literature by way of giving a better understanding of VAT compliance. SMEs can be used this finding as means to control their operational expenses, adopt of best information technology tools.

VAT in Oman leads organizations to get ready to integrate VAT into their existing accounting system. This research would be beneficial to suggest accounting software developers develop cost-effective technology tools for small and medium enterprises, especially small shops operated in villages. Small business owners or accountants who have little or no knowledge of VAT-compliant accounting systems can improve practical understanding of VAT-enabled accounting systems to achieve optimum benefit. Furthermore, business owners, managers, accountants, employees, customers, consumers, consultants, and the public get a robust understanding of the determinants of Oman’s VAT law, VAT impacts on society and among customers.

Awareness of VAT in Oman aid various stakeholders to eliminate ambiguity among themselves. Additionally, the findings highlight insights Higher Educational Institutions in Oman initiate by integrating VAT in the university or college curriculum. Finally, government and software vendors should also devise strategies that improve practical knowledge of VAT-complaint accounting systems in business organizations (such as manufacturers, service providers, distributors, wholesalers, and retailers) and educational institutions.

### 6. Conclusion

The main aim of the current study is to understand to a great extent the determinants of Value Added Tax in Oman. More precisely, VAT determinants (VAT law, VAT awareness, and VAT impacts) are significant factors that might be additional support for the successful implementation of the VAT in Oman.

Based on the review of literature and interviews with senior accountants and businessmen, this study facilitated to identification and examine VAT determinants with VAT law in Oman. This study has empirically investigated VAT determinants in Oman using qualitative research methods and there was no past qualitative study as such.

Based on the research, the study has concluded with indisputable facts that the majority of the respondents did not exactly know about the overall scope of VAT, intra sales and purchase between countries, input tax, output tax, and zero tax. They also don't have clear knowledge about VAT administration and VAT regulations in Oman. It is evident that among respondents, the majority of them don't have strong knowledge of VAT applicable products, exempted VAT products, and VAT calculations. But the majority of the respondents were ready to accept and agree that VAT impacts Oman's GDP significantly.

The findings have further revealed that VAT determinants employ a significant impact on the successful implementation of VAT-compliant accounting system in Oman by providing acceptable awareness updated VAT regulations among manufacturers, services, distributors, wholesalers, retailers, software providers, small business owners, and other

stakeholders. Hence, it makes accountants, business owners, consumers, and the general public that are more compliant and knowledgeable about the VAT law in Oman. Consequently, determinants of VAT law, VAT awareness and VAT impacts are not well understood, especially by micro, small and medium enterprises.

The current study was an initial attempt to assess determinants of VAT, VAT law, VAT awareness, and VAT impacts in Oman, and other several issues could also be examined in the future by the researchers. Similar research can be done using a quantitative approach. One likely avenue for researchers can be to consider the interactive effects of VAT on consumer products. Further, the current research has been conducted before the implementation of VAT in Oman.

Thus, the researchers can do an extensive study of the effects of post-implementation of VAT on small and medium enterprises, accounting, and consumer buying behavior in the Sultanate of Oman.

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### For citation

Thottoli M.M., Mamari N.A.R. Determinants of Value Added Tax in Oman. *Journal of Tax Reform. 2022;8(2):157–169*. <https://doi.org/10.15826/jtr.2022.8.2.114>

### Article info

Received January 8, 2022; Revised June 14, 2022; Accepted July 16, 2022

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### Для цитирования

Thottoli M.M., Mamari N.A.R. Determinants of Value Added Tax in Oman. *Journal of Tax Reform. 2022;8(2):157–169*. <https://doi.org/10.15826/jtr.2022.8.2.114>

### Информация о статье

Дата поступления 8 января 2022 г.; дата поступления после рецензирования 14 июня 2022 г.; дата принятия к печати 16 июля 2022 г.



### Ownership Structure and Tax Avoidance in Asia: a Systematic Literature Review and a Research Agenda

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#### ABSTRACT

The paper aims to understand the impact of corporate ownership structure on tax avoidance in Asian contexts. The ownership structure in Asia is concentrated in one group of shareholders, which enables this shareholder to have a significant influence on tax avoidance. This research mainly reviews published research articles. Search terms, such as ownership, tax avoidance, and tax aggressiveness were used in the search function in all fields of the papers from Scopus and Web of Science databases. This study captured nine pieces of empirical research after applying several filtrations (inclusion and exclusion) in the article search. Most of selected researches were conducted in China, while some in Southeast Asia. There are four review questions in this research, namely: (1) How do shareholders influence tax avoidance levels in Asia; (2) What is the best way to measure the level of ownership and tax avoidance; (3) What type of corporate owners do scholars study the most and the least; (4) What are the methodological gaps in the research topic (corporate ownership and tax avoidance) that future scholars should be aware of. The paper finds that different shareholders behave differently towards tax, and the behaviour is according to the host country's attributes, such as country settings, national tax policy, and investor protection levels. The study primarily helps governments and regulators understand the motives and techniques shareholders apply to avoid tax. Furthermore, it also provides repeatable methodological guidance in detail for future researchers to conduct a systematic literature review and for research students to formulate their hypothesis on the relationship between ownership structure and tax avoidance.

#### KEYWORDS

systematic literature review, tax avoidance, ownership structure, Asia

JEL G32, H26, Z11

УДК 336.228

### Структура собственности и уклонение от уплаты налогов в Азии: системный обзор литературы и программа исследований

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#### АННОТАЦИЯ

Цель статьи – понять влияние структуры корпоративной собственности на уклонение от уплаты налогов в условиях стран Азии. Структура собственности в Азии сосредоточена в руках одной группы акционеров, что позволяет этой группе акционеров оказывать значительное влияние на уклонение от уплаты налогов. В данном исследовании рассматриваются данные из опубликованных научных статей. Поиск термины, такие как собственность, уклонение от

уплаты налогов и налоговая агрессивность, были использованы в функции поиска по всем полям статей из баз данных Scopus и Web of Science. В данное исследование после применения нескольких методов фильтрации при поиске статей (включение и исключение) было включено девять эмпирических исследований. Большинство из выбранных исследований были проведены в Китае, а некоторые – в странах Юго-Восточной Азии. В исследовании поставлены четыре обзорных вопроса, а именно: (1) Как акционеры влияют на уровень уклонения от налогов в Азии; (2) Каков наилучший способ измерения уровня собственности и уклонения от налогов; (3) Какой тип корпоративных собственников ученые изучают больше всего и меньше всего; (4) Каковы методологические пробелы в теме исследования (корпоративная собственность и уклонение от налогов), о которых должны знать будущие ученые. В работе установлено, что различные акционеры ведут себя по-разному в отношении налогов, и это поведение зависит от характеристик изучаемой страны, таких как экономические условия, национальная налоговая политика и уровень защиты инвесторов. Исследование, в первую очередь, позволит правительствам и регулирующим органам понять мотивы и методы, применяемые акционерами для ухода от налогов. Кроме того, подробно изложены методологические рекомендации по проведению систематического обзора литературы, которые могут быть использованы учеными и студентами в будущих исследованиях при формулировке гипотез о взаимосвязи между структурой собственности и уклонением от уплаты налогов.

#### КЛЮЧЕВЫЕ СЛОВА

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### 1. Introduction

Taxes are one of the most important costs for firms [1] and are commonly perceived as the most considerable cost incurred by firms. Companies treat the tax expense like how they treat other expenses to achieve the targeted after-tax income possible. The effort to reduce the tax liability is called tax avoidance if legally done without altering one's consumption basket [2] or called tax evasion if done by breaching rules/regulations.

Avoiding taxes can be accomplished through various legal means, whereas evading taxes is a financial crime and can result in severe penalties [3]. While someone is punishable for tax evasion, tax avoidance refers to minimising tax payment/liabilities by planning tax allowable under tax law, thus unpunishable. Companies may have different preferences regarding their involvement in tax avoidance activities [4]. Indeed, these activities are considered risky corporate decisions [5].

Lower-income countries lose around 5.5% of their annual tax revenue or 52% of their public health budget due to tax avoidance [6], which is expected to increase salaries for medical workers in

rural areas for a better public health system. As around two-thirds of Asian countries are lower-income and developing, they potentially experience considerable economic consequences of tax avoidance abuse.

From the ethics perspective, tax avoidance is considered unfair as it is exclusively benefiting the shareholders (and others but less). Tax avoidance affects government revenue to be spent on the public, and the wider community that is ultimately served by government expenditure (on health, security, infrastructure, and welfare) is greatly affected [7]. Aggressively avoiding tax prevents governments from their primary resources [8]. This is why tax avoidance is also deemed to be a major issue related to economic consequences. However, further discussion is crucial to understand whether tax avoidance is ethical.

The ethical sides of tax avoidance depend on a person's philosophical beliefs in faith. As utilitarianists focus on the good consequences for greater benefactors of one's action, utilitarianist-capitalists believe that the private sector is more efficient in generating economic benefit for society than the public sector [9]. Others

believe that the tax revenue that governments have collected just serves the least advantaged members of society to narrow the gap and inequalities in society to create a fair civil system [10]. Thus, any efforts and intention that supports tax avoidance and others like that are greedy, unethical, and certainly of poor corporate citizenship [11]. Some others believe that if the societal harm is greater than the benefits provided in such actions, then aggressive tax planning would not meet an ethical determination under utilitarianism [12].

Companies have different preferences regarding their involvement in tax avoidance activities. The incentives to avoid taxes can be driven by numerous factors, such as size, leverage, profitability, and corporate governance [8; 13; 14]. Some investigate the effect of ownership structure on tax avoidance [15-18] since ownership structure is an important governance tool, especially in the absence of a strong legal environment. Hence, the incentives to engage in such risky activities may vary among different groups of shareholders [19].

The relationship between ownership structure and tax avoidance needs to be proved empirically as the correlation could be different in other countries with different economic settings and cultural backgrounds. However, the influence of ownership structure on tax avoidance is becoming interesting in Asia as concentrated equity ownership is common in Asian contexts [20], which makes particular shareholders control the decisions, including tax avoidance. There are In this region, studies on ownership structure and tax avoidance have been just explored profoundly in China [21-25] but less explored in other parts of Asia.

In more recent years, ownership structure has been tested to have a distinct impact on corporate tax planning [26]. Ownership structure can mean both shareholding concentration and shareholders' identity [27]. Shareholders are interested in profit after tax since this profit will be distributed to shareholders as dividends or kept in the company as retained earnings. Therefore, ownership

structure determines the direction of the company's operations [28], including the decision to avoid tax. Nowadays, studies focus on the ownership classes within its structure (managerial, foreign, and institutional ownership), which may influence the level of tax avoidance [29].

In developed countries, issues on ownership structure might not be captivating to study as the monitoring power of shareholders is dispersed to many shareholders. While in Asian developing countries, the ownership structure is concentrated [20], enabling the shareholder to exercise its majority power over the minority shareholders. This should be the main concern for researchers to investigate how these shareholders influence their companies to avoid tax. Currently, most published research articles are concentrated on some types of ownership structure, and the empirical research in Asian emerging economies is still scanty. Most of the previous research focuses on certain types of shareholders, i.e. family [4; 24] and government [30; 31], and on certain institutional settings like China [22; 32], Thailand [33], and Malaysia [34; 35]. Another reason why economies in Asia provide an appealing setting to study is that the Asian markets are emerging and massive, and they receive considerable economic impacts from tax avoidance practices.

This paper aims to explore empirical pieces of academic evidence on how different types of shareholders affect the level of tax avoidance in Asia.

## **2. Methodology**

### **2.1. Review Protocol**

ROSES (Reporting Standards for Systematic Evidence Synthesis), which was introduced by Haddaway et al. [36], has become popular as a review protocol for building an SLR paper. The SLR process starts by setting the research questions following the formulation of PICo: Population, Interest, and Context. The next step was systematic document searching, applying the three phases: identification, screening, and eligibility. Lastly, the selected articles were going through data extraction and data analysis.

## 2.2. Formulation of the review questions

The main objective of this SLR paper is to review published journal articles to understand the impact of corporate ownership structure on tax avoidance in Asian contexts. In SLR studies, it is highly encouraged to formulate a review question using mnemonics, also known as Research Questions Development Tools (RQDT) [37].

Some examples of RQDTs include PICOC (population, intervention, comparison, outcomes, and context), PICO (population, interest, context), and SPIDER (sample, phenomenon of interest, design, evaluation, and research type). As each of these RQDTs provides specific purposes, we thus, selected PICO to help us formulate research questions. The implementation of the PICO framework in this paper is detailly presented in Table 1.

This study mainly aims to review published journal articles on how each type of shareholder influences tax avoidance levels in Asian contexts. However, Mas-saro et al. [38] argue that an SLR should have at least three research questions to discuss one topic extensively. Therefore, the review questions of this SLR paper are as follows. (1) How do shareholders influence tax avoidance levels in Asia? (2) What is the best way to measure the level of ownership and tax avoidance? (3) What type of corporate owners do scholars study the most and the least? (4); and

What are the methodological gaps in the research topic (corporate ownership and tax avoidance) that future scholars should be aware of?

## 2.3. Systematic searching strategies

We employed the systematic identification, screening, and eligibility process proposed by Shaffril et al. [37] to retrieve relevant articles. These processes allowed authors to trace papers in a well-organised manner comprehensively. The sub-sections 2.3.1 to 2.3.3 explain in detail the searching strategies in this SLR paper. A summary of this part is presented in Table 2.

### 2.3.1. Identification

The first step of document search is to choose keywords to find relevant articles that extend existing topics in a particular field. Thus, keywords need careful consideration to select the correct terms [39].

We used several search terms, such as ownership, tax avoidance, and tax aggressiveness. In this case, we also used the term 'tax aggressiveness' since researchers usually used it interchangeably with tax avoidance. Then, we inputted these terms in the search function of Scopus and Web of Science (WoS). We limited our search within Scopus and WOS databases to ensure the quality of the papers.

