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Миссия рецензируемого журнала "Journal of Tax Reform" заключается в содействии всесторонним исследованиям налоговых реформ и эффектов различных налоговых преобразований, ведущих к повышению качества и достоверности исследований в области налогообложения.

Цель журнала "Journal of Tax Reform" – представление значимых выводов оригинальных социо-экономических исследований, проведенных специалистами разных стран в области налоговых реформ и налогообложения в целом.

В журнале публикуются оригинальные эмпирические и обзорные статьи, связанные с административно-управленческими, экономическими проблемами налоговых реформ, а также рассматривающие вопросы, связанные с историей налоговых реформ и практикой противодействия уклонению от уплаты налогов.

История журнала

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С 2023 г. журнал "Journal of Tax Reform" выходит в только электронном формате (eISSN 2414-9497).

Journal Policy

Relevance of the thematic focus of the Journal
The exchange of competent opinions on tax reforms carried out in different countries is important for strengthening the theoretical grounding of tax reform practice and facilitating the implementation of best practices for simpler, fairer and more efficient tax systems.

International character of the Journal
The international character of the Journal is ensured by the universality of taxation topics and the international demand for the implementation of best practices in the field of tax reform. The facilitation of international collaborations and cross-border analytical comparisons is informed by a broad methodological similarity between techniques used to analyse the results of tax reforms carried out in different countries.

Mission and Objective

The mission of the peer-reviewed Journal of Tax Reform is to promote comprehensive research into tax reform and the effects of tax system reorganisation leading to improvements in the quality and credibility of research in the field of taxation.

The Journal of Tax Reform is aimed at presenting significant findings of original socio-economic research carried out by professionals from various countries in the field of tax reform and taxation in general.

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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eISSN 2414-9497

Journal of Tax Reform

T. 9, № 3 2023 Vol. 9, no. 3

CONTENTS

eISSN 2414-9497

Journal of Tax Reform

Т. 9, № 3 2023 Vol. 9, no. 3

СОДЕРЖАНИЕ

Original Paper

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Taxpayers' Perceptions Towards Income Tax Administration: A Study from Indian Perspectives

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ABSTRACT

Tax procedures more particularly income tax laws are considered to be more complex and cumbersome by the individual taxpayers. Direct tax constitutes 46.84% of total tax revenue and personal income tax contributes 51.48% of total direct tax in India. Similarly individual taxpayers constitute around 95% of the total taxpayers in India. But individual assesses faces most about compliance challenges and administrative burdens. Governments often introduce new amendments to address these issues and promote economic efficiency. This paper primarily investigates factors influencing tax administration and taxpayer perceptions, particularly in the context of Indian income tax. This analytical study utilizes primary data and focuses exclusively on income taxpayers in Odisha, an Indian state. Despite uniform national tax laws, the study assumes consistency in typical taxpayer behavior across states. To address data collection limitations, nine districts in Odisha with a 2011 census literacy rate above 80% were selected. A structured questionnaire with five-point Likert scale were used to collect responses through random sampling techniques. From the total sample of 1300 respondents, only 1068 provided complete answers. The study's findings are based on this sample. The research employs Exploratory Factor Analysis (EFA) and Structural Equation Modeling (SEM) to identify significant aspects of tax administration. Three factors emerge: tax procedure, tax services, and tax penalty from factor analysis. Notably, all observed variables have positive impacts on these factors, corroborating the hypotheses, except for one. Tax procedure negatively correlates with tax penalty and services, while services positively correlate with the penalty, resulting in a hypothesis rejection. This study confirms that more the simplification of tax procedures, lesser will be the chance of problems in tax services and chances of imposing penalty.

KEYWORDS

tax administration, taxpayer perceptions, income tax, compliance behavior, Indian economy

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Отношение налогоплательщиков к администрированию подоходного налога: исследование с точки зрения Индии

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АННОТАЦИЯ

Налоговые процедуры, в частности законы о подоходном налоге, считаются более сложными и громоздкими в восприятии налогоплательщиков. Прямой налог составляет 46,84% от общего объема налоговых поступлений, а личный по-

доходный налог составляет 51,48% от общего объема прямых налогов в Индии. Индивидуальные налогоплательщики составляют около 95% от общего числа налогоплательщиков в Индии. Но отдельные оценщики сталкиваются с проблемами, связанными с соблюдением требований и административным бременем. Правительства часто вносят новые поправки для решения этих проблем и повышения экономической эффективности. В данной работе исследуются факторы, влияющие на налоговое администрирование и восприятие налогоплательщиками, особенно в контексте индийского подоходного налога. В этом исследовании используются первичные данные и основное внимание уделяется налогоплательщикам в штате Одиша. Несмотря на единообразие национального налогового законодательства, исследование предполагает последовательность типичного поведения налогоплательщиков в разных штатах. Для устранения ограничений по сбору данных были выбраны девять округов штата Одиша с уровнем грамотности по данным переписи населения 2011 г. выше 80%. Для сбора ответов методом случайной выборки использовалась структурированная анкета с пятибалльной шкалой Лайкерта. Из общей выборки в 1300 респондентов только 1068 дали полные ответы. Результаты исследования основаны на этой выборке. В исследовании используются исследовательский факторный анализ (EFA) и моделирование структурными уравнениями (SEM) для выявления значимых аспектов налогового администрирования. На основе факторного анализа выделяются три фактора: налоговая процедура, налоговые услуги и налоговый штраф. Примечательно, что все наблюдаемые переменные оказывают положительное влияние на эти факторы, подтверждая гипотезы, за исключением одной. Налоговая процедура отрицательно коррелирует с налоговым штрафом и услугами, в то время как услуги положительно коррелируют со штрафом, что приводит к отклонению гипотезы. Данное исследование подтверждает, что чем больше упрощение налоговых процедур, тем меньше будет шансов возникновения проблем в налоговых службах и шансов наложения штрафа.

КЛЮЧЕВЫЕ СЛОВА
налоговое администрирование, восприятие налогоплательщиков, налог на прибыль, комплаенс-поведение, индийская экономика

1. Introduction

Taxes are the government's primary source of revenue, and they are used to benefit the country's citizens. The central government and state governments both levy taxes in India. The objective of taxes is to provide social welfare by funding public services, property protection, defense costs, and economic infrastructure, among other things. Revenue, redistribution, reprisal, and representation are the four basic reasons of taxation. Direct tax measures at the federal level were an important part of broader fiscal and economic reforms. Income tax is a significant component of direct taxes and a significant income stream for the government. And so, the tax system should include traits like simplicity, feasibility, efficacy, and anti-inflationary characteristics, as well as incentives for the production of fundamental commodities. Furthermore, the tax structure should be less expensive, simple to understand, simple for people to follow, and simple for authorities to administer.

Income tax satisfies all taxation canons, aids the government in attaining socio-economic goals, and is anticipated to aid in achieving distributional justice through differential tax rates between the wealthy and the poor. Despite numerous reforms, India's tax structure is riddled with complications and issues such as multitude of taxes, indirect tax dominance, aphorism, and bias in tax prevalence, complexity and corruption, imbalance in the tax machine, lack of built-in flexibility, and asset wasting, leading to low collection of tax revenue. The tax revenue of the Government therefore demands more attention.

Direct taxes constitute 46.84% of total tax revenue contributing 4.78% of total GDP witnessing a decline in growth rate of –9.85% during financial year 2020–21.

Further, personal income tax payable by individuals contributes 51.48% of total direct taxes and collection cost was 0.76% of total direct tax collections as compared to previous year 0.66% (Central Board of Direct Taxes, Government of India, statistics, 2020–21). Similarly, to bring more user friendly and compliance savvy, Government of India also introduced new e-filing portal 2.0 on 7th of June 2021 that aims to bring more smooth tax administration.

The extent the income tax department is effective enough in sorting out grievances of assesses amicably within reasonable time is also the need of the era. This provides insight into effectiveness and efficiency of entire tax administration procedure. Attempts to establish a fair tax system in emerging countries like India have always proven difficult.

An ideal tax system would raise the government's required revenue in a timely manner without having a significant impact on investment decisions or economic activity. However, establishing an efficient tax system in a growing country like India, where vast numbers of people continue to work in the unorganized or informal sector, where cash transactions still dominate economic activity, is not a simple feat.

As a result, calculating the tax base or deciding on a rate with any objectivity is challenging. Furthermore, the tax administrative structure has flaws in terms of wages and infrastructure, which are part of the total administration system, and the State is limited in its possibilities for building an effective and perfect tax system. As a result, despite numerous reform attempts, we have yet to achieve a flawless ideal system of tax administration, which is critical in identifying a country's real or effective tax domain.

Unfortunately, many countries' tax administrations are unable to work properly, and as a result, the objectives of tax laws are not met. The tax administration must function successfully and efficiently to have the intended effect on resource allocation, income distribution, macroeconomic stability, and growth. In a developing market economy, the basic goal of tax policy is to raise revenue in an equitable manner with minimal unexpected changes in relative prices and resource allocation.

The *primary focus of this paper* is to examine the factors contributing to tax administration and perception of taxpayers towards tax administration specifically income tax in Indian context. After going through a rigorous review of existing literatures, following *hypothesis* have been formulated to achieve our objectives.

H1: The observed variables have significant loadings on the factors of tax administration.

H2: Different factors explaining tax administration are positively correlated.

H3: Tax procedure and tax service significantly influence tax penalty.

The structure of this paper comprises of five sections. At the beginning, present state of research problems is explained. The next section explores the existing literatures relevant to the study and provides a strong theoretical background in identifying the research problems, research gap and formulating research hypotheses. The section "methods" describes the research design, methods, variables, techniques, models, and software adopted in this study. The following section is "results and discussion" that explores the tax administration components and comparative findings with existing studies followed by "conclusion" section.

2. Review of literatures

2.1. Tax Administration and Tax Procedures

Tax administration refers to a set of detailed procedures laid down under different Tax Acts regarding overall management of taxation system with an objective to optimize tax collection by the Government while at the same time maintaining the equity and justice for all taxpayers. Poor administration of tax may lead to non-compliance of tax and there by creates tax penalty.

Cuccia & Carnes [1] showed that it exists is negative relationship between complex tax procedure and the ability to tax payment.

Murphy & Torgler [2] showed that tax administration is generally perceived as the external factor affecting the tax compliance as well as tax management practices. The tax procedure has positive impact on tax morale.

Paleka & Vitezić [3] showed that the more the compatibility of an individual with tax procedure and tax service, the more will be tax compliance and less will be the tax penalty.

Rani & Arora [4] showed that the tax professional play's crucial role for promoting the tax policy which automatically advanced tax administrative functions.

The tax administration function largely depends on assessment of tax (Official Assessment of Tax and Self-Assessment of Tax) system by the taxpayer. It was also observed that, at the state level audit by CAG about value added tax is weaker than other country.

Das-Gupta & Andrade [5] and Smith & Kinsey [6] has recommended that the tax compliance behaviors of individuals are depends upon five factors like: deterrence, social norms, complexity of tax system, and fairness of policy and role of government in the economic environment.

Adefolake & Omodero [7] found that, the lack administrative enforcement policy in Nigeria faces low revenue return from its taxpayers and overall affect the economic growth in the country.

Gale & Samwick [8] tried to make a comparative study in between the reform made in present tax system before and after 1991. The study revealed that there is on an average of twenty percent rise in personal tax revenue in between the periods. The authors tried to highlight that the tax rate in India is comparatively better in comparison to other developed countries.

Gurama & Mansor [9] further emphasized on the simplification of present tax structure by increasing the tax base and it will increase the tax compliance. The tax should also be collected genuinely by the government. Additionally, the tax administration of Gombe state board faces more problems like insufficient public awareness, poor staffing, poor record keeping, poor working conditions, poor conducive environment and poor incentive system leads to wicked tax compliance system, so it recommended for improve tax administrative policy.

Pogorletskiy & Bashkirova [10] showed that the tax evasion activity can reduce by proper formulation of tax administrative policy at global level for high revenue collection through taxes. This study reveals that the revolution in national tax system and dynamic tax administration reform in Russia have eliminated the tax burden of tax authorities and promoting appropriate fiscal policy for conducting the business.

Das-Gupta et al. [11] suggested that the behavioral intention of taxpayer is highly influenced by tax regulatory and administration policy. Many developed countries introduce integrated reliable system for e-filling of tax return to reduce high perceived risk of taxpayer. Through the external audit of value added tax in the Indian state government, found that the tax administration regulation policy has highly significant impact on collection of tax revenue from the taxpayers.

Jaidi et al. [12] has focused on self-assessment activity of taxpayer for effectively utilization of economic resources in the Indian government.

Keen & Slemrod [13] showed that an optimal tax enforcement policy should be formulated by the tax administrative for fill-up the optimal tax compliance gap and better mobilization of economic resources of the government. This study has found out that the information technology like online tax filling, registration and remittance have significantly enhanced the productivity in tax collectivity and administration.