Instead of searching the terms in a specific part of the paper (such as title, abstract, and keywords), we searched the terms in all fields of the paper, as some

Table 1

Review question development per PICO tools

Concept	Definition	Application
Population	The population is the type of literature to be reviewed.	The reviewed articles must be indexed in Scopus or WoS during 2015–2020.
Interest	Interest is the interesting issues or phenomena to be highlighted.	Not all shareholders are interested in tax avoidance. Previous researchers use various formulas to measure ownership and tax avoidance levels. Previous pieces of research have been discussing a particular type of shareholders more often than others. Future researchers might be interested in doing empirical research on how shareholders affect tax avoidance.
Context	The settings or areas of the population.	Type of ownership that impacts the tax avoidance in the Asian context.

papers may not contain the observed variables in the title, abstract, and keywords. Therefore, the complete Boolean operators for search within all fields are:

*ALL(tax-avoidance OR tax-aggressiveness AND ownership).*

These operators enable authors to identify articles that have “tax avoidance and ownership” or “tax aggressiveness and ownership” in the paper. Therefore, we obtained 2,786 research articles in Scopus and 2,419 in WoS indexes at this stage.

### 2.3.2. Screening

Screening is the second step in filtering papers by setting up the inclusion-exclusion criteria. This review paper restricted the articles published between 2015 and 2020. The chosen timeline is to include the latest empirical discussion on the ownership structure of Asian companies.

Since our discussion is more from the perspective of the economic impact of tax aggressiveness, we limit the screening process to articles published in business-related subject areas, such as Management, Accounting, Econometrics, and Finance. Therefore, we remove articles published in non-business-related fields, such as social sciences, STEM, and multidisciplinary, because those articles might discuss ownership structure and tax avoidance from non-business perspectives. These two screening criteria resulted in 1,536 remaining articles for Scopus and 941 for WoS lists.

The authors only used literature that had been published in its final form as a journal article. The literature must also include an empirical study conducted in Asia, where this topic is still uncommon but fascinating to explore. As a result, empirical investigations conducted outside of Asia were omitted. Furthermore, to minimise ambiguity, we only examine papers written in English.

There were 649 journal papers in Scopus and 177 in WoS indexes left at this point. The final stage of the screening process was to exclude papers that included tax evasion or tax aggression. It left 132 articles in each index to be screened for eligibility.

### 2.3.3. Eligibility

In this final step, we manually checked the articles that discuss ownership structure and tax avoidance inside the article. The three reviewers (authors of this paper) read the whole paper and extracted information from the articles, such as type of ownership, measurements of ownership and tax avoidance, and political context/country where the empirical study took place. The final number of articles that meet the eligibility is nine articles.

### 2.4. Quality Appraisal

Results of screening are presented from each of the reviewers to ensure the review consistency. We believe that having at least three people reviewing the articles' content could solve conflicts of disagreement. Any conflicts among the experts' opinions will be solved by majority choice. Besides, we only reviewed Scopus- and WoS-indexed journal articles to maintain the quality of the articles and the review.

## 3. Findings and Discussion

### 3.1. Review of the bibliographical of the selected literature

All of the reviewed articles and journals are impactful to the academic society, as shown in Table 3. The data from the third column, Citations, is the number of publications (within the same index) that cited the article. The data is derived from the database of Scopus and Web of Science. The most cited research article is the one by Bradshaw et al. [21] (75 citations) published in the Journal of Accounting and Economics, and the least cited article is from Chen et al. [22] (0 citations) published in the China Journal of Accounting Studies as of March 31, 2022. The second most cited paper is by Abdul Wahab et al. [34] (25 citations), followed by Li et al. [25] (14 citations).

The fifth column of Table 3 is the impact of the journal on the body of knowledge measured by normalised impact calculations, which are SNIP (Source-Normalized Impact per Paper) for Scopus and JCI (Journal Citations Indicator) for WoS journals. The most impactful journal is the Journal of Accounting and Econo-

mics, with a 3.553 impact factor, and the lowest impact factor is 0.110 for Asia-Pacific Management Accounting Journal (per observation on March 31, 2022).

This review is able to gather nine articles indexed in Scopus and WoS databases, many of which were published by reputable academic publishers. Out of two papers published by the university-owned press, one is indexed by WoS in the ESCI collections, and another is in Scopus. Corporate Ownership and Control that publishes the paper by Sudibyo and Jianfu [30] had been delisted from the Scopus journal list for a specific publication issue, while the others are still indexed by Scopus or WoS as of the beginning of March 2022. Details about the journals and their publishing house are exhibited in Table 4.

**3.2. Review of the methodology of the selected literature**

From the nine articles, a total of four papers focuses on China [21; 22; 25; 32], two on Malaysia [34; 35], and one each on Indonesia [30], Jordan [40], and the Philip-

pinas [41]. There are generally two types of proxies that researchers have used to quantify ownership: by percentage and a dummy. The ownership percentage is the comparison of a particular type of shareholder and total ownership. In this review, ownership by institutions [32; 34; 40], foreigners [40; 41], and managers [40], are measured by percentage. Some literature [21; 22; 25; 30] defines ownership by binary measurement to classify companies as government-owned companies. Rahman et al. [35] are the only ones who used percentages in measuring government ownership, which makes it possible to test how changes in ownership can affect the level of tax avoidance.

There are various scales used in measuring tax avoidance. This review recorded two articles [22; 32] employed Book-Tax Difference modifications (BTDs), such as total BTD, temporary BTD, and permanent BTD, as one of the tax avoidance measures, while others used ETR modifications (ETRs) such as GAAP ETR and Cash ETR.

Table 2

<b>Systematic searching strategies</b>						
<b>Research question:</b>						
<b>How does ownership structure in Asian companies influence tax avoidance?</b>						
<b>Systematic searching strategies</b>				<b>N articles Scopus</b>	<b>N articles WoS</b>	
IDENTIFICATION	Boolean operators on document search				2,786	2,419
	ALL(tax-avoidance OR tax-aggressiveness AND ownership)					
		Inclusion	Exclusion			
	Cover period	2015–2020	Before 2015; After 2020	1,794	1,411	
Subject area	Business fields	Non-business fields	1,536	941		
Document type	Full articles; journal articles	In-press articles. Books. Conference proceedings.	1,386	787		
SCREENING	Country/territory	Asian countries	Non-Asia countries	662	184	
	Language	English	Non-English	649	177	
	Keywords	Tax avoidance. Tax aggressiveness. Ownership. Types of ownership	All but: Tax avoidance. Tax aggressiveness. Ownership. Types of ownership	132	132	
ELIGIBILITY	Handpick empirical articles meeting the objective: Ownership (X) and Tax Avoidance (Y)			9		

Table 3

**The citations of the reviewed articles and journal impact**

No	Article	Citations*	Journal	Impacts
1	Agency costs and tax planning when the government is a major shareholder [21]	75	Journal of Accounting and Economics	3.553
2	Political connections, corporate governance, and tax aggressiveness in Malaysia [34]	25	Asian Review of Accounting	0.936
3	Controlling shareholders' incentive and corporate tax avoidance – a natural experiment in China [25]	14	Journal of Business Finance and Accounting	1.738
4	The impact of ownership structure and the board of directors' composition on tax avoidance strategies: empirical evidence from Jordan [40]	6	Journal of Financial Reporting and Accounting	0.785
5	The effect of institutional ownership on listed companies' tax avoidance strategies [32]	2	Applied Economics	1.029
6	Political connections, state-owned enterprises and tax avoidance: an evidence from Indonesia [30]	2	Corporate Ownership and Control	0.301
7	An analysis of the effects of foreign ownership on the level of tax avoidance across Philippine publicly listed firms [41]	1	DLSU Business & Economics Review	0.415
8	Government-linked investment companies' shareholdings and tax aggressiveness [35]	1	Asia-Pacific Management Accounting Journal	0.110
9	State ownership, performance evaluation, and tax avoidance [22]	0	China Journal of Accounting Studies	0.120

Note: \* as of March 1, 2022

Table 4

**Review of bibliographical information**

No	Article	Journal	Quartile	Publisher
1	The effect of institutional ownership on listed companies' tax avoidance strategies [32]	Applied Economics	Q2	Taylor and Francis
2	Political connections, corporate governance, and tax aggressiveness in Malaysia [34]	Asian Review of Accounting	Q3	Emerald
3	State ownership, performance evaluation, and tax avoidance [22]	China Journal of Accounting Studies	Q4	Taylor and Francis
4	Political connections, state-owned enterprises and tax avoidance: an evidence from Indonesia [30]	Corporate Ownership and Control	Q3	Virtus Interpress (2016)
5	An analysis of the effects of foreign ownership on the level of tax avoidance across Philippine publicly listed firms [41]	DLSU Business & Economics Review	Q3	De la Salle University
6	Agency costs and tax planning when the government is a major shareholder [21]	Journal of Accounting and Economics	Q1	Elsevier
7	Controlling shareholders' incentive and corporate tax avoidance – a natural experiment in China [25]	Journal of Business Finance and Accounting	Q1	Wiley-Blackwell
8	The impact of ownership structure and the board of directors' composition on tax avoidance strategies: empirical evidence from Jordan [40]	Journal of Financial Reporting and Accounting	Q2	Emerald
9	Government-linked investment companies' shareholdings and tax aggressiveness [35]	Asia-Pacific Management Accounting Journal	ESCI	Universiti Teknologi MARA

Specifically, the frequently-used measures from the options are the total BTD and GAAP ETR. The BTD is the difference between income measured for financial reporting purposes and taxable income. Using total BTD to measure tax avoidance is not merely due to its straightforward computation [42], but it has been used widely by the latest research [4; 32; 43] discussing tax avoidance.

Moreover, specific BTDs, such as permanent BTD and discretionary permanent BTD (DTAX), are the measures for companies with a certain level of tax aggressiveness, potentially breaking the tax system or being non-compliant [19]. The GAAP ETR is the reported tax expense on the financial statements compared with the before-tax profit. It can also capture the form of tax reduction implied in tax shelters and loopholes in tax laws [44], either through legal or illegal strategies [13].

ETR has an inverse effect on tax avoidance, and there is thus a greater involvement in corporate tax avoidance, which means lower values for the ETR. Table 5 presents the review results on the methodology.

### 3.3. Review of the types of ownership structures and their impact on tax avoidance

#### 3.3.1. Foreign ownership and tax avoidance

Foreign ownership is the ownership of shares held by foreign investors. Alkurdi and Mardini [40] discover a positive association between foreign ownership

and tax avoidance in Jordan, similar to what Shi et al. [41] found in the Philippines, which means that foreign investors, with their power and influence, can affect management to avoid tax.

The study supports the idea that foreign ownership increases the possibility of tax avoidance schemes. Foreign ownership effectively manages businesses, allowing for more options for tax avoidance by implying that their income falls between high and low tax rates in geographical regions [45]. This finding is in line with previous research, which has found a link between foreign ownership and tax avoidance strategies [21; 46; 47].

Because of the poor shareholder protection in the host country, foreign investors can have enormous influence over their investee enterprises [40]. As a result, the government and anyone concerned must take several steps to limit insiders' potency to maximise their self-interest by engaging in tax avoidance schemes. These foreign investors make use of the possibility to spread profit across their different operational outlets, causing multinational corporations to avoid paying taxes in the host country. Thus, the government should consider imposing laws and restrictions on corporation ownership structure.

Shi et al. [41] exposed that tax avoidance schemes have developed over the years and become more complex due to the high tax rates and narrow tax base imposed in the Philippines. The schemes may

Table 5

Review of methodology							
No	Authors	Country	Managerial	Governmental	Foreign	Institutional	Tax Avoidance
1	Alkurdi and Mardini [40]	Jordan	Percentage		Percentage	Percentage	ETRs
2	Bradshaw et al. [21]	China		Dummy			ETRs
3	Chen et al. [22]	China		Dummy			BTDs
4	Jiang et al. [32]	China				Percentage	BTDs
5	Li et al. [25]	China		Dummy			ETRs
6	Shi et al. [41]	Philippines			Percentage		ETRs
7	Sudibyo and Jianfu [30]	Indonesia		Dummy			ETRs
8	Wahab et al. [34]	Malaysia				Percentage	ETRs
9	Rahman et al. [35]	Malaysia		Percentage			ETRs

imply weaknesses in corporate governance mechanisms and hinder the government from providing quality public service. Shi et al. [41] found a positive relationship between foreign influence and corporate tax avoidance. Given the potential for greater tax avoidance, officials should carefully consider whether the costs of foreigner participation outweigh the benefits.

### 3.3.2. Governmental ownership and tax avoidance

Most Asian countries are developing countries with lax (or non-existent) regulatory enforcement. According to Bradshaw et al. [21], companies in developing countries may substantially be influenced by governments as shareholders and only minimally influenced by management interest. As per Sudibyo and Jianfu [30], politically linked enterprises are likely to pay fewer taxes in developing economies with a weak legal framework.

In China, research on ownership structure is quite complex in discussing government intervention as shareholders in corporate decision-making. For example, Chen et al. [22] looked at how local and central government ownership affects tax avoidance in Chinese businesses. They emphasised that the viewpoints on company performance and taxation differ for both government control types. After-tax profit is used by local government-owned companies in Shanghai, Guangdong, Zhejiang, and Fujian to evaluate their performance, whereas pre-tax profit is used by local government-owned companies in other provinces and central government-owned companies. As a result, corporate tax is treated differently by local and central government-owned businesses.

The ability of local governments and the federal government to encourage/reduce tax avoidance is vastly different. Bradshaw et al. [21] conclude that enterprises owned by local governments avoid paying more taxes than those owned by central governments. Li et al. [25] opined that local governments have direct control over the taxation authority, a location advantage, and cheaper communication costs

when dealing with local SOEs. However, local governments do not concern with tax avoidance since they are not CIT tax collectors, unlike the central governments.