Olatunji & Aoydele [14] recommended to monitor and control the online systems for eradicate the adverse impact on taxpayer in future.

Basri et al. [15] showed that the tax policy and tax administration are mutually dependent on each other, because improving the tax administration policy can have significant return to the government.

Deepti & Goel [16] showed that in every country the dynamic tax rate changes as per changes in the economic con-

dition of that country, so the government has reformed the tax policies and availed innovative digitalized services for enhancing the voluntary tax compliance system.

In the current era, the ICT have become highly sophisticated system for availed e-services to enhance the tax administration performance. Bassey et al. [17] have developed a theoretical framework for focusing upon fifteen ecosystem themes which influence the digitalized tax administrative structure around four categories: context, technology, stakeholders and demonstrated result to advanced digital taxation system.

H1: The observed variables (tax procedures, penalties, and services) have significant loadings on the factors of tax administration.

2.2. Tax Administration and Taxpayer Perception

Saad [18] analyzed the knowledge and views of taxpayers on the complexities of tax administration. He found that the updated knowledge of using the technology is also the major constraint of tax non-compliance behavior. And all these factors have forced the taxpayers to perceive the present tax system as complicated one.

Adnan et al. [19] conducted a study to examine the effect of some selected factors influencing the perception of taxpayer on tax administration. Better tax compliance can be assured through trust of taxpayer on administration. They found two factors – faith on administration and fairness in tax system were found as the most significant factors amongst all.

Hauptman et al. [20] discussed the struggle of tax authorities to fight against tax avoidance. The economic downturn and financial crisis around the world have put the tax authorities in the problems of tax evasion as non-compliance of tax has been the global issue. The tax department is facing the problem of tax noncompliance and thereby putting extra burden of penalties to the taxpayers. This unnecessary burden in turn creates another form non-compliance in successive year. So, the task of tax evasion has been the challenging task in front of all tax administrators all over the world. The study identifies that understanding the causes of non-compliance behavior will help the tax administrator in developing the policy to avoid tax evasion.

To measure the behavioral intention of taxpayer about e-government services, Haryani et al. [21] reveals that the factors like perceived ease of use and perceived usefulness have significantly affect the behavior intention of public to adoption of electronic tax filing. This study will develop strategic policy for e-government services of tax administration.

Ufuk [22] conducted a study to assess the perception of tax administrative people about taxpayers. The study resulted that the tax officers are not fully aware of the rights of taxpayers. They have only medium level of knowledge. The female and young tax administrators are more aware about the rights as compared to male participants. It was suggested by the author that tax authority should take steps to develop the knowledge on rights of taxpayers amongst the people of tax offices.

H2: Different factors explaining tax administration are positively correlated.

2.3. Tax Administration and Components

James & Alley [23] described the purpose of tax compliance and the factors that effects the willingness of taxpayers to comply with a tax system. They have used two different approaches- use of penalties and assisting citizens on tax obligations i.e., economic and behavioral approaches. Though both the approaches add as an explanatory behavior in amalgamation of into a single policy for compliances still more or less financial considerations also influences the taxpayers' behaviors.

Alabede et al. [24] showed that self-assessment increases the risk on a revenue service which resort penalty driven compliance policy but with the technology it can curb the revenue collection through tax compliance. A positive relationship has already been established between the quality of tax service and tax penalty as well as compliance behavior.

Alm & Torgler [25] explained the neglected role of individual behaviors in the standard neoclassical paradigm through

ethical dimensions on their decisions compliance using multi-faceted policy approach. They concluded that traditional "enforcement" paradigm is consistent with neoclassical theory where its less traditional in "service" paradigm involving "kinder and friendlier" role in tax administrations in encouraging compliance, adding a "trust" paradigm which is ethics foundation. However, in government administrative approach the "full house" behavior policies to be initiated to ensure compliance.

Paul & Peter [26] examined the issues of all tax authorities as how to motivate all the taxpayers of real estate to comply within framed system of tax regulations in Kenya. The study revealed that, tax compliance level is negatively influenced by its cost. But, knowledge of tax, tax fines and tax education positively influence the compliance attitude of tax. The paper also confirmed that imposition of fines for tax evasion and tax education would increase the rate of tax compliance in near future.

Savić et al. [27] analyzed the performance of tax administration in two phases, first by using DEA technique of analysis and the second by using regression analysis. The study was based on thirteen European countries. DEA analysis revealed that only five out of thirteen tax administrators are efficient. The findings of the study showed that increase in efficiency of tax administration would lower grey economy.

Pogorletskiy & Bashkirova [10] and Labunets & Mayburov [28] showed that tax evasion can be reduced significantly by improving the effectiveness of tax administration. The increase in cost of tax compliance also results in avoidance of tax in the countries. It is also found that the dynamic transformation in the tax system and well reformed of tax administration, will help Russian became competitive ability to face international financial framework for effectively running the business.

Mayburov [29] has found that the symposium act as key driver for exploring the theoretical and practical knowledge about transformation of tax administration and enhancing the tax policies in the digitalized economy.

Newman et al. [30] emphasized on evaluating the extent tax administration is effective in collecting tax revenue. The study found a little evidence for presumptive tax administration (PTA) to act as standalone and that has resulted ZIMRA not fulfilling the targeted tax revenue since last seven years.

Baeli [31] has anticipated that the psychological factors of individuals have negatively influence tax compliance system, but different tax awareness activity like implementation of easy tax services, penalty for delay, focusing financial condition of taxpayer will increase the better tax compliance behavior of taxpayer.

Borshchevskiy & Mossaki [32] have applied both qualitative and quantitative measures to fond that, there is a significant statistical relationship between the tax system indicators with tax administration activity in post-Soviet Russia.

Harkushenko [33] has defined that the digital technology was positively and negatively influence the tax administration procedures. His study found that the e-invoicing and block chain technology not more conscious about VAT administration, wherever, that digital technology helps to reduce cost of VAT administration, develop ICT regulatory framework and transform high tax culture economy.

H3: Tax procedure and tax service significantly influence tax penalty.

3. Methods

The current study employs primary data and is analytical in character. The study only includes income taxpayers in Odisha, one of the Indian states. As the country's tax laws are uniform, it is anticipated that typical taxpayer behavior will be more or less consistent across all States. However, since it is impractical to gather data from all taxpayers, we have chosen nine districts in Odisha with a 2011 census-reported literacy rate of more than 80%.

Cuttack, Balasore, Khordha, Jajpur, Puri, Bhadrak, Kendrapara, Jagatsinghpur, and Nayagarh are the nine districts

that were chosen. Data were gathered for the study using a structured questionnaire and stratified random sampling. The information gained from the pilot study and the conclusions of Torgler & Murphy [2] were considered when designing the questionnaire.

There are two sections to the questionnaire. The demographic makeup of the respondents is covered in the first section, and several facets of tax administration are covered in the second. There were 12 statements in all, covering features of procedures, services, and penalties. The responses were rated on a 5-point Likert scale, with 1 being strongly agreed with and 5 being strongly disagreed with each statement.

Respondents were hesitant to share their opinions because the questionnaire asked about their views on tax administration/government tax system, which resulted in a non-response/incomplete response. However, only 1068 of the 1300 respondents who received a complete answer to the questionnaires issued in the sample domain made up our study's sample.

The data gathering time frame is limited to the first six months of 2022. In this work, statistical methods like structural equation modeling (SEM), confirmatory factor analysis (CFA), and exploratory factor analysis (EFA) were applied. To arrive at results and draw inferences, statistical programs like SPSS and AMOS are employed. The model to be used in this study is presented in Figure 1.

Table 1 provides insights into the distribution of respondents across different age groups, education levels, genders, and occupations. It is seen that the largest age group falls within the 30–40 years range, the majority of respondents have a postgraduate education, males outnumber females, and there is a varied distribution among different occupational categories.

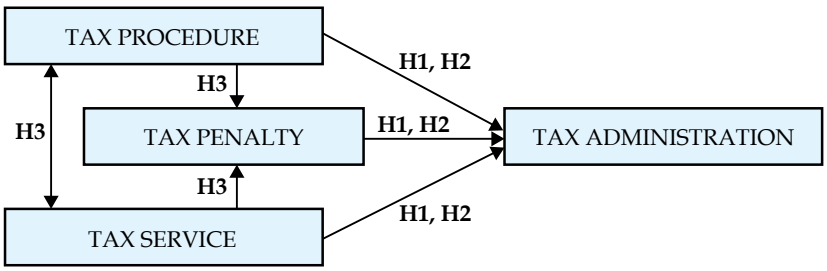

Figure 1. **Proposed Model**

Table 1

Demographic Characteristics of Respondents

	Number	Percentage		Number	Percentage
Age			**Education**		
Below 30 years	235	22	Under graduate	117	11
30–40	406	38	Graduate	299	28
40–50	299	28	Postgraduate	470	44
Above 50	128	12	Professionally /Technically qualified	182	17
Gender			**Occupation**		
Male	844	79	Govt./private employee	438	41
Female	224	21	Business	341	32
			Professional	289	27
Total	**1068**	**100**	**Total**	**1068**	**100**

Source: Primary data collected from questionnaire.

4. Results

4.1. Primary Results

Table 2 witnessed the perception of individual assesses on various aspects of tax administration on 5-point scale. Around 60% of respondents were disagreed on most of the tax procedures components while 30% approx. were either agreed or strongly agreed. Similarly, 55% of assesses expressed their disagreement or strongly disagreement with tax services components whereas 35% were of agreed or strongly agreed. So far tax penalty is concerned, respondents were of inference in their opinions i.e., half of them approx. were either agreed and strongly agreed and other half were of opposite view.

4.2. Exploratory Factor Analysis

Tax administration entails the overall scope of taxation in a country. Further the administration system must convey and develop a sense of trust among all potential taxpayers that encourages them to adopt a culture of timely and justified tax filling. EFA is used to identify the factors explaining the tax administration as perceived

Table 2

Perception of Assesses on various aspects of Tax Administration

Code	Components of Tax Administration	Strongly Disagreed	Disagreed	Neutral	Agreed	Strongly Agreed
	Tax Procedures					
X1	Appealed cases are pending for long period time due to delay in tax procedure	225	448	36	170	189
X2	Further improvement is required to strengthen the functioning of Income tax department	216	436	50	177	189
X3	Information of Income tax administration is not fully known	207	433	51	186	191
X4	IT authorities should be accountable for all tax related issues	259	431	45	173	160
X5	Tax procedure is well explained by the tax administration	201	411	49	207	200
	Tax Service					
X6	Legal enforcement of tax administration is quite appreciated.	252	357	73	208	178
X7	IT officials are empowered to do anything	273	389	69	174	163
X8	The services rendered by tax administration is satisfactory	248	360	76	207	177
X9	Delay in my payment are always reminded by the department	228	355	87	223	175
X10	Tax administrators are cooperative	220	312	66	244	226
	Tax Penalty					
X11	Arbitrary penalties are charged due to discretionary powers of tax authorities	223	328	77	240	200
X12	Tax evaders can easily escape from punishment due to administrative people of IT department	223	302	66	248	229

Source: Primary data collected from questionnaire.

by an individual assesses. The sample respondents were asked to opine their views on twelve statements related to tax administration on 5-point Likert scale.

The scale used to measurement of perception is having high level of internal consistency reliability as evident from table where the value of Alpha (0.757) is more than 0.70. Similarly, construct validity of the construct is demonstrated significantly with the help KMO value of 0.832. and Bartlett's test through a significant "p" value (Table 3).

The number of factors extracted from the analysis is evident from the number of variables getting Eigen values more than one in Table 4. The analysis explored three factors with eigen values more than one. It is evident from above table that only 78.87% of the data are valid and the rest 23% are lost in the analysis.

The analysis explored three important factors "Tax procedure" with 5 significant loadings, "Tax Service" with 5 loadings and "Tax Penalty" with 2 loadings (Table 5). The First factor is accounted for 35.708% of the variance and it emphasizes on filing of Income tax return, accountability of tax administration and improvement in tax administration. The second factor gives importance on services rendered by tax administration and accounts for 30.819% of variance. Similarly, the third factor includes the importance on tax penalties and accounts for 12.343% of variance.

4.3. Structural Equation Model

The factors discovered by factor analysis are further examined using regression analysis and structural equation modeling (SEM) with regard to their interrelationship. The term "SEM" is typically employed when the variables that make up the factor or construct are correlated. The link between the latent and observable variables is conceptualized as a graphic. The constructs are also referred to as latent variables in the context of SEM, while the observable variables that make up each construct are referred to as indicators.