Therefore, companies owned by local governments are more aggressive in tax avoidance than companies owned by central governments. Bradshaw et al. [21] also compared SOEs companies with non-SOEs in tax avoidance. They found Chinese SOEs pay more taxes than non-SOEs. Similarly, Rahman et al. [35] discovered that Malaysia's Government-Linked Investment Companies (GLICs) prevent tax planning (GLICs). The analysis demonstrates that the government's involvement in business ownership helps to secure government revenue.

Previous research conducted in Asia could not find a consensus on whether the ownership level by government bodies positively/negatively correlates with tax avoidance. The dissimilar findings can happen due to different cultures of the settings and sampling methods. In China, the governments used to own all corporations around their political influence/territories, and their shares and ownership could not be traded publicly until 2005 [21]. So, there is a different level of sense of belonging from governmental bodies toward corporations. On the other hand, governments in Malaysia manage their ownership through GLICs (government-linked investment companies), comprising seven investment companies. These GLICs govern the governmental shareholdings in the so-called GLCs (government-linked companies).

In a western context, Mafrolla [31] surprisingly found in Italy that government-owned enterprises, especially those owned by local governments, avoid tax more than private-owned firms. Despite the risk of damaging the firm's reputation and the political costs, government ownership was shown to avoid corporate income taxes. The local governments are not purely tax collectors because the revenue does not directly benefit the local government. Because of this, the local government paid less attention to tax collection, and local government-owned businesses were more likely to avoid paying taxes.

### **3.3.3. Institutional ownership and tax avoidance**

Institutional ownership is the ownership of shares by institutions, such as financial institutions, other companies, or organisations. Jiang et al. [32] have found that institutional shareholders in China's A-share market typically do short-term investments and frequent transactions. Thus, these institutional shareholders have a reduced level of involvement in corporate governance, allowing them to improve their tax avoidance capabilities.

The exciting notion is that when ownership concentration is high, the degree of tax avoidance within the company with low institutional ownership [32]. In other words, ownership concentration is interdependent on institutional investors concerning promoting corporate tax avoidance. When ownership concentration is low, the increase in institutional shareholding can significantly promote tax avoidance. Thus, institutional investors are likely to have a stronger promotional effect on tax avoidance when they have the opportunity to participate in corporate governance effectively.

Currently, in China, the individual power of institutional investors is weak due to the restrictions of the investment ratio policy, mixed-ownership reforms, the registration system, and the reduction in the dominant position and concentration of shares of the majority shareholder. Therefore, institutional investors should take advantage of this reform to improve corporate governance. The degree of tax avoidance by Chinese-listed companies is relatively low. Instead of promoting tax payment, regulators have encouraged institutional investors to invest with active participation in corporate governance, longer holding periods, and lower transaction frequency.

Contrastly, Alkurdi & Mardini [40] from Jordania and Abdul Wahab et al. [34] from Malaysia conclude that institutional ownership is negatively associated with tax avoidance. Institutional owners aim to reduce tax avoidance to improve the firm's performance. Institutional investors play a governance role and increase

monitoring levels in the firm [34]. Hence, this improvement may attract investors' attention as investing their capital in the firm depends on the business's performance success [16]. These owners focus on gaining more benefits by avoiding potential costs from tax authorities.

Alkurdi & Mardini [40] also suggested that institutional structures consider the cost of tax avoidance practices to outweigh the benefit. A firm's awareness of the commitment to paying accrued tax can reduce those agency problems among managers and owners. For example, in Indonesia, Resti Yulistia et al. [48] find that there is a positive effect of institutional ownership on corporate income tax avoidance.

Institutional ownership is a certain portion of the capital contribution of both local and foreign institutional shareholders. Previous researchers did not highlight or distinguish whether the institutional ownership belonged to local or foreign investors. Future researchers might hypothetically make an empirical prediction that there might be a possibility that there is a different tax planning behaviour between local and foreign institutional shareholders.

### **3.3.4. Managerial ownership and tax avoidance**

Alkurdi & Mardini [40] reported that a higher proportion of management ownership reduces the likelihood of tax avoidance in Jordan, a Western Asian country. According to the experts, managers who own many shares in a Jordanian company are less likely to engage in tax avoidance. Researchers from the Western world also back up these findings [14; 49; 50]. Managerial shareholders are more likely to be risk-averse and hence less looking to engage in risky decisions, such as tax avoidance, resulting in a misalignment of interests between managers and shareholders. Managerial owners may also believe that the costs of tax avoidance outweigh the advantages.

Those ideas may not be applicable in other places, such as Egypt [51]. It was discovered there that management ownership could facilitate tax avoidance. Similarly, as seen in Brazil [44], companies

with larger degrees of manager ownership have a higher level of tax avoidance. To boost the firm's value and long-term viability, managers may increase ownership levels, which may be enhanced by tax avoidance strategies [52; 53]. By aligning the interest with shareholders' interest, those managerial shareholders can obtain unobserved benefits they could not get before being shareholders [54]. Therefore, in Asian contexts, it concludes that there is a positive relationship between managerial ownership and tax avoidance.

### **3.4. Research agenda on ownership structure and tax avoidance**

Research on the effect of ownership structure on tax avoidance in emerging countries is scanty, as we found only nine articles published from 2015 to 2020 in the established database Scopus and WoS. The scarce evidence may be related to the complexity of the ownership structure in Asia. However, this review paper provides research agenda that future researchers could follow.

This review documents that very little research employs both BTDs and ETRs at once as tax avoidance measures. So, at most, researchers use only the modifications of either one ETR modification or one BTD modification to increase the robustness of their model. Both ETRs and BTDs might see a different perspective on tax avoidance. Thus, using a combination of measurements can provide more insight.

This review paper also suggests that future researchers should understand that using a dummy or a percentage delivers a different meaning. Using a dummy variable to explain ownership indicates whether that certain type of shareholder is a shareholder (indicated by 1) or not a shareholder (indicated by 0) of the firm.

This way, tax avoidance is motivated by the existence of ownership of a particular shareholder, regardless of the level of ownership. Measuring the ownership structure with a percentage could explain that tax avoidance is motivated by the ownership level of a particular shareholder. Future researchers should be careful

and have clear rationales when choosing the measure of ownership structure.

This research also finds that business in emerging countries is more into relationship-based markets, creating concentrated ownership in a typical Asian business environment. Concentrated ownership means the majority of the ownership is held by a certain investor or a group of investors. The family-owned business is also common in Asia [20], but the exploration of tax avoidance in family businesses is much under the radar.

Prior researchers have done, to some extent, research on ownership structure and tax avoidance in Asian contexts but very rarely discussed how family-owned firms avoid tax. The existing literature [4; 55; 56] discusses family ownership and tax avoidance outside the Asian context. Family ownership is an effective organisational structure [57], [58], especially in Asia, where relationship-motivated decisions are common. If the ownership is concentrated in a family, there will be lower diversification policies, long-term objectives, and greater reputational concerns [8]. Family-owned businesses usually firmly control the companies since the family members usually sit on the board, resulting in aligned management (minimal agency conflicts). In addition to that, family firms tend not to engage in tax avoidance since the firm must defend its big names and avoid future tax problems [8]. In the Indonesian setting, the related-party transactions (RPTs) are so strictly regulated by the government that makes family business owners prefer dividend payment minimisation as a strategy to avoid tax [59].

Asian economies provide interesting settings as emerging markets potentially lead global business and trades in the future. Additionally, developing countries, like many of the Asian states, considerably receive severe impacts from the practice of corporate tax avoidance. That is why the governments, as tax collectors and policy-makers, need to give attention to limiting unfavourable tax avoidance.

Through their research output, researchers could help the policy makers

by providing empirical evidence and suggestions. This SLR paper offers potential hypotheses that future researchers can propose for their future empirical research. The proposed hypothesis is that there is a positive relationship between those ownership levels by foreign, government, institutional, and managerial shareholders and tax avoidance in Asia.

#### **4. Conclusion**

This paper investigated how different shareholders avoid tax in Asia through a structured literature review. The shareholder types captured in this paper are foreign, governmental, institutional, and managerial shareholders. This SLR paper finds interesting findings on how these shareholders influence tax avoidance strategies.

The involvement of foreign shareholders is substantial in the corporate governance mechanism and for corporate growth. However, literature has said that foreign shareholders making investments in Asia tend to avoid tax due to the weak investor protection in Asia, especially in Asia's developing countries. These shareholders lower their tax contributions in their host countries by playing with differential tax rates between political territories (multinational transfer pricing).

Federal or national government bodies in Asia are corporate income tax collectors, while local governments do not collect income tax from corporations. These governments could also own, usually majority, shares. The companies are called government-owned companies when they own more than 50% of the shares. This paper finds that (national) government shareholders tend to not be involved in tax avoidance. Instead, they are concerned more with the national agenda by securing the corporate income tax. However, in countries where local governments could hold corporate shares, these (local government) shareholders avoid tax to a certain level as they are in charge of corporate income tax collection in the country.

Institutional shareholders invest some of their funds in other firms hoping to receive dividends and returns. This paper

finds that institutional shareholders in Asia contexts behave towards tax avoidance levels differently depending on their shareholding concentration and holding periods. Managerial shareholders also act differently for tax avoidance depending on whether these managers have satisfying benefits by being company employees. Literature has said managerial shareholders are eager to encourage tax avoidance if they want extra substantial benefits and returns.

In general, tax avoidance is a crucial topic to discuss as it impacts so much economic development. Even though it is legal, tax avoidance activities could impair governments' revenue, which reduces the governments' ability to run their agenda in improving national development. Theoretically, shareholders are expecting to earn after-tax income as much as possible through the default business goal of shareholders' wealth maximisation. So, efforts to minimise costs and expenditures, including corporate income tax expenses, would be implemented.

This paper reviewed empirical research literature discussing shareholder type and tax avoidance in the Asian region. It is seen that most research in Asia was conducted in China, while some in Southeast Asia. Research in other big and important economies in Asia that discussed the relationship between ownership structure and tax avoidance is undetectable in the article search.

In this study, we investigated how different types of shareholders affect the level of tax avoidance in Asia through a systematic literature review. We used a systematic literature review for this study using two established databases: Scopus and WoS. Our literature analysis finds that the ownership structures in Asian countries are concentrated ownership in specific types of shareholders, like foreigners, governmental bodies, institutions, and managers. Despite that, we find the literature scarce and limited as there are nine articles from the established databases meeting our literature search criteria.

Another type of ownership that is common in Asia but rarely discussed today is family ownership.

Research in ownership structure and tax avoidance is poorly explored in unique Asian settings. This review paper helps academicians and researchers find the research gap to be filled by future researchers. This study summarises the bibliographical history, methodology, and findings of the published articles. Besides that, this paper assists regulators in understanding that each type of shareholder has different motives and perspectives on tax avoidance. The understanding is crucial in helping regulators formulate legislation and policy, especially on shareholdings that consider different types of shareholders.

This study can also help researchers develop hypotheses for the empirical study in a specific economy. This study also provides implications for the auditors to understand the motives of different shareholdings that can influence their audit outcomes. The study is restricted to only two established databases, Scopus and WoS. Thus, future research can extend the database to expand the inclusion process of this systematic literature review. Additionally, future studies can be conducted to compare shareholdings between developed and developing countries.

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### **Acknowledgements**

This paper is part of doctoral research, which is funded by the Malaysia International Scholarship program, an initiative by the Malaysian Government. We are also very thankful for the time and sincere academic dedication of the anonymous reviewers.

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### **For citation**

Syukur M., Madah Marzuki M., Zakaria M. Ownership Structure and Tax Avoidance in Asia: a Systematic Literature Review and a Research Agenda. *Journal of Tax Reform. 2022;8(2):170–185.* <https://doi.org/10.15826/jtr.2022.8.2.115>

### **Article info**

Received *June 15, 2022*; Revised *July 18, 2022*; Accepted *August 4, 2022*

### **Благодарности**

Эта статья является частью докторского исследования, которое финансируется Малайзийской международной стипендиальной программой, инициативой правительства Малайзии. Мы также очень благодарны анонимным рецензентам за потраченное время и искреннюю академическую приверженность.

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### **Для цитирования**

Syukur M., Madah Marzuki M., Zakaria M. Ownership Structure and Tax Avoidance in Asia: a Systematic Literature Review and a Research Agenda. *Journal of Tax Reform. 2022;8(2):170–185.* <https://doi.org/10.15826/jtr.2022.8.2.115>

### **Информация о статье**

Дата поступления 15 июня 2022 г.; дата поступления после рецензирования 18 июля 2022 г.; дата принятия к печати 4 августа 2022 г.

Original Paper

<https://doi.org/10.15826/jtr.2022.8.2.116>

## Tax Revenue, Night Lights and Underground Economy: Evidence from China

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### ABSTRACT

This objective of this paper is to assess the correlation among economic growth, tax revenues, tax evasion and tax reforms in China. Especially, we explore the usefulness of a special proxy for economic activity: the amount of nightlight that can be observed from outer space as a measure of economic growth to measure its impact on tax revenue. Empirical analyses GDP and taxes were based on the data of National Statistical Yearbook of China from 1991 to 2020. The night-lights data was gathered from the United States Air Force Defense Meteorological Satellite Program (DMSP). Kuznets approach was used to estimate the correlation between China's GDP and taxes. The theoretical model to measure and calculate the sum of night illumination brightness was designed. We used the SUR-OLS method and the sum of night lights data to estimate its impact on China's tax revenues. We have found that the total tax revenue increases with the growth of GDP, revealing that China's GDP has not yet reached the Kuznets inflection point where the elasticity of tax revenue is equal to zero. That is, China's current GDP does not show serious tax evasion. To confirm the correlation between GDP and direct and indirect taxes, we have found that GDP and indirect tax revenue shows a J-shaped curve. However, the relationship between GDP and direct tax holds an N-shaped curve, indicating that indirect tax revenue is less likely to lead to tax evasion than direct tax revenue. The evidence suggests that there is a significant positive correlation between the sum of night lights and GDP, and the impact of sum of night lights on total tax revenue is also positive, but it is insignificant.