Table 3

Reliability and Validity Test

Test	Statistic Value
Cronbach's Alpha	0.757
Kaiser-Meyer-Olkin Measure of Sampling Adequacy	0.832
Bartlett's Test of Sphericity (Approx. Chi-Square and P value)	1.212E4 0.000

Table 4

Total Variance Explained: Tax Administration

Component	Initial Eigenvalues			Extraction Sums of Squared Loadings			Rotation Sums of Squared Loadings		
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
x1	4.285	35.708	35.708	4.285	35.708	35.708	4.043	33.693	33.693
x2	3.698	30.819	66.526	3.698	30.819	66.526	3.919	32.656	66.349
x3	1.481	12.343	78.870	1.481	12.343	78.870	1.502	12.521	78.870
x4	0.584	4.865	83.735						
x5	0.496	4.136	87.871						
x6	0.466	3.884	91.755						
x7	0.373	3.112	94.866						
x8	0.285	2.377	97.243						
x9	0.147	1.226	98.469						
x10	0.073	0.610	99.079						
x11	0.058	0.485	99.564						
x12	0.052	0.436	100.000						

Table 5

Rotated Component Matrix: Tax Administration

	Component		
	1	2	3
x1	**0.930**	–0.037	0.029
x2	**0.963**	–0.057	0.004
x3	**0.945**	–0.023	0.012
x4	**0.803**	–0.011	0.022
x5	**0.838**	–0.020	–0.031
x6	–0.051	**0.943**	–0.004
x7	–0.010	**0.834**	–0.013
x8	–0.059	**0.955**	–0.022
x9	–0.056	**0.940**	–0.016
x10	0.021	**0.722**	–0.114
x11	0.027	–0.002	**0.864**
x12	–0.007	–0.107	**0.860**

Table 6

Reliability Statistics: Tax Administration

Constructs	Cronbach's Alpha	N of Items
Tax procedure	0.811	5
Service	0793	5
Penalty	0.741	2

4.4. Reliability

The reliability and validity of the instruments used in SEM are tested through Cronobach's Alpha. The values of Alpha for all the constructs are more than 0.70 (Table 6), indicating a strong level of internal consistency reliability for the scale used as measuring instrument.

4.5. Convergent validity

Convergent validity is measured through composite reliability (CR) and average variance explained (AVE). It is evident from Table 7 that the calculated values of CR, AVE for all the constructs meet the minimum requirement for the data to be reliable.

4.6. Discriminant Validity

This validity states how different constructs are different from each other and can be confirmed by comparing AVE with MSV and ASV value. From Table 8 it is clear that our data confirms all suggestive range of validity i.e., MSV < AVE, ASV < AVE, $\sqrt{\text{AVE}} > Correlation$ (Hair et al. [34]).

The output of the final SEM models is given in Table 9 where the range of all the indicators of model fit is suggested. Initially, all the model fit indicators are not within their suggestive range as evident from Model-I, II and Model-III.

Table 7

Validity: Tax Administration

			Estimate	AVE	CR
x1	←	Tax_procedure	0.917		
x2	←	Tax_procedure	0.993		
x3	←	Tax_procedure	0.931	0.95	0.9395
x4	←	Tax_procedure	0.728		
x5	←	Tax_procedure	0.756		
x6	←	Service	0.973		
x7	←	Service	0.708		
x8	←	Service	0.945	0.726	0.9275
x9	←	Service	0.966		
x10	←	Service	0.596		
x11	←	Penalty	0.325	1.22	1.1461
x12	←	Penalty	1.527		

Therefore, it is attempted to bring an improvement in the model through modification of indices using the covariance of variables used in the model. The process of modification thus developed four models for a good model fit. The modification index of the Model-I suggests the covariance of error terms e7 and e8 with the maximum index of 154 to develop model-II. Again, the modification index of the Model-II suggests the covariance of error terms e3 and e5 with the maximum index of 68.091 to develop model-III. The modification index of the Model-III suggests the covariance of error terms and e10 with the maximum index of 64.347 to develop model-IV. The fourth model ultimately fits the data well with all the values of the variables of model fit within the suggestive range. Comparative statements of model fit summary of four different models are summarized in Table 9 and path diagram is given in Figure 2.

In Table 10, the regression weights of all the observed variables under the factor/construct "Tax procedure" and "Tax Service" are comparatively high and so all observed variables significantly and highly positively influence the "Tax procedure" and "Tax Service". But only one observed variable under the construct "Tax Penalty" has less significant load on the construct. Three observed variables under the construct "tax procedure" have high significant loadings of value more than 0.90 and other two have loadings of more than 0.70. Similarly, three observed variables under the construct "Tax Service" have high significant loadings of value more than 0.90 and other two have loadings of more than 0.55. Except x12, all other observed variables have significant loadings on their construct. So, H1 is accepted for all observed variables except x12 at 5% level of significance.

The correlation coefficients between different constructs are negative (Table 11) So, the constructs "Tax procedure", "Tax Service", and "Tax Penalty" are negatively related with each other. So, H2 is rejected at 5% level of significance.

The tax administration factors – "Tax procedure", "Tax Service", and "Tax Penalty" are negatively related as identified from above analysis. Further attempt is made to find out the significance of effects of "Tax procedure", "Tax Service" on "Tax Penalty" by using SEM and to test H3.

Table 8

Factor correlation matrix of tax administration components

	MSV	AVE	ASV	Tax Procedure	Tax Penalty	Tax Service
Tax_Procedure	0.011025	0.9500	0.010413	0.974	–0.099	–0.105
Tax_Penalty	0.1705	0.7260	0.0901	–0.099	0.852	0.413
Tax_Service	0.1705	0.6237	0.0907	–0.105	0.413	0.789

Table 9

Model fit summary of Tax Administration

Variable	Value (Model-I)	Value (Model-II)	Value (Model-III)	Value (Model-IV)	Suggested value
"Chi-square value"	526.285, d.f =51	359.772, d.f = 50	283.460, d.f =49	216.838, d.f = 48	
"P value"	0.000	0.000	0.000	0.000	"P-value > 0.05 [34]"
"CMIN/DF"	10.319	7.195	5.785	4.517	"Less than 5 is reasonable [35]"
"GFI"	0.925	0.949	0.959	0.968	"More than 0.90 [36]"
"AGFI"	0.886	0.920	0.934	0.948	"More than 0.90 [37]"
"CFI"	0.961	0.974	0.981	0.986	"More than 0.90 [38]"
"RMR"	0.059	0.059	0.058	0.047	"Less than 0.08 [36]"
"RMSEA"	0.093	0.076	0.067	0.057	"Less than 0.08 [36]"
"P-CLOSE'	0.000	0.000	0.000	0.055	"More than 0.05 [38]"

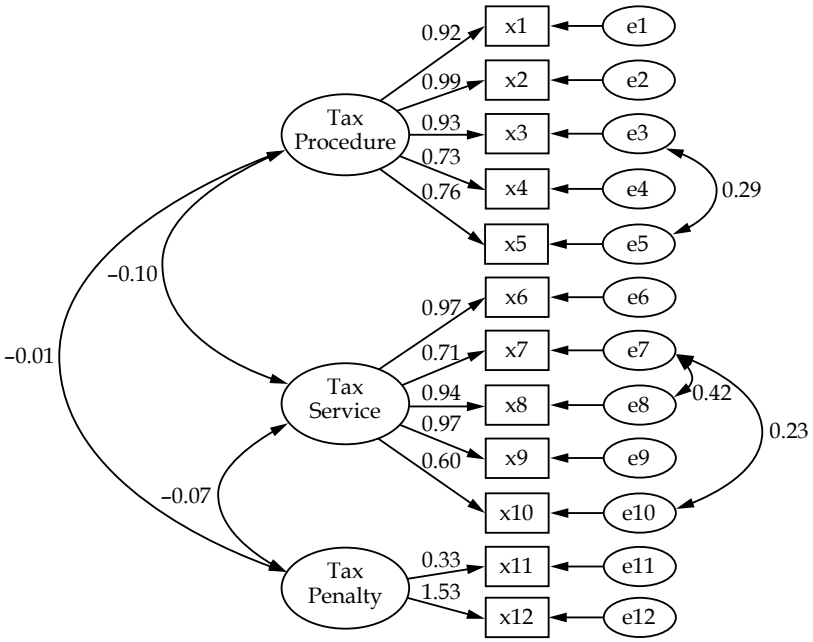

Figure 2. **Path Diagram of model-IV: Tax Administration**

Table 10

Standardized Regression Weights: Tax Administration

			Estimate
x1	←	Tax_procedure	0.917
x2	←	Tax_procedure	0.993
x3	←	Tax_procedure	0.931
x4	←	Tax_procedure	0.728
x5	←	Tax_procedure	0.756
x6	←	Service	0.973
x7	←	Service	0.708
x8	←	Service	0.945
x9	←	Service	0.966
x10	←	Service	0.596
x11	←	Penalty	0.325
x12	←	Penalty	1.527

Table 11

Correlations: Tax Administration

			Estimate
Tax_procedure	↔	Service	–0.105
Tax_procedure	↔	Penalty	–0.005
Service	↔	Penalty	–0.075
e7	↔	e8	0.420
e3	↔	e5	0.289
e7	↔	e10	0.225

The output of the final SEM models is given in Table 12 where the range of all the indicators of model fit is suggested. Initially, all the model fit indicators are not within their suggestive range as evident from Model-I and II.

Therefore, the modification index of the Model-I suggests the covariance of error terms e7 and e8 with the maximum index of 154.571 to develop model-II while Model-II further suggests the covariance of error terms e7 and e10 with the maximum index of 64.342 and the covariance of error terms e3 and e5 with the index of 67.501 to develop model-III. All the indicators of model fit of the third model lie within the suggestive range and so further improvement is not required and path diagram is given in Figure 3.

In Table 13 the value of critical ratios (C.R) are more than 1.96 and the P-values are also not significant for first two paths. That means the factors "Tax procedure" and "Tax Service" have in-significant loads on "tax penalty". As such, H3 is rejected at 5% level of significance.

Table 12

Model Fit Summary: Influence of Tax procedure and tax service on tax penalty

Variable	Value (Model-I)	Value (Model-II)	Value (Model-III)	Suggested value
"Chi-square value"	536.741, d.f = 52	370.320, d.f = 51	228.154, d.f = 49	
"P value"	0.000	0.000	0.000	"P-value > 0.05 [34]"
"CMIN/DF"	10.322	7.261	4.656	"Less than 5 is reasonable [35]"
"GFI"	0.924	0.947	0.966	"More than 0.90 [36]"
"AGFI"	0.886	0.919	0.946	"More than 0.90 [37]"
"CFI"	0.960	0.974	0.985	"More than 0.90 [38]"
"RMR"	0.088	0.088	0.081	"Less than 0.08 [38]"
"RMSEA"	0.093	0.077	0.059	"Less than 0.08 [36]"
"P-CLOSE'	0.000	0.000	0.052	"More than 0.05 [38]"

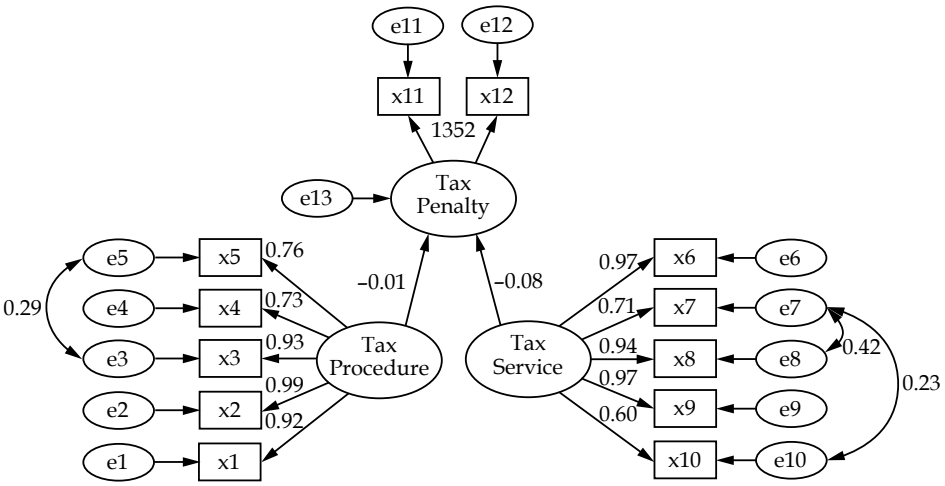

Figure 3. **Path Diagram: Influence of Tax procedure and tax service on tax penalty**

Table 13

Regression Weights: Influence of Tax procedure and tax service on tax penalty

			Estimate	S.E.	C.R.	P
Penalty	⟵	Tax_procedure	−0.004	0.008	−0.518	0.604
Penalty	⟵	Service	−0.023	0.028	−0.810	0.418
x1	⟵	Tax_procedure	1.000			
x2	⟵	Tax_procedure	1.077	0.016	68.617	***
x3	⟵	Tax_procedure	1.010	0.018	55.508	***
x4	⟵	Tax_procedure	0.780	0.025	31.328	***
x5	⟵	Tax_procedure	0.829	0.025	33.535	***
x6	⟵	Service	1.000			
x7	⟵	Service	0.713	0.023	31.286	***
x8	⟵	Service	0.967	0.013	74.970	***
x9	⟵	Service	0.978	0.011	86.421	***
x10	⟵	Service	0.631	0.027	23.544	***
x11	⟵	Penalty	1.000			
x12	⟵	Penalty	4.880	5.496	0.888	0.375

5. Discussion

Income tax administration is mostly perceived by individual taxpayer as a complex process and simplification of methods would increase the tax compliance [8; 18]. Tax compliance is negatively influenced by its cost while positively influenced by tax knowledge, fines and education [26]. Faith on tax administration, fairness in tax system, use of advanced technology, rights of taxpayer, respect to tax administration and resistance are few factors there influence by perception of taxpayer towards tax administration [19]. Tax administration plays an important role in maximizing revenue collection for the government and tax compliance by the payers.