### KEYWORDS

sum of night light, underground economy, tax evasion, light pollution, defense meteorological satellite program

JEL D43, D69, H26

УДК 336.25

## Налоговые поступления, ночные огни и теневая экономика: данные из Китая

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### АННОТАЦИЯ

Целью данной работы является оценка корреляции между экономическим ростом, налоговыми доходами, уклонением от уплаты налогов и налоговыми реформами в Китае. Изучена возможность использования показателя количества ночного освещения, которое можно наблюдать из космоса, для измерения экономического роста и оценки его влияния на налоговые поступления. Эмпирический анализ ВВП и налогов проводился на основе данных Национального статистического ежегодника Китая за 1991–2020 гг. Данные о ночном освещении были получены из Оборонной метеорологической спутниковой програм-

мы. Для оценки корреляции между ВВП и налогами в Китае использовался подход Кузнецца. Для измерения и расчета суммы яркости ночного освещения была разработана теоретическая модель. Для оценки влияния суммарной яркости ночного освещения на налоговые поступления в Китае использован метод SUR-OLS. Выявлено, что общий объем налоговых поступлений увеличивается с ростом ВВП, что свидетельствует о том, что ВВП Китая еще не достиг точки перегиба Кузнецца, когда эластичность налоговых поступлений равна нулю. Это свидетельствует о том, что в текущем ВВП Китая отсутствует серьезное уклонение от уплаты налогов. Исследование корреляции между ВВП и прямыми и косвенными налогами продемонстрировало, что ВВП и доходы от косвенных налогов показывают J-образную кривую. Однако связь между ВВП и прямыми налогами имеет N-образную форму, что указывает на то, что доходы от косвенных налогов с меньшей вероятностью могут привести к уклонению от уплаты налогов, чем доходы от прямых налогов. Исследование показало, что существует значительная положительная корреляция между суммой ночного освещения и ВВП. Влияние суммы ночного освещения на налоговые доходы также положительное, но оно не значительно.

### **КЛЮЧЕВЫЕ СЛОВА**

сумма ночных огней; теневая экономика; уклонение от уплаты налогов; световое загрязнение; оборонная метеорологическая спутниковая программа

## **1. Introduction**

Economic growth is the basis of tax growth, but there are many factors that affect tax growth, including the adjustment of tax policies, tax base erosion caused by the underground economy, etc. In practice, there are some factors that affect tax that are not related to GDP. It can be seen that tax growth is the common result of many factors, and there is no direct comparative relationship between GDP and tax growth.

The most commonly used definition seeks to relate the underground economy to officially measured national income: including all presently not recorded productive (i.e. value-adding) activities which should be in the national product. Underground economy can be measured both directly and indirectly. Indirect methods are measured based on the comparison of macroeconomic aggregates (such as national accounts, cash transactions). However, indirect methods (especially monetary) often overestimate the level of undeclared work and say little about its socio-economic characteristics. Direct methods, on the contrary, are measured based on statistical surveys and have advantages in terms of comparability and detail but tend to underreport the extent of undeclared income [1].

In fact, there are several challenges to the collection of GDP data in many countries, including the absence of standardi-

zed national income accounting methods, lack of consistent methodology in data collection, the subjective response of the responders in ground surveys. But more importantly, in many countries, a greater percentage of economic activity is conducted within the underground sector than the ground sectors, and underground sector productivity is often excluded from the formal statistics [2]. Hence, estimation of underground economic activity from the nighttime lights may help to solve many of the difficulties associated with data which gathered through surveys.

This objective of this paper is to assess research on the correlation among economic growth, tax revenues, tax evasion and critical tax reforms of China's tax sharing system since 1994, and the implementation of replacing business tax with value-added tax (VAT) since 2012. Based on the previous arguments, so the following hypothesis can be proposed:

**Hypothesis 1.** In this research we use satellite images of night lights to measure and testify the correlation between the total amount of night lighting and GDP, and discusses whether the sum of night lights are positively correlated with GDP and reaches a significant level, If so, the sum of night lights is an effective proxy indicator of GDP, further, estimating tax revenue under the sum of night lights.

**Hypothesis 2.** In this research we use the data base of China's National Statistical Yearbook to measure the relationship between GDP and indirect tax revenue, and the relationship between GDP and direct tax revenue from 1991 to 2020, respectively. Thus, we discuss the empirical analysis results of the tax base erosion caused by the increase and decrease of GDP on direct tax and indirect tax, and compare them.

In sum, this paper is organized as follows. Section 2 is literature review. Section 3 denotes the methodology, research design and research model for estimating the correlation of GDP and the sum of night lights, measure empirical data and the empirical analyses and results are presented in section 4. Finally, in section 5 we summarize and draw some valuable conclusions.

## 2. Literature Review

The approach forecasts the relationship between GDP growth and aggregate tax revenues. IFS adopts this approach to forecast revenue from minor taxes after adjusting for tax changes announced in previous Budgets. (Giles and Hall [3]).

According to Schneider and Enste's [4] survey, during the last decades the underground economy was nearly three-quarters of the officially recorded GDP in Nigeria and Thailand, but it amounted to a noteworthy 15% in the OECD countries as well.

Milorad and Williams [5] indicate that 22.6% of all employees in Montenegro are unregistered employees. In addition, 17.5% of regular employees receive understated wages from their employers, mainly for the purpose of reducing the tax payment on the total salary payable.

Schneider [4] and Frey [6] focused on the research of tax losses caused by tax evasion of underground activities and interpret the underground economy as an indicator of an unhealthy state between citizens and government.

In recent studies, Zhou [7] shows the hidden income of the urban household in China is not less than 4 trillion and 800 billion yuan and the underground

economy scale accounts for as much as 25–49% of the GDP.

In a recent paper, Henderson et al. [8] denotes that the growth rate of night lights intensities is a useful proxy for the growth rate of GDP as well. They show that this estimate is not obviously biased by changes of measurement errors of observed GDP.

Gonzalez and Lrving [9] adopt satellite nightlights to weigh economic activity in México and discrepancies between estimated an official GDP for the purpose of identifying the underground economy.

In addition, several research findings show that the sum of night lights reflect human economic activity (e.g., Sutton & Costanza [10], Christopher et al. [11] and Tilottama et al. [12]). It is worth noting that the night light data released by NOAA came from the defense meteorological satellite program of the United States (DMSP) equipped with operational line scan system (OLS) sensor. DMSP / OLS sensors have been used in the 1970s. When it is applied, it can work at night and detect urban lights and even low-intensity lights from small-scale residential areas and traffic flow. This data reports every "30 seconds" on earth × light intensity ranging from 0-63 on the grid unit of "30 seconds", with a digital archive beginning in 1992. That is, the night light images were taken by the operational line scan system (OLS) carried by DMSP from 1992 to 2013.

Likewise, Elvidge et al. [13] propose that there is a strong correlation between night light, population, GDP and electricity consumption data. Other related research, such as measuring points at different heights and sky azimuths and drawing sky glow distribution maps (Garstang [14]).

Chalkias et al. [15] use DMSP-OLS to analyze space and build urban light damage models. In other research, Li et al. [16] show that the night sky brightness of Shanghai city is four times that of Tokyo city. Henderson et al. [8] believe that for low-income and middle-income countries, it seems reasonable and necessary to analyze the elasticity between real income and real light growth.

While Henderson et al. [8] denote that the correlation between GDP and SNL is stable at the country level, however, Bickenbach et al. [17] demonstrate that it is rather unstable at the regional level within countries. Hence, this paper only discusses the impact of China's overall night lighting on GDP and taxes, and does not separately discuss the impact of night lighting on GDP and taxes of cities and towns.

### 3. Research Design

#### 3.1. Data

Thinking about the source of the data for this article, our empirical analyses are estimated according to the data base of National Statistical Yearbook of China. In addition, as mentioned earlier, the sum of night lights data is gathered from the United States Air Force Defense Meteorological Satellite Program (DMSP). The night-lights data are gathered from Air Force satellites that have been circling the earth 14 times a day since the 1970s, which measure the light intensity emanating from specific geographic pixels.

#### 3.2. Methodology

Our methodology involves using the SUR-OLS method and Night Light Sum (SNL) data to estimate its impact on China's tax revenues. In research design, this paper discusses three underground economic evaluation methods (Gutmann\_UE[18] / Feige\_UE[19] / Tanzi\_UE[20]), PMI, government expenditure in the previous period, tax reform in 1994 and 2012, night lighting, and the impact of the above variables on tax revenue (TTR/ DTR/ ITR). In empirical analyses, the time series data covered the time period from 1991 to 2020. The tax revenues are the independent variable, whereas the nine selected variables which are classified as components of economic growth are independent variables (GDP, SNL, PMI, Dummy 1994, Dummy 2012, prior period government expenditure, Gutmann\_UE, Feige\_UE, Tanzi\_UE).

#### 3.3. The Model

The International Astronomical Union (IAU) sets the international standard for dark sky in 1997, which is defined as the

brightness of the night sky without moon without the influence of man-made light damage (light pollution). The standard is that the sky glow is 21.6mag/arcsec, and the natural brightness of the night sky at the full moon is 16mag/arcsec.

In this paper, we utilize several crucial variables to observe the usefulness of economic activity indicators and their impact on taxation. Especially, we explore the usefulness of a different proxy for economic activity: the amount of light that can be observed from outer space as a measure of economic growth to measure its impact on tax revenue.

By observing the total number of lighting sources at night through the satellite system, we propose a hypothesis that people can only see part of the whole sky when they watch the night sky through the satellite. In the beginning, we suppose the original night sky brightness (area) is  $A_0$ , the night sky brightness (area) visible through the satellite is  $A$ , then: satellite observation of light depth caused by night illumination on the earth's surface  $\tau$  can be expressed as:

$$A = A_0 e^{-\tau}, \quad (1)$$

where  $A < A_0$  indicates that the night illumination seen from the satellite is lower than the actual night illumination visibility on the earth's surface due to the influence of clouds and air pollution.

Nevertheless, we can calculate the light depth  $\tau$  via absorption coefficient  $k$  and  $s$  meters of DMPS satellite system from the earth's surface. Further, we demonstrate that DMPS data is adopted a spherical coordinate system, measured in degrees, 30 seconds which is approximately equal to 0.0083 degrees, and it is about 0.86 square kilometers near the equator. Such that:

$$\tau = \int kds = \int 1397 ds, \quad (2)$$

where absorption coefficient  $k$  can be measured through light source density  $\chi = 1.27 \text{ mcd/m}^2$  and the area of each light spot  $v$  is equal to one thousand and one hundred  $\mu \text{ CD/m}^2$ . Hence, the above is represented as follows:

$$k = \chi v = 1397. \quad (3)$$

Next, optical density (OD) is defined as an indication of the shading ability of a material. which is measured with a light transmitting mirror. The optical density has no dimensional unit and is a logarithmic value. In reality, the optical density is measured only for aluminized film and pearlescent film. Optical density is the logarithm of the ratio of incident light to transmitted light, or the logarithm of the reciprocal of light transmittance. In addition, the calculation formula is  $OD = \log_{10}(\text{incident light} / \text{transmitted light})$  or  $OD = \log_{10}(1 / \text{transmittance})$ , where the area of each light spot  $v$  and its diameter  $m$  can be expressed as:

$$v = \pi \left( \frac{m}{2} \right)^2 \sin \omega, \tag{4}$$

where  $\omega$  is the average inclination of the light spot, which is 45 degrees. Therefore, the light depth can be expressed as:

$$\tau = \int x v ds = H v, \tag{5}$$

where

$$H = \int x ds = \left( = \frac{\tau}{v} \right)$$

variable  $H$  is the column density, the assumption of column density  $H$  is multiplied by the total area illuminated at night by the region/country where the satellite is going to observe the earth (the surface area of the hemisphere multiplied by 2).

Thus, we can further calculate the total amount of nighttime illumination in the region or country of the earth to be observed on the satellite, such as  $Z$ , so that:

$$Z \sim 2\pi\gamma^2 H = \frac{2\pi\tau\gamma^2}{v} = \frac{2\pi\gamma^2}{v} \left( -\ln \frac{A}{A_0} \right). \tag{6}$$

Notice that from 1992 to 2013, NOAA took luminous images using the operating line scanning system (OLS) carried by "DMSP". Its value is equivalent to the  $Z$  derived from equation (6), which is used in this article.

Therefore, through empirical analysis, the relationship between the sum of night lights and GDP is estimated as follows:

$$\widehat{GDP}_t = aZ_t^2 + bZ_t + c. \tag{7}$$

According to the analytic results of SUR-OLS regression, we get:

$$\widehat{GDP}_t = -2.22E - 49Z_t^2 + 4.23E - 07Z_t - 1.714034. \tag{8}$$

Eq. (8) mainly focuses on testing the correlation between the sum of night lights and GDP. In Eq. (8), we depict the correlation coefficient between the sum of night lights (SNL) and GDP is 4.23E-07, reaching 1% significance level, denoting the increment of the sum of night lights is positively correlated with GDP. The empirical study confirms that changes of night lights intensities are a useful proxy of changes of true GDP as well (Henderson et al. [8]).

## 4. Research results

### 4.1. Empirical analysis

In this section, our methodology involves assessing the relationship among independent variables UE, GDP, China's major tax reform in 1994 and 2012 and explore their impact on total tax revenue (TTR) covering 1991-2020. This analysis is based on the data base of "National Statistical Yearbook of the People's Republic of China" and uses RMB as the unit measurement. Before the study of co-integration analysis, a unit root test should be carried out for individual variables to determine whether the integration order of variables is the same, and then the multivariate model was further analyzed.

At first, we adopt BDS Test- Serial Independence to check whether the time series variables are i.i.d. (see Brock et al. [21]; Willian et al. [22]). Table 1 depicts the p-values of all variables are 0.0000, Hence, we reject the null hypothesis that the variables are i.i.d.

Then, we use the overlapping variation ratio test of Lo and Craig [23], the null hypothesis denotes the parameter is a martingale. Table 2 shows that TTR and GDP are not a "martingale process" which demonstrates that variables GDP and TTR in this model are not random walking process.

Before conducting empirical research on time series analysis, it is essential to tackle with unit root problems and discuss the cointegration approach between the GDP, Gutmann\_UE, Tanzi\_UE and Feige\_UE for China over a time period ranging

from 1991 to 2020 as follow. The results of unit root tests are presented in Table 3, which demonstrates that independent variables Gutmann\_UE, Tanzi\_UE and Feige\_UE present stationary at the first order cointegration under 1% significant

Table 1

**BDS independence test (time period: from 1991 to 2020)**

Variable	Dimension	BDS statistic	Std. error	Z-Statistic	Prob
GDP	2	0.166377	0.012125	13.72213	0.0000
	6	0.265933	0.024577	10.82042	0.0000
TTR	2	0.166632	0.010993	15.15781	0.0000
	6	0.282599	0.023348	12.10402	0.0000
Gutmann	2	0.194879	0.010608	18.37087	0.0000
	6	0.543515	0.022509	12.10402	0.0000
Feige	2	0.142208	0.024968	5.695507	0.0000
	6	0.392875	0.054869	7.160298	0.0000
Tanzi	2	0.193853	0.009370	20.68861	0.0000
	6	0.530556	0.019822	26.76583	0.0000

Note: The original data source are derived from National Bureau of Statistics, China

Table 2

**Variance ratio test (time period: from 1991 to 2020)**

Variable	Period	Variance ratio	Std. error	z-Statistic	Prob
GDP	2	1.766613	0.196148	3.908350	0.0060
	4	3.093528	0.347332	6.027460	0.0060
	8	6.290816	0.516929	10.23509	0.0030
	16	6.831789	0.731531	7.972037	0.0030
	Joint Tests			Value	df
	Max  z  (at period 8)		10.23509	29	0.0030
TTR	2	1.700574	0.212401	3.298357	0.0130
	4	2.842488	0.369588	4.985246	0.0140
	8	5.834021	0.535155	9.032938	0.0100
	16	6.838145	0.743883	7.848205	0.0050
	Joint Tests			Value	df
	Max  z  (at period 8)		9.032938	29	0.0100

Note: we set the null hypothesis: variable GDP is not a martingale, variable TTR is not a martingale. The Variance ratio is  $VR_i(q) = \frac{\delta_i^2(q)}{\delta_i^2(1)}$ .

Table 3

**Performance of unit root test: time series 1991-2020**

Variable	N-st difference	(C, T, K)	DW	ADF	5%	1%	Result
GDP	1	(C,n,9)	2.07	-3.65	-3.67	-4.53	I(1)*
Gutmann_UE	1	(C,n,7)	2.06	-5.50	-3.58	-4.32	I(1)***
Tanzi_UE	1	(C,n,7)	2.05	-5.30	-3.58	-4.32	I(1)***
Feige_UE	1	(C,n,7)	2.23	-5.21	-3.59	-4.35	I(1)***

Note: (C, T, K) indicates whether the test formula contains constant term, time trend and number of lag periods using AIC. Standard errors in parentheses: \*\*\* denotes the 1st-differenced form passes the stability test at 1% significance level, \*\* denotes the 1st-differenced form passes the stability test at 5% significance level.

level, and GDP presents stationary at the first order cointegration under 10% significant level, respectively. Our research reveals the variables are I(1).

Next, we adopt Pairwise Granger Causality method [24, 25] to test whether there exists a correlation between GDP and TTR. In Table 4, the result demonstrates that there does not exist any causality under the 5% significance level.

Table 4  
Performance of Pairwise Granger Causality

Null Hypothesis	OBs	F-Statistic	Prob
GDP does not Granger Cause TTR	26	5.3877	0.0055
TTR does not Granger Cause GDP	26	18.6645	5.E-06

We then adopt VAR Residual Serial Correlation LM test. The result depicts that the correlation between GDP and TTR as following:

$$\begin{aligned} \begin{bmatrix} GDP_t \\ TTR_t \end{bmatrix} &= \begin{bmatrix} 0.1449 \\ 2874.563 \end{bmatrix} + \\ &+ \begin{bmatrix} -0.2966 & 0.0001 \\ -19629.64 & 2.8983 \end{bmatrix} \begin{bmatrix} GDP_{t-1} \\ TTR_{t-1} \end{bmatrix} + \quad (9) \\ &+ \begin{bmatrix} 0.5063 & -7.29E-05 \\ 8301.89 & -0.879 \end{bmatrix} \begin{bmatrix} GDP_{t-2} \\ TTR_{t-2} \end{bmatrix}. \end{aligned}$$

As can be seen from Table 5, the *p*-value of the previous four periods is greater than 0.05, indicating it falls within the ac-

ceptance domain. That is, the random error term of the model is a white noise process, and there is no autocorrelation. Clearly, the residual sequence passes the test.

Table 5  
VAR Residual Serial Correlation LM test

Lags	LM-stat	Prob
1	7.717263	0.1025
2	7.356669	0.1182
3	6.343649	0.1749
4	6.777367	0.1481

Note: Probs from chi-square with 4 df.

We then utilize CUSUM (cumulative sum) and CUSUM-sq (CUSUM squared) tests to inspect the stability and constancy for SUR-OLS result. Figure 1 shows the CUSUM curve fall within two critical straight lines and does not exceed the range. Hence, it is proved that the parameter TTR, GDP, GDP<sup>2</sup>, GDP<sup>3</sup> of the model are stationary.

Next, we use a generalized variance decomposition method (Koop et al. [26]). Through the VAR model, Table 6 shows the unexpected impact variation of GDP and the sum of night lights (SNL) on TTR, respectively.

At the beginning, the percentage of TTR explained by GDP and the sum of night lights (SNL) is extremely small, however, when we observe the next 9 periods. The sum of night lights (SNL) can explain only 0.53% of the variation for TTR

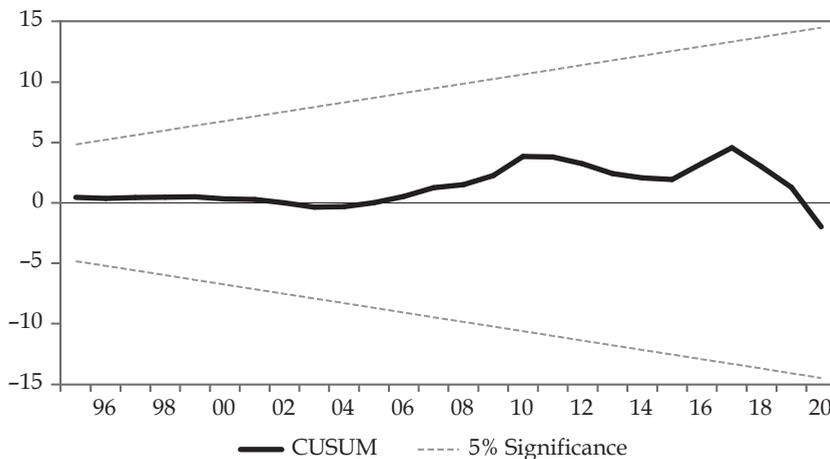


Figure 1. CUSUM test result

prediction errors. Comparatively, GDP can explain 40.80% of the variation for TTR prediction error, indicating that variable GDP has a higher correlation with TTR than that of sum of night lights (SNL).

**4.2. Estimation of tax revenue under the sum of night lights**

To illustrate this point, Eq. (10) discusses the influence of independent variables including economic growth, the sum of night lights (SNL), purchasing manager index (PMI) and Dummy variables (tax reform in 1994 and 2012 respectively) upon the total tax revenue (TTR) as following:

$$TTR_{it} = \alpha_t + \gamma_1 GDP_t + \gamma_2 (GDP_t)^2 + \gamma_3 (GDP_t)^3 + \gamma_4 SNL_t + \gamma_5 PMI_t + \gamma_6 Dmmy1994 + \gamma_7 Dmmy2012 + \epsilon_{itg}, \tag{10}$$

$$\epsilon_{itg} = \mu_{ig} + v_{itg},$$

where *i* is tax item, *t* stands for time, and *g* is the scope of government auditing.

As mentioned earlier in Eq. (8), the estimated relationship between GDP and SNL is:

$$\widehat{GDP}_t = -2.22E - 49SNL_t^2 + 4.23E - 07SNL_t - 1.714034.$$

To precisely demonstrate the correlation among tax revenue and relevant variables, the empirical research and results can be stated formally as follows.

*Case 1.* As is indicated in model 1 of Table 6, we show there is an inverted U-shaped relationship between TTR and

GDP, prob (J statistic) is 0.3916, which does not pass the 5% significant level, indicating that we can not reject the null hypothesis that instrumental variables are effective. On the other hand, the empirical result of model 1 indicates that with the growth of GDP, total tax revenue also increases, revealing that China’s GDP has not yet reached the Kuznets inflection point where the elasticity of tax revenue is equal to 0. That is, China’s current GDP does not exist serious tax evasion.

*Case 2.* On the basis of Model 1 in Table 6, we add variable PMI, the regression coefficient of PMI is 41.5174, which does not pass the 10% significance test, indicating that the tax increase caused by the PMI price index is not statistically significant.

*Case 3.* As shown in model 3 of Table 6, we use the night lighting index to detect the possible error of tax originally estimated by GDP (see Henderson et al. [8]). As we add variable SNL into model 1, the results depict the corresponding regression coefficient is 0.0002, which does not pass the 10% significance test, denoting the increase of sum of night lights (SNL), to some extent, may not result in the increment of total tax revenue.

Next, we discuss the impact of economic growth on direct tax as follows.

*Case 4.* As is indicated in Model 4 of Table 6, we show the economic growth has positive impact on raising direct tax revenue (DTR). The corresponding regression coefficient is 6.284, passing the 1% significance test, showing there is an N-shaped correlation between the DTR

Table 6

**Variance decomposition of TTR/GDP/SNL**

Period	S.E.	TTR	GDP	Sum of Night Lights
1	1562.443	100.0000	0.000000	0.000000
2	2460.682	81.38599	18.57044	0.043569
3	2942.398	68.62177	29.77517	1.603059
4	3623.122	76.70528	22.23705	1.057667
5	4708.615	70.75343	28.58951	0.657059
6	5505.776	62.59401	36.47445	0.931545
7	6427.284	66.00394	33.30227	0.693787
8	7892.810	63.92787	35.60076	0.471374
9	9245.824	58.66108	40.80301	0.535910

and GDP, revealing that except in the interval of negative slope, GDP has a significantly positive impact on direct tax revenue (DTR). Moreover, we depict the prob (J-statistic) is 0.6224, which does not pass the 5% significant level, revealing it is impossible to reject the null hypothesis that the instrumental variable is effective:

$$DTR_{it} = \alpha_t + \gamma_1 GDP_t + \gamma_2 (GDP_t)^2 + \gamma_3 (GDP_t)^3 + \epsilon_{itg}. \tag{11}$$

Case 5. Likewise, in Model 5 of Table 6, we show the GDP has positive impact on raising indirect tax revenue (ITR), the corresponding regression coefficient of GDP is 12,990.35, passing the 1% significance test, revealing there is a J-shaped relationship between the ITR and GDP. These results indicated that, according to model 4 and model 5 of Table 7, the relationship between GDP and indirect tax revenue (ITR) presents a J-shaped curve, however, the relationship between GDP and direct tax revenue (DTR) presents an N-shaped curve, indicating that indirect tax is relatively less likely to lead to tax evasion:

$$ITR_{it} = \alpha_t + \gamma_1 GDP_t + \gamma_2 (GDP_t)^2 + \gamma_3 (GDP_t)^3 + \epsilon_{itg}. \tag{12}$$

Case 6. On the basis of Model 1 of Table 7, in Model 6, we add two important tax reform in China in 1994 and 2012 as independent variables, the corresponding regression coefficient is

12,990.35, passing the 1% significance test, depicting the higher the GDP, the larger the total tax revenue.

Further, we show the regression coefficients of dummy variables in 1994 and 2012 are 483.6615 and -1,764.304, respectively. Our empirical research denotes that the dummy variable 1994 is positively correlated with TTR. However, the dummy variable 2012 shows a negative correlation with TTR, but neither of these two dummy variables pass the 10% significance test.

**4.3. Underground economy versus tax revenue**

There are many methods to measure the size of underground economy. Each approach has its own strengths and weaknesses [5]. In general, the currency demand variable approaches [20; 27] are the most widely used (Johnson et al. [28]).

In estimating the results of underground economy upon tax revenue we incorporate three kinds of underground economic approach methods, including Gutmann\_UE, Tanzi\_UE and Feige\_UE, into Eq. (10) in pursuit of measuring underground economy’s influence on total tax revenue (TTR). It can be observed that research conducted by Tanzi [27] calculates only those underground activities that are solely the result of taxes. In general, the estimates are obviously higher for the Gutmann approach than for the Tanzi approach (see Cebula & Feige [29]).