With this background, the present study attempts to explore the factors of tax administration as perceived by Indian taxpayers using EFA and further tries to establish their inter relationship with the help of SEM technique. EFA explored three important factors such as tax procedure, tax services and tax penalty that explain tax administration. It is found that all the observed variables have significant and high positive influence on tax procedures, tax services and tax penalty. *H1* is accepted for all observed variables except x12.

This result is also supported by earlier studies i.e., Murphy & Torgler [2] and Alabede et al. [24] while contradicts from the findings of Paleka & Vitezić [3] and Cuccia & Carnes [1].

Tax procedure is negatively correlated with tax penalty and tax services while tax services are positively correlated with tax penalty. So, *H2* is rejected. This finding is in line with conclusion of Paleka & Vitezić [3], Cuccia & Carnes [1] while contradicts from the findings of Murphy & Torgler [2] and Alabede et al. [24].

Further, the factors "Tax procedure" and "Tax Service" have in-significant loads on "tax penalty". As such, *H3* is rejected. This finding is in line with conclusion of Paleka & Vitezić [3], Cuccia & Carnes [1] while contradicts from the findings of Murphy & Torgler [2] and Alabede et al. [24]. It is inferred from the discussion that more the simplification of tax procedures, lesser will be the chance of problems in tax services and chances of imposing penalty.

Introduction of new user-friendly e-filing portal (e-filing 2.0) in the year 2021, quick return processing, Annual Information Statement (AIS, an extended version of 26AS) that shows income from all sources with edit option, E-verification of tax returns, Tax Return preparer scheme (TRP), new tax regime with low tax rates and minimum deductions, faceless assessment procedures, etc. are few exemplary reforms brought in by Government of India to bring more transparency and healthy atmosphere for the tax payers.

6. Conclusion

The primary aim of this paper is to explore the components that explain the tax administration in India as perceived by the individual assesses. It further examines their interrelationship and magnitude of influence on each other. Primary data from 1068 respondents have been collected through structured questionnaire applying random sampling and exploratory factor analysis followed by structural equation model were used to achieve the objectives.

It is found that all the observed variables have significant and high positive influence on tax procedures, tax services and tax penalty. Tax procedure is negatively correlated with tax penalty and tax services while tax services are positively correlated with tax penalty. It is inferred from the discussion that more the simplification of tax procedures, lesser will be the chance of problems in tax services and chances of imposing penalty.

These findings are result of primary data collected from sample respondents over a limited time and region only which may change over a longitudinal study and hence, this result can't be generalized for all spheres.

Further studies could be expanded to include more of districts with additional variables as the present study includes only nine districts of Odisha.

The current study ignores recent changes in technology and new tax regime applicable to individuals on the basis of different sources of income which could help in getting cue regarding the primary types and value economic activities in the state.

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Government Revenues and Government Expenditures, or Fiscal Synchronization: Empirical Evidence from South and Eastern Asia

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ABSTRACT
To understand and solve budget deficit problems, some academics propose budgets cuts while some suggest increase in taxes. The purpose of this study is to check the causal relationship among ten countries from two regions, south and eastern Asia, where all countries are developing except, Japan. The relationship is tested among three fiscal variables for the period of twenty-seven years from 1980 to 2017. For analysis purposes, Augmented Dickey Fuller test, Toda and Yamamoto Granger Causality Test and Johnson co-integration tests has been used. The results reveal three co-integrating effects for, Bangladesh and Mongolia, two for India and Japan, one for Sri Lanka, Nepal, China, South Korea, North Korea, while non for Pakistan. The Toda and Yamamoto Granger causality tests reveal evidence of tax-and-spend hypothesis for China, Pakistan, and Nepal. For Nepal, we found support for spend-and-tax hypothesis. There is evidence of neutrality for Japan, South Korea, North Korea, Mongolia, India, Sri Lanka, and Bangladesh. The results validate that south and eastern Asian countries tax policies have lessor impact to reduce budget deficits and do not offer permanent solution for fiscal problems. Our findings support increase in taxes may be a good solution to budget deficit problem, but it can be reduced if revenues and expenditures are controlled simultaneously. Major policy implications include, raising tax rates in nations like China, Pakistan, and Nepal, to increase revenue and strengthen fiscal sustainability, the significance of government spending reduction as a key tactic for managing budget imbalances, the importance of balancing both revenue generation and expenditure and flexibility in approach and continual monitoring of fiscal indicators.

KEYWORDS
budget deficits; government revenues; government expenditures; fiscal synchronization; Johnson Co-integration; South and Eastern Asia

JEL C32; E62; H20; H50

УДК 336.13

Государственные доходы и государственные расходы, или фискальная синхронизация: эмпирические данные из Южной и Восточной Азии

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АННОТАЦИЯ
Чтобы понять и решить проблемы бюджетного дефицита, некоторые ученые предлагают сократить бюджеты, а некоторые предлагают увеличить налоги. Целью данного исследования является проверка причинно-следственной связи

между десятью странами из двух регионов, Южной и Восточной Азии, где все страны развиваются, за исключением Японии. Связь тестируется между тремя финансовыми переменными за период в 27 лет с 1980 по 2017 г. Для целей анализа использовались расширенный тест Дики Фуллера, тест причинности Тоды и Ямамото Грейнджера и тесты коинтеграции Джонсона. Результаты выявили три коинтеграционных эффекта для Бангладеш и Монголии, два – для Индии и Японии, один – для Шри Ланки, Непала, Китая, Северной Кореи, Южной Кореи. Для Пакистана не было выявлено эффектов. Тесты причинно-следственной связи Тоды и Ямамото Грейнджер подтверждают гипотезу «налоги и расходы» для Китая, Пакистана и Непала. В Непале мы нашли поддержку гипотезы расходов и налогов. Имеются свидетельства нейтралитета Японии, Северной Кореи, Южной Кореи, Монголии, Индии, Шри Ланки и Бангладеш. Результаты подтверждают, что налоговая политика стран Южной и Восточной Азии оказывает меньшее влияние на сокращение бюджетного дефицита и не предлагает постоянного решения финансовых проблем. Наши результаты подтверждают, что повышение налогов может быть хорошим решением проблемы бюджетного дефицита, но его можно уменьшить, если доходы и расходы контролируются одновременно. Основные последствия для политики включают повышение налоговых ставок в таких странах, как Китай, Пакистан и Непал, для увеличения доходов и укрепления финансовой устойчивости, важность сокращения государственных расходов как ключевой тактики управления бюджетными дисбалансами, важность балансирования доходов и расходов. и гибкость в подходе и постоянный мониторинг бюджетных показателей.