Table 7

**SUR-OLS Regression analysis of TTR/DTR/ITR- GDP**

Dependent Variable	GDP	(GDP) <sup>2</sup>	(GDP) <sup>3</sup>	PMI	Sum of Night Light	Dummy 1994	Dummy 2012	TSLS-(Prob J-statistic)	DW	Curve style
Model 1 (TTR)	13514.21*** (15.5071)	-136.0141 (-0.9437)	-2.0010 (-0.3115)					0.3916	0.9370	∩
Model 2 (TTR)	8372.107** (2.8865)	496.6146 (1.3468)	-25.1322 (-1.7868)	47.5174 (0.2418)				0.3678	1.0807	∪
Model 3 (TTR)	16375.53*** (16.0220)	-1054.171*** (-3.1370)	63.9263*** (2.9542)		0.0002 (1.6110)			0.3678	1.3485	N
Model 4 (DTR)	3514.348*** (6.2840)	-50.8446 (-0.5497)	3.4828 (0.8450)					0.3916	0.6224	N
Model 5 (ITR)	8896.618*** (9.9189)	97.9074 (0.6600)	-13.1680* (-1.9920)					0.3916	2.2567	∪
Model 6 (TTR)	12990.35*** (10.5355)	-27.3618 (-0.1197)	-6.6097 (-0.6685)			483.6615 (0.3094)	-1764.304 (-0.5773)		0.9268	∩

Based on the empirical research as indicated in Table 8, we draw the valuable results as follows.

*Case 7.* In Model 1 of Table 8, we add variable Gutmann\_UE into model 1 of Table 7. We demonstrate that the variable Gutmann\_UE is negatively correlated with TTR, passing the 10% significant level. Clearly, the cash deposit ratio (CDR) method depicts that the higher the proportion of currency to current deposit, the more underground economic activities it exists, leading to the decline of TTR.

*Case 8.* Likewise, in Model 2 of Table 8, we add variable Feige\_UE into model 1 of Table 7, the result reveals that the Feige\_UE has a negative correlation with TTR, and its coefficient value is -0.6991 which does not pass the 10% significance test.

*Case 9.* In Model 3 of Table 8, we add variable Tanzi\_UE into model 1 of Table 7, the coefficient is -2.5852, indicating that the influence of Tanzi\_UE on TTR is negative, passing the 5% significance. Clearly, the result depicts the increase of those underground economy activities that are solely the result of cash transaction will lead to the decrease of

taxpayer’s willingness to declare total tax revenue. Likewise, the result of Model 6 in Table 8 declares variable Tanzi\_UE has a negative correlation with DTR, its coefficient value -1.8667, passing 10% significance, revealing the increase of cash transaction eventually leads to the decrease of DTR:

$$TTR_{it} = \alpha_t + \gamma_1 GDP_t + \gamma_2 (GDP_t)^2 + \gamma_3 (GDP_t)^3 + \gamma_4 G_{t-1} + \epsilon_{itg} \tag{13}$$

*Case 10.* In Model 10 of Table 8, we show variable “government expenditure” occurred in the previous year has a positive correlation with current TTR, and its coefficient value is -0.1067, however it does not pass the 10% significance test (see Eq. (13)).

Our empirical results are in line with Kelton [30] who considers the government is self-financing and do not necessarily need to collect taxes or borrow. In addition, in our previous article, we have denoted that China’s fiscal revenue has a one-way and positive impact on public expenditure, but public expenditure does not appear one-way positive/negative im-

Table 8

Result for Gutmann/Feige/Tanzi and TTR/DTR/ITR

Dependent Variable	GDP	(GDP) <sup>2</sup>	(GDP) <sup>3</sup>	G Gutmann-UE	Feige-UE	Tanzi-UE	Prior Period expenditure	TSLS-(Prob J-statistic)	DW	Curve style
Model 1 (TTR)	10816.48*** (6.7189)	192.5907 (0.8894)	-14.3740 (-1.6385)	-18865.92* (-1.6385)				0.0005	0.9405	∩
Model 2 (TTR)	13145.63*** (12.9826)	-90.2730 (-0.5741)	-3.7291 (-0.5456)		-14904.18 (-0.6991)			0.0012	0.9345	∩
Model 3 (TTR)	9817.3*** (6.0126)	302.9156 (1.4152)	-18.5181** (-2.1446)			-46186.32** (-2.5852)		0.0004	0.9625	∩
Model 4 (DTR)	2426.752** (2.2639)	81.6332 (0.5661)	-1.5053 (-0.2577)	-7605.848 (-1.1796)				0.0000	0.6188	∩
Model 5 (DTR)	3506.022*** (5.3524)	-49.8113 (-0.4897)	3.4438 (0.7789)		-336.6822 (-0.0244)			0.0001	0.6221	N
Model 6 (DTR)	1721.41 (1.5696)	162.029 (1.127)	-4.5276 (-0.7806)			-22399.61* (-1.8667)		0.0001	0.6176	∩
Model 7 (ITR)	7493.589*** (4.3236)	268.8075 (1.1530)	-19.6029** (-2.0756)	-9811.748 (-0.9411)				0.4227	2.2961	∩
Model 8 (ITR)	8473.13*** (8.1470)	150.4627 (0.9316)	-15.1535** (-2.1588)		-17124.54 (-0.7820)			0.4061	2.2938	∩
Model 9 (ITR)	7251.472*** (3.9705)	293.2338 (1.2248)	-20.5182** (-2.1244)			-20553.2 (-1.0285)		0.4596	2.3021	∩
Model 10 (TTR)	12255.87*** (9.8024)	-137.0595 (-0.9800)	-3.9937 (-0.6239)				0.1067 (1.3662)	-0.0671	1.0379	∩

pact on fiscal revenue. That is, if the fiscal revenue has a positive one-way impact on expenditure (tax spend hypothesis), it represents that increasing revenue will lead to the increment of public expenditure, but reducing expenditure will not lead to the reduction of fiscal revenue [31].

## 5. Conclusion

In this paper, our research design differs from the traditional measurement of underground economy and tax revenue.

*First*, we attempt to design a theoretical model to measure and calculate the sum of night illumination brightness according. Through empirical research, we correspond to the “hypothesis 1” that the sum of night lights has a positive significant correlation with GDP, revealing the correlation between the sum of night lights (SNL) and GDP reaching 1% significance level, denoting the increment of the sum of night lights is positively correlated with GDP. However, when we add the variable SNL to the model, according to the “hypothesis 1”, it is found that the corresponding regression coefficient does not pass the 10% significance test, indicating that the increase of total night lighting (SNL)

does not necessarily lead to the increase of total tax. In spite of the shortcomings, the methodology developed here to estimate economic activity using a combination of nighttime satellite data, official measures of GDP, and underground economy estimates is a useful and innovative initiative.

*Second*, with regard to “hypothesis 2”, after the previous empirical analysis, we show that during the period from 1991 to 2020, the relationship between GDP and indirect tax revenue (ITR) presents a J-shaped curve, however, the relationship between GDP and direct tax revenue (DTR) shows an N-shaped curve, indicating that indirect tax is relatively less likely to lead to tax evasion.

*Third*, our research denotes that PMI has a positive correlation with TTR, but the effect is insignificant.

*Finally*, the underground economy is present in both the developed and developing countries. Almost no official national GDP statistics take into account the contribution of underground economy, however, we demonstrate that with the growth of GDP, TTR also increases, revealing that China’s current GDP does not exist serious tax evasion.

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### **For citation**

Wang Y.K., Zhang L. Tax Revenue, Night Lights and Underground Economy: Evidence from China. *Journal of Tax Reform.* 2022;8(2):186–198. <https://doi.org/10.15826/jtr.2022.8.2.116>

### **Article info**

Received *May 28, 2022*; Revised *July 1, 2022*; Accepted *August 2, 2022*

### **Информация об авторах**

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### **Для цитирования**

Wang Y.K., Zhang L. Tax Revenue, Night Lights and Underground Economy: Evidence from China. *Journal of Tax Reform.* 2022;8(2):186–198. <https://doi.org/10.15826/jtr.2022.8.2.116>

### **Информация о статье**

Дата поступления 28 мая 2022 г.; дата поступления после рецензирования 1 июля 2022 г.; дата принятия к печати 2 августа 2022 г.

Original Paper

<https://doi.org/10.15826/jtr.2022.8.2.117>



### Analyze the impact of the transition from business tax to VAT on the tax burden of transport enterprises in various regions of China

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#### ABSTRACT

In recent years, the transportation industry has enjoyed the benefits brought about by changes in the national tax policy. The purpose of this paper is to analyze the impact of the change from Business Tax to Value-Added Tax (BT-to-VAT) on the tax burden of transport enterprises in various regions of China. Based on the cross-regional characteristics of the transportation industry, China is divided into four regions: eastern, central, western and northeast. Research hypothesis – the tax reduction effect of the BT-to-VAT tax burden is not only related to the characteristics of the enterprise itself, but also related to the regional environment and market integration factors of China. Using the Difference in differences (DID) method, the data covers 22 listed companies from 2009 to 2020. The paper analyzes the internal characteristics of the enterprise itself, the influence of the external environment and the degree of industrial integration on the enterprise, and the reasons for the difference. Empirical research shows that BT-to-VAT reduces the tax burden of enterprises, the eastern region has the least impact on the ratio of corporate income tax expenses to operating income, while the central and western regions have relatively greater impacts. The scale of the enterprise and the level of economic development have a positive effect on the financial efficiency of the enterprise, while the non-current assets ratio and the degree of market integration have a negative effect on the tax burden. This research is beneficial to provide reference for enterprises in different regions to improve their management and to formulate macro policies by relevant national departments.

#### KEYWORDS

transport industry, Business Tax, VAT, tax burden, difference in differences method

JEL H20, L98

УДК 336.22, 332.13

### Анализ влияния перехода от налога на предпринимательскую деятельность к НДС на налоговую нагрузку транспортных предприятий в различных регионах Китая

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#### АННОТАЦИЯ

В последние годы транспортная отрасль пользовалась преимуществами, связанными с изменениями в государственной налоговой политике. Целью данной статьи является анализ влияния перехода от налога на предпринимательство к налогу на добавленную стоимость на налоговую нагрузку транспортных предприятий в различных регионах Китая. По межрегиональным характери-

стикам транспортной отрасли Китай делится на четыре региона: восточный, центральный, западный и северо-восточный. Гипотеза исследования – налоговый эффект снижения налоговой нагрузки при переходе от налога на предпринимательство к налогу на добавленную стоимость связан не только с особенностями самого предприятия, но и с региональной средой и факторами интеграции рынка Китая. С помощью метода «разность в разностях» (DID) мы собрали информацию о 22-х зарегистрированных на бирже с 2009 по 2020 гг. компаниях. В работе анализируются внутренние характеристики самих предприятий, влияние внешней среды и степени промышленной интеграции на предприятия, а также причины их различий. Эмпирические исследования показывают, что переход от налога на предпринимательство к НДС снижает налоговую нагрузку на предприятия. При этом в восточном регионе у предприятий прослеживается наименьшее влияние изменений по расходам по корпоративному подоходному налогу в процентах от операционной деятельности, в то время как предприятия центрального и западного регионов Китая находятся под большим влиянием анализируемого перехода. Масштаб и уровень экономического развития предприятия положительно сказываются на его финансовой эффективности, тогда как величина внеоборотных активов и степень рыночной интеграции отрицательно сказываются на налоговой нагрузке. Результаты исследования могут быть востребованы национальными и региональными ведомствами для разработки макрополитики.

#### КЛЮЧЕВЫЕ СЛОВА

транспортная отрасль, налог на предпринимательскую деятельность, НДС, налоговая нагрузка, метод «разность в разностях»

### 1. Introduction

Tax policies have an important impact on the operation and development of various market players. Since business tax is included in the product price, it was used as the main tax collection method in the past, resulting in repeated taxation by taxpayers and aggravating the tax burden [1]. In order to reduce the tax burden and stimulate the vitality of the market, accelerate the integration with the international mainstream tax system, and adapt to the international economic development situation. In 2011, the State Administration of Taxation of China promulgated the “Pilot Plan for the change from Business Tax to Value-Added Tax”. The state has begun to continuously reduce the tax burden on taxpayers and release tax reduction dividends.

On January 1, 2012, Shanghai took the lead in implementing the BT-to-VAT policy for the transportation industry and some modern service industries. In May 2016, BT-to-VAT was fully launched in China. In 2018, the “Notice on Adjusting the Value-Added Tax Rate” issued by the Ministry of Finance and the State Administration of Taxation clearly pointed out that on the

basis of BT-to-VAT, from May 1, 2018, the original VAT rates were reduced from 17% and 11% to 16% and 10%.

In March 2019, in order to promote the substantial reduction of value-added tax, the Ministry of Finance, the State Administration of Taxation and the General Administration of Customs jointly issued the “Announcement on Industry-Related Policies for Deepening the Value-Added Tax Reform”, stating that, the previously applicable VAT rates of 16 and 10% were further reduced to 13 and 9%. These tax incentives not only bring direct benefits to enterprises, but also stimulate the development of the national economy.

As the pioneer of the BT-to-VAT pilot, the effect of the reform of the transportation industry is not only a test of the direction and rationality of the policy, but also directly related to whether the tax reform can be carried out smoothly. The transportation industry plays an important role in the development of the national economy and is the link connecting other upstream and downstream industries [2]. At the same time, it is closely related to regional economic development and plays a role in promoting or restricting regional

economic development. Sylvie Démurger confirmed that the development scale and speed of the transportation industry and the regional economy have a relationship of mutual promotion and interaction [3]. Due to reasons such as history, location, and degree of openness, China's regional economic development has long been in an unbalanced situation of fast development in the east and slow development in the west, and so is the transportation industry [4]. Therefore, it is necessary to analyze the impact of tax policy changes on the transportation industry from an inter-regional level.

The purpose of this paper is to analyze the impact of the change from Business Tax to Value-Added Tax (BT-to-VAT) on the tax burden of transport enterprises in various regions of China.

The reasons for the differences are analyzed from the aspects of the company's own situation, regional economic development, regional market integration and national policies, in order to provide a reference for the country to formulate transportation industry policies.

Research hypothesis – the tax reduction effect of the BT-to-VAT tax burden is not only related to the characteristics of the enterprise itself, but also related to the regional environment and market integration factors of China.