КЛЮЧЕВЫЕ СЛОВА
дефицит бюджета; государственные доходы; государственные расходы; фискальная синхронизация; коинтеграция Джонсона; Южная и Восточная Азия

1. Introduction

Budget deficits cause problems for governments both in developed and developing worlds. These deficits pressurize governments to increase interest rates and ultimately capital formation become slower.

In last few decades many empirical studies examined deficit problems in the developing world. Numerous academia suggest cut in government expenditures (GE) to overcome deficits and believe rising taxes will simply cause high expenditures (Friedman [1]), the causal relationship between government revenues (GR) and GE is not easy to understand and considering one component and ignoring the other can negatively affect deficit solution. First, government revenues cause expenditures, second, expenditures cause revenues, Third, and both occurred concurrently (Joulfaian & Mookerjee [2]).

The causal relationship between GR and GE is of greater importance for government authorities to understand and to quantify its sources.

These hypothesis present theoretical and empirical implications, on the theoretical side the Tax (revenue)-spend (expenditures) hypothesis examine that higher revenue leads to higher government expenditures (Nwosu & Okafor [3]). The estimated causal relationship would be in the same direction running from GR to GE.

The spend-and-tax hypothesis holds that deficits cause governments to raise taxes to match its spending, this increase upholds by government and remain a permanent raise in taxes, ultimately expected causal relationship is unidirectional from expenditure to revenues.

Third hypothesis, fiscal synchronization which holds that governments spending budgets on projects are determined by revenue sources and may change bidirectional (Gounder et al. [4]).

The debate among academia has been increased in recent past with increasing trends in government budgets deficits both in developing and developed world. On the policy implication side, if the revenue causes expenditures, then government can eliminate deficits by increasing revenues. Second, if governments spend first and finance program later that will unbalance the pattern and will cause a perma-

nent shift in government taxes (Peacock & Wiseman [5]). Third, if governments avoid fiscal synchronization, then government expenditures will increase at higher phase then revenues (Nzimande & Ngalawa [6]).

The purpose of this study is to check the causal relationship among ten countries[1] from two regions, South and Eastern Asia, where all countries are developing except, Japan and among them eight are facing budget deficits.

This study tests the *following hypothesis*:

H1: Tax and Spend Hypothesis: raising tax leading to more expenditure in south and eastern Asia.

H2: Spend and Tax Hypothesis: government expenditures causing revenue in south and eastern Asia.

H3: Fiscal Synchronization Hypothesis: government may change taxes and expenditures simultaneously in south and eastern Asia.

The contribution of this work are as follows. First, in this study we analyzed annual data for twenty-seven years and for ten countries, the data possess structural changes and important to examine (Payne et al. [7]). Second, in the literature no study was found on these two regions of the world which examined comprehensive measures of GR and GE. Third, most of the countries included in this study are newly industrialized and are not examined for causal relationship among the interest variables.

The rest of the paper is organized as follow. Section two presents the theoretical and empirical literature. Section three presents' data source variable measurements, and methodology. Section four estimates the key findings and discussions. Section five conclude the paper with policy implications for stakeholders.

2. Literature Review

The causal relationships between Government Revenues and Government Expenditures are topic of great discussion in the last five decades. The causal relationships between GR and GE to budgets deficit have not been resolved empirically (Febriani & Rambe [8]).

Theoretically, volume of studies in the developed and developing world appeared to examine its importance. The implications of revenues and expenditures have been emphasized by (Chen & Xu [9]). Irrespective of their relationships the policy implication of these findings is significant.

The tax-and-spend hypothesis was presented by Babarinde [10], stated that rising taxes will simply give government an opportunity to spend more on projects, but it would not reduce government budget deficits. Public rule ensures government spend what is received in form of taxes and at the same time reducing taxes can lead higher budgets deficits (Shkarlet et al. [11]), because GE are increases with taxes. To reduce the budgets deficits the government should reduce its spending.

The tax led government expenditure hypothesis were also examined by Arvin et al. [12]. They stated that with a cut in taxes lead to reduction in the cost of government programs. This induce pressure on new programs, which results in higher budget deficits and can be realized of reduction in tax revenue and government spending.

The spend-and-tax hypothesis explain that expenditures cause revenue (Chang & Ho [13]). They stated crisis situations brings permanent changes in expenditure pattern of governments. Initial crisis increase government expenditure more in proportion to increase in taxes, this brings continuous changes in fiscal variables initially justify by crises situation become public permanent tax policy, hence government will have no choice but to increase the taxes to match its spending (Brady & Magazzino [14]).

Fiscal Synchronization hypothesis holds that government may change expenditures and revenue at the same time (Akram & Rath [15]). It means government revenue decisions are not made in absence of expenditures, and the causality remains bidirectional, under this belief

[1] Ten countries from two regions; from Asia; India, Pakistan, Bangladesh, Sri Lanka and from Eastern Asia; Mongolia, China, South Korea, North Korea, Japan.

government brings down expenditures with a belief it will bring increase in taxes in the future.

The empirical literature on the causal relationship between GR and GE both in the developed and developing world are discussed in the country scenario.

Owoye [16] by using co-integration and ECM Models reported bidirectional causality for G7 countries except Italy and Japan by using data from 1960–1990.

Raza et al. [17] found a non-linear causal relationship between GR and GE in Pakistan for a period of (1972–2014). The authors reported a co-integration among GR and GE and fiscal synchronization in the government budget process.

Yashobanta & Behera [18] estimates the causal relationship between GR and GE in India from 1970–2008 by using VECM, they reported a bidirectional causal relationship between GR and GE in the long run while unidirectional in the short run. The long run relationship validates the hypothesis of fiscal synchronization and short run spend and tax hypothesis for India.

Ikhsan & Virananda [19] used data of GR and GE from 1973 to 2009 for Sri