This paper comprehensively analyzes the impact of BT-to-VAT on the financial benefits of transportation enterprises under the influence of regional economy, transportation infrastructure and regional market integration, which can enrich theoretical research. At the same time, it has reference value to formulate relevant policies for listed companies in the transportation industry and macro-control of the country.

## **2. Literature Review**

For a long time, scholars from various countries have conducted research on whether to introduce VAT and how to improve the VAT system.

Kay & King [5] elaborated the meaning and characteristics of VAT from the perspective of the basic theory of taxation and pointed out that taxing profits is far

inferior to taxing gross business profits, and that VAT will become an inevitable choice for all countries.

Carbonnier [6] believes that VAT has two sides: the advantage is that it plays a positive role in restraining tax evasion, and it also promotes the establishment of a relatively complete financial management system for enterprises, and at the same time makes the tax burden fairer. The downside is that the administrative cost of imposing VAT is too high.

Bogari [7] collected 287 samples in the private and public sectors and used descriptive and analytical methods to analyze the economic and social impact of VAT adoption in Saudi Arabia. The findings show that the implementation of VAT increases the country's financial resources. There is a strong and significant correlation between VAT application and economic variables such as investment, consumption, inflation, purchasing power, and trade balance.

While increasing tax revenue, VAT also promotes the development of various industries. Maybuurov et al. [8] used comparative analysis and analogy methods to analyze its neutrality from the constituent elements of VAT and confirmed that the differentiated export VAT rebate rate is beneficial to supervise the export structure and improve the tax compliance of export companies.

Benzarti & Tazhitdinova [9] estimate their impact on trade flows by using all VAT changes in EU member states from 1988 to 2016. It is found that trade flows are less elastic relative to VAT, even with large changes in VAT. The results suggest that VAT is unlikely to distort trade flows.

Liu et al. [10] used discontinuous regression to study the relationship between BT-to-VAT and Total Factor Energy Efficiency in the logistics industry. The research shows that the reform has significantly promoted the development of Total Factor Energy Efficiency in the logistics industry, thus drive the progress of green technology.

VAT also has a strong role in promoting the transportation industry. Maybuurov & Ma [11] confirmed that VAT is con-

ductive to promoting energy conservation, emission reduction and low-carbon green development. Tax policies promote environmentally friendly behavior by manufacturers and owners of automobiles and related products.

Barros et al. [12] believe that a lower VAT rate on public transport fares and a higher tax rate on vehicle ownership can lead to an increase in public transport's market share. Taxing car utilization through VAT on fuel does appear to be significant.

Barbone et al. [13] conducted an economic assessment of the impact of the current EU VAT regime on passenger transport and the possible impact of alternative regimes. It reveals an enormous potential of the application of VAT in the passenger transport sector with regard to generating revenue, and the small impact of applying simpler VAT rates.

Zhang & Lu [14] confirmed that BT to VAT reduces the double taxation of enterprises and accelerates the development of the industry by analyzing the tax burden on the air transport industry after the VAT reform.

The advantages of VAT are prominent, so a large number of scholars have conducted a lot of research on the BT-to-VAT policy. Smart & Bird [15] research shows that, in fact when replacing a traditional sales tax with a VAT consumer price including taxes actually fell, by  $-0.3\% \pm 0.49\%$ .

Keen & Mintz [16] proved that the imposition of VAT on products and services can avoid the drawbacks of double taxation in the previous business tax system and played an important role in promoting social tax fairness.

A Schenk made a detailed comparison of VAT and BT, and believed that VAT not only improved economic efficiency, but also improved tax equity [17].

Hoseini & Briand [18] examines the impact of BT-to-VAT on productivity and tax legitimacy in India. The study found that BT-to-VAT improved productivity and tax compliance in India. The study also found that the implementation of the VAT credit and rebate system expanded

the formal sector of upstream industries with strong positive linkages.

Many Chinese experts have continued to pay attention and research on BT-to-VAT, providing experience for China's tax reform. Li & Wang [19] researched that companies' reported sales and reporting costs increased significantly after BT to VAT, and the impact of business-to-business transactions was much greater than that of business-to-consumer transactions [19].

Wei [20] assessed the first two years of the BT-to-VAT reform from a tax policy perspective. It is confirmed that reforms may reduce commodity prices by reducing the cost of production, partially mitigating the impact of price increases on consumer services. The government's reforms appear to be aimed at reducing the tax burden.

Peng et al. [21] studied the impact of China's VAT pilot on the total factor productivity of manufacturing enterprises and proved that it has a greater impact on non-state-owned enterprises and labor-intensive enterprises.

Zou et al. [22] confirmed that the corporate leverage ratio dropped significantly after the VAT reform, but it was mainly driven by short-term liabilities.

Lan et al. [23] studied the impact of tax cuts on corporate R&D intensity. The results show that the tax reform has prompted enterprises to increase R&D investment. Specifically, the stronger the tax transfer ability, the more significant this change will promote the R&D intensity of enterprises.

Yang & Zhang [24] using the difference method, confirms that firms enjoying tax benefits become more capital-intensive, but their employment and labor shares decline significantly.

Peng et al. [25] investigated the impact of VAT reform in the service sector on enterprise upgrading during China's transition period. By using 2009-2017 Chinese listed company data and differentiated methods, it is proved that the reform has accelerated the process of enterprise upgrading.

Yu & Qi [26] used the DD model to examine the impact of BT-to-VAT on

productivity in China. The reforms are found to have a significant positive effect on firms’ total factor productivity, while bringing in tax relief and additional cash flow.

Fang et al. [27] studied the asymmetric impact of BT-to-VAT on the total tax burden of Chinese enterprises, which has a broad reform dividend effect on small-scale taxpayers. The plan has an asymmetric rather than a broad reform dividend effect on the general taxpayer.

Wang et al. [28] explore the causal relationship between tax deductions and fiscal constraints. Research shows that VAT reform has significantly improved firms’ external financing capacity by reducing borrowing costs and promoting commercial credit.

Deng et al. [29] examine the causal relationship between taxation and capital structure by exploiting two institutional features. Prove that businesses are slow to respond to tax cuts but increase long-term leverage when taxes increase.

To sum up, most experts and scholars agree that VAT is imperative. Its implementation can make the tax system completer and more effective. Compared with BT, it can reduce the tax burden on taxpayers. However, there are few studies that specifically focus on the transportation industry. And it does not combine the differences between regions to analyze the impact of BT-to-VAT on the tax burden of the transportation industry in each region and does not consider the particularity of cross-regions and the relationship between inter-regional transportation. Therefore, it is particularly important for the continu-

ous tax reform policy and transportation policy to analyze the impact of BT-to-VAT on the tax burden of the transportation industry in various regions by drawing on domestic and foreign research results.

### 3. Research Methodology

China is divided into four regions. According to the information from the National Bureau of Statistics, the country is divided into four regions (Table 1).

This paper analyzes the impact of BT-to-VAT on the tax burden of transportation enterprises in different regions from the perspective of mesoeconomics and uses the DID model to analyze the policy effect [30].

Taking the transportation industry as the treatment group, the life service industry as the control group. Set the grouping dummy variable as “treated”, its value is 1 for the treatment group and 0 for the control group; the time dummy variable is “time”, its value is 0 before BT-to-VAT and 1 after BT-to-VAT. So the DID model is:

$$Y = \beta_0 + \beta_1 \text{treated} \cdot \text{Time} + \beta_2 \text{treated} + \beta_3 \text{Time} + \varepsilon. \tag{1}$$

Among them, Y is the explained variable, and “treated × Time” is the interaction item. When the enterprise “i” of the treatment group is affected by the policy in the year “t”, the dummy variable “treated × Time” takes the value of 1, otherwise it is 0.

According to the research purpose of this paper, Debt Asset Ratio is selected as the explained variable, GDP per capita growth rate, Location entropy coefficient as the explanatory variable, enterprise size

Table 1

Regional division of China	
East	Beijing, Shanghai, Tianjin, Guangdong Province, Zhejiang Province, Hebei Province, Jiangsu Province, Shandong Province, Fujian Province, Hainan Province
Central	Hubei Province, Jiangxi Province, Shanxi Province, Hunan Province, Anhui Province, Henan Province
West	Chongqing, Shanxi Province, Sichuan Province, Guizhou Province, Qinghai Province, Yunnan Province, Gansu Province, Guangxi Zhuang Autonomous Region, Inner Mongolia Autonomous Region, Ningxia Hui Autonomous Region, Tibet Autonomous Region, Xinjiang Uygur Autonomous Region
Northeast	Liaoning Province, Heilongjiang Province, Jilin Province

and age, Corporate income tax expense as a percentage of operating, Non-current assets ratio as the control variable (Table 2).

Since this paper mainly analyzes the impact of BT-to-VAT on the tax burden of enterprises in different regions from the perspective of regional market integration, on the basis of the DID model, considering market integration a factor, the model is constructed as follows:

$$\begin{aligned}
 DAR = & \beta_0 + \beta_1 LQ \cdot treated \cdot Time + \\
 & + \beta_2 LQ + \beta_3 treated \cdot Time + \\
 & + \beta_4 treated + \beta_5 time + \varepsilon.
 \end{aligned}
 \tag{2}$$

According to the exogenous requirements analyzed by the DID model and the condition that the treatment group and the control group have the same or similar conditions, BT-to-VAT is implemented in different regions in batches in different time periods, and this paper studies the listed companies in the transportation industry (with road Transportation as an example), so the research in this paper satisfies the randomness assumption. In addition, transportation and life services are both service industries, and their development is consistent. Therefore, this paper is suitable to use the DID model for analysis.

Considering the availability of data, the sample companies selected in this paper are all listed companies. According to the industry classification guidelines of listed companies of the China Banking Regulatory Commission, the 2009–2020 data of companies that have been in the road transportation industry and listed on the Shanghai and Shenzhen main board A-shares since they were classified according to this standard were selected as the treatment group. Considering that BT-to-VAT was launched in 2012, the companies that changed to other industries in 2012 and later and were processed and delisted by ST were excluded. Finally, a sample of 22 road transport listed companies was obtained, including 9 in the east, 7 in the middle, 4 in the west, and 2 in the northeast.

The companies whose classification criteria have always been companies in the life service industry and listed on the A-shares of the Shanghai and Shenzhen Main Boards were selected as the control group. The life service industry began to implement the BT-to-VAT policy in May 2016. Therefore, after excluding the listed companies in 2016 and later, the data of 8 listed companies in this industry from 2009 to 2016 were selected as the control group.

Table 2

Variable description			
Variable properties	Variable name	Representation	Variable description
Explained variable	Debt Asset Ratio	DAR	(Total Liabilities / Total Assets) × 100%
Explanatory variables	GDP growth rate per capita	AGDP	After deducting inflation, the growth level of per capita GDP at the end of the year relative to the beginning of the year
Explanatory variables	Location entropy coefficient	LQ	(Transportation employment in a region / total employment in the region) / (National Transportation Industry Employment / National Total Employment)
Control variable	Enterprise size	SIZE	ln (total assets)
Control variable	Enterprise age	AGE	Sample Year - Enterprise Registration Year
Control variable	Corporate income tax expense as a percentage of operating income	TPR	Corporate income tax expense / operating income × 100%
Control variable	Non-current assets ratio	NCR	Non-current assets/total assets × 100%

Due to the different implementation time of BT-to-VAT in each region or industry, the value of each region will be different. The values of the dummy variables for each region of the transportation enterprises are as follows: the eastern region has gradually expanded from Shanghai to Beijing, Jiangsu, Guangdong, Fujian, Zhejiang, and Tianjin, all of which were implemented BT-to-VAT in 2012. The number of enterprises reached more than 86% of the total number in the eastern region, and most of them were in the second half of 2012. Therefore, the eastern region will set its start time as 2013, so that the dummy variable of 2013 and later years is 1, and the value before 2013 is 0. The central region, the northeast region and the western region were implemented in August 2013, so the start time is set as 2014, the dummy variable value of 2014 and later years is 1, and the value before 2014 is 0 (Table 3).

Table 3

DID Model Descriptive Statistics			
	Before	After	Summary
Control	32	32	64
Treatment	101	75	176
Summary	133	107	240

The table shows the different groups, as well as the sample distribution before and after the experiment. There are a total of 176 experimental samples in this case, 101 are before the experiment and 75 are after the experiment.

The required data come from the statistical yearbooks and statistical bulletins of various provinces and cities. The panel data of each sample company from 2009 to 2020 comes from CSMAR and the annual report of each company.

#### 4. Research Results

According to the variable setting and the sorted sample conditions, the impact of BT-to-VAT on the operational capacity of transportation enterprises is analyzed, and DID model is established. Descriptive statistics of variables were obtained after analyzing and operating the panel data (Table 4).

Analyzing the Non-current assets ratio in each region, the results show that the change is not obvious, and it is in a stable state. The eastern region has not changed significantly, while the non-current assets ratio of the northeast region is higher than other regions, but it shows a downward trend. The western region has a small increase in 2013, but the central region has a downward trend, so it can be considered that the western region increased its investment in illiquid assets in 2013, increasing its deductible costs in the future, while the deductible costs in the central and northeastern regions decreased.

Therefore, from the changes in the tax burden and non-current assets ratio in each region, it can be found that the BT-to-VAT policy reduces the corporate tax burden, but due to deductible costs or tax policies and other reasons, the reduction is not It is clear.

The DID regression was performed using SPSS software, and the following results were obtained (Table 5).

The results of the DID model are shown in Table 5, including the effect size levels of the control group and the treatment group before and after the experiment. The DID effect value, "diff-in-diff" is  $-0.08$  and it is significant ( $p = 0.039 < 0.05$ ), which means that the DID effect is significant.

Construct the interaction item for OLS regression test (Table 6). The regression coefficient value of the interaction item "treat · time" in the table is  $-0.08$ , which is the Diff-in-Diff effect value in the "DID Model Results Summary" table, and the results are consistent.

It can be known from the DID results that the Corporate income tax expense as a percentage of operating is negative, and the Debt Asset Ratio of the transportation industry in each region has a negative impact on the financial performance of the company. It shows that under the BT-to-VAT policy, the higher the Debt Asset Ratio, the lower the financial benefit and the greater the risk. If a company is financing, it is best to use equity financing to reduce the risk of excessive debt.

Table 4

Descriptive statistics						
Central						
Items	Mean	Median	Std. Deviation	Min	Max	N
LQ	0.92	0.91	0.08	0.76	1.12	77
AGDP	0.11	0.10	0.06	-0.04	0.27	77
NCR	0.73	0.81	0.19	0.29	0.96	77
DAR	0.49	0.49	0.17	0.21	0.80	77
AGE	17.71	18.00	4.65	7.00	27.00	77
TPR	0.08	0.07	0.05	0.01	0.17	77
SIZE	23.11	23.26	1.11	21.00	24.74	77
Northeast						
Items	Mean	Median	Std. Deviation	Min	Max	N
LQ	1.24	1.24	0.15	1.04	1.55	22
AGDP	0.08	0.06	0.10	-0.22	0.22	22
NCR	0.71	0.70	0.15	0.39	0.95	22
DAR	0.31	0.26	0.19	0.09	0.83	22
AGE	5	5	3	0	10	22
TPR	0.10	0.10	0.03	0.04	0.17	22
SIZE	22.25	22.33	0.32	21.64	22.68	22
East						
Items	Mean	Median	Std. Deviation	Min	Max	N
LQ	1.00	0.87	0.40	0.08	1.91	99
AGDP	0.08	0.09	0.06	-0.16	0.20	99
NCR	0.74	0.82	0.18	0.40	0.98	99
DAR	0.45	0.45	0.11	0.24	0.72	99
AGE	19.78	20	4.85	7	28	99
TPR	0.08	0.09	0.05	-0.02	0.19	99
SIZE	23.46	23.50	0.81	21.28	25.25	99
West						
Items	Mean	Median	Std. Deviation	Min	Max	N
LQ	1.05	1.03	0.17	0.80	1.40	44
AGDP	0.11	0.10	0.07	0.00	0.26	44
NCR	0.75	0.78	0.10	0.48	0.90	44
DAR	0.56	0.57	0.13	0.29	0.77	44
AGE	19.75	20	4	13	28	44
TPR	0.05	0.04	0.05	0.01	0.35	44
SIZE	22.75	22.86	1.07	20.45	24.42	44

Table 5

Summary of DID Model Results					
	Time	DAR	S. Err.	t	p
Before	Control	-0.320			
	Treated	-0.182			
	Diff (T - C)	0.138	0.029	4.804	0.000**
After	Control	-0.234			
	Treated	-0.176			
	Diff (T - C)	0.058	0.029	1.992	0.048*
Diff-in-Diff		-0.08	0.038	-2.071	0.039*

R<sup>2</sup>: 0.453, Adjusted R<sup>2</sup>: 0.432  
\* p < 0.05 \*\* p < 0.01

Table 6

**OLS regression analysis results (n = 240)**

VARIABLES	Coeff.	S. Err.	t	p	95% CI	R <sup>2</sup>	Adjusted R <sup>2</sup>	F
VARIABLES	-0.32	0.093	-3.455	0.001	-0.503 ~ -0.138			
LQ	-0.075	0.02	-3.69	0	-0.116 ~ -0.035			
AGDP	0.227	0.183	1.24	0.216	-0.134 ~ 0.587			
AGE	-0	0.002	-0.044	0.965	-0.004 ~ 0.003			
SIZE	0.03	0.005	6.514	0	0.021 ~ 0.039	0.453	0.432	F (9,230) = 21.168, p = 0.000
TPR	-2.034	0.217	-9.387	0	-2.461 ~ -1.607			
NCR	0.216	0.063	3.423	0.001	0.092 ~ 0.340			
Treated	0.138	0.029	4.804	0	0.081 ~ 0.195			
Time	0.086	0.033	2.577	0.011	0.020 ~ 0.152			
Treated × Time	-0.08	0.038	-2.071	0.039	-0.155 ~ -0.004			

Explained variable: DAR

\* p < 0.05 \*\* p < 0.01

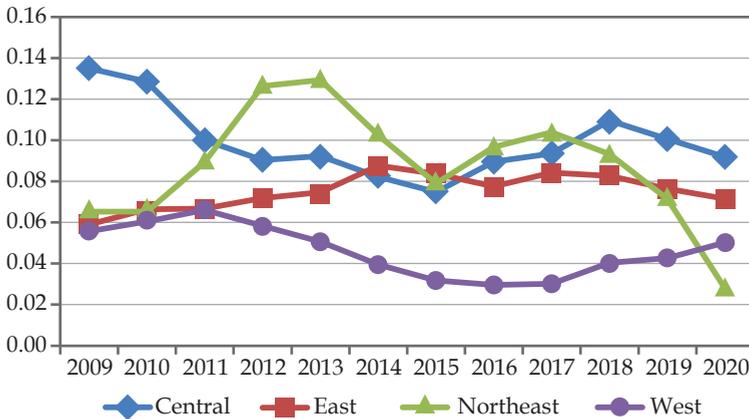


Figure 1. Corporate income tax expense as a percentage of operating

It can be seen from the results that the overall tax burden after BT-to-VAT has a downward trend, but after 2015, the ratio of income tax expenses to operating income has an upward trend. It shows that the BT-to-VAT policy has reduced the corporate tax burden, and after 2015, the tax burden may increase due to the increase in corporate operating income. In terms of the degree of volatility, the fluctuations in each region are very large. From the perspective of the tax burden of each region, the northeast region has a heavier tax burden than other regions, and the average corporate income tax burden is the highest in each region, while the western region has a lighter tax burden and the lowest average tax burden.

This also leads to the fact that the financial benefit of the northeast region is the lowest among all regions, while the financial benefit of the western region is the highest. This may be because the deductible costs in the western region are more than in other regions, but less in the northeast region. The western region enjoys the preferential tax policies for the development of the western region, which reduces the overall tax burden of enterprises.

To sum up, from the perspective of various regions, after 10 years of trial implementation of the BT-to-VAT policy, the tax reduction effect of transportation enterprises is obvious, that is, the BT-to-VAT policy is conducive to reducing the

tax burden of enterprises. Both the degree of regional market integration and the Non-current assets ratio have a significant negative impact on the tax burden of transportation enterprises, which is conducive to reducing the tax burden of enterprises. Only when the proportion of deductible costs in the company's costs to operating income reaches a corresponding threshold, the company's overall tax burden will show a downward trend.

Therefore, although the operating income of enterprises may increase, the overall tax burden of enterprises has a downward trend. And from the perspective of regional market integration, BT-to-VAT is beneficial to regional market integration, which further reduces the tax burden of enterprises. From an inter-regional perspective, BT-to-VAT has a larger tax burden on the western and central regions and a smaller impact on the eastern region. As the eastern region is relatively developed and has relatively complete road infrastructure, the degree of regional market integration is relatively high. Therefore, the improvement rate of BT-to-VAT in the market integration of the eastern region is lower than that of other regions, and the tax reduction rate is also lower.

In addition to being greatly affected by the BT-to-VAT policy in the western region, the state also has relatively large tax incentives for the western region. For example, the Western Development Policy gives preferential treatment to income tax expenses. The investment intensity of Non-current assets in the central region is the smallest among several regions, so it is greatly affected by the BT-to-VAT policy, but its average value is relatively large.

## **5. Conclusion**

One of the main purposes of China's tax reform is to reduce the tax burden of enterprises. In all regions, BT-to-VAT has reduced it. Under the effect of market integration, the tax reduction effect of BT-to-VAT is greater, so the degree of market integration has an impact on the tax reduction effect. The greater the proportion of investment in non-current assets, the more conducive to reducing the tax burden of enterprises.

From the comparison of various regions, the impact of BT-to-VAT on the tax burden of the western region is significantly greater than that of the eastern region. This may be due to the fact that in addition to being affected by BT-to-VAT in the western region, the state has relatively large tax incentives for the western region, while the eastern region has advantages in economic development due to good basic conditions, and the rate of improvement in market integration is relatively low. Therefore, the tax cut effect on the eastern region is also lower.

Based on the above analysis, the research hypothesis was confirmed, and it is found that the tax reduction effect of the BT-to-VAT tax policy is not only related to the characteristics of the enterprise itself, but also related to the regional environment and market integration factors, which should further improve the financial efficiency and reduce the tax burden.

As far as the government is concerned, it is appropriate to increase tax incentives, especially in the northeast and central regions. Although changes in tax policies in recent years have brought about a reduction in corporate tax burdens, the financial benefits are not ideal, indicating that the benefits brought by tax policies have not been fully reflected in business operations. Therefore, tax incentives should be further increased to reduce the impact of tax policy changes on enterprises. Since the tax burden of the central and northeastern regions is significantly higher than that of the western and eastern regions, more preferential taxation should be given to these two regions to facilitate the balanced development among the regions.

BT-to-VAT has carried out input tax deduction, but because different industries have different resource allocation tendencies, the resulting tax impact is also different. Transportation is a capital-intensive industry, and the purchase of means of transportation requires high capital and has a long service life. For large and medium-sized transportation enterprises, which are general taxpayers, they have entered a relatively mature and stable stage, and are unlikely to frequent-

ly purchase new transportation vehicles in the short term. Therefore, the input tax credit for the acquisition of non-current assets is not continuous in most years. For the transportation industry, the input tax deduction is insufficient, and BT-to-VAT has not actually reduced the tax burden of enterprises, so greater policy support is needed. In view of this actual situation, it is recommended to consider implementing a certain percentage of deduction for existing non-current assets. The monthly depreciation amount of non-current assets can be used as the base to determine a proportional coefficient.

At the same time, increasing the construction of infrastructure in areas with relatively backward road infrastructure is conducive to improving the financial benefits of transportation enterprises. The development of the transportation industry is inseparable from infrastructure. In order to develop the transportation industry, it is necessary to increase investment in road infrastructure. The key to strengthening inter-regional connections is to make them more closely connected, improve market integration, and provide favorable conditions for the development of the transportation industry in underdeveloped areas.

As far as the enterprise is concerned, enterprises in the central, western and northeastern regions should focus on cooperation with similar companies to enhance the degree of market integration, while the eastern region should pay

more attention to the improvement of their own strength. In regional with low economic level, their infrastructure is relatively poor, and the external conditions of enterprises are also not good. Strengthening the cooperation between enterprises can improve the ability to resist risks and achieve common development. In regional with relatively good economy, the infrastructure is relatively good, the external conditions of enterprises are relatively good, and the degree of integration of enterprises is also high. Therefore, in order to achieve further development, it is necessary to enhance the strength of enterprises themselves.

In the context of the full implementation of BT-to-VAT in China, this paper compares the change curves of tax burdens in the four major regions from 2009 to 2020, and builds a DID model to analyze the impact of BT-to-VAT on the Debt Asset Ratio in each region. Overall, the BT-to-VAT policy has achieved a structural tax reduction effect.

The BT-to-VAT policy is a major measure in China's tax system reform. The state implements it not only to reduce the tax burden of enterprises, but also to optimize the industrial structure and promote the connection between industries. Although the BT-to-VAT policy has been fully promoted at present, the promotion time is not long, so the long-term effect it brings and the related effect with other industries can be deeply analyzed in future research.

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### **Acknowledgements**

This research was funded by the China Scholarship Council.

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### **For citation**

Ma J., Leontyeva Yu.V., Domnikov A.Y. Analyze the impact of the transition from business tax to VAT on the tax burden of transport enterprises in various regions of China. *Journal of Tax Reform*. 2022;8(2):199–211. <https://doi.org/10.15826/jtr.2022.8.2.117>

### **Article info**

Received *March 12, 2022*; Revised *May 24, 2022*; Accepted *June 6, 2022*

### **Благодарности**

Это исследование финансировалось Китайским стипендиальным советом.

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### **Для цитирования**

Ma J., Leontyeva Yu.V., Domnikov A.Y. Analyze the impact of the transition from business tax to VAT on the tax burden of transport enterprises in various regions of China. *Journal of Tax Reform*. 2022;8(2):199–211. <https://doi.org/10.15826/jtr.2022.8.2.117>

### **Информация о статье**

Дата поступления 12 марта 2022 г.; дата поступления после рецензирования 24 мая 2022 г.; дата принятия к печати 28 июня 2022 г.

# Journal of Tax Reform

2022. Vol. 8, no. 2

Editor in Chief  
*Igor A. Mayburov*

---

Design and layout *Tatyana A. Loskutova*

---

Signed in the press on 14.08.22. Format 70x100 1/16. Writing paper. The printing is flat. Usl. Printer. L. 6.88.  
Circulation 100 copies. Order

Printed in the publishing house UrFU Publishing and Printing Center.  
4 Turgenev St., 620000, Yekaterinburg, Russian Federation.  
Phone +7 (343) 371 54 48, +7 (343) 350 58 20, +7 (343) 358 93 06  
E-mail: [press-urfu@mail.ru](mailto:press-urfu@mail.ru)

Distributed for free

# Журнал налоговых реформ

2022. Т. 8, № 2

Главный редактор  
*Игорь Анатольевич Майбуров*

---

Дизайн и верстка *Т. А. Лоскутовой*

---

Дата выхода в свет 14.08.22. Формат 70x100 1/16. Бумага писчая. Печать плоская. Усл. печ. л. 6,88.  
Тираж 100 экз. Заказ

Издательство Уральского университета  
620000, г. Екатеринбург, ул. Тургенева, 4

Отпечатано в типографии Издательско-полиграфического центра УрФУ.  
620000, г. Екатеринбург, ул. Тургенева, 4.  
Тел. +7 (343) 371 54 48, +7 (343) 350 58 20, +7 (343) 358 93 06  
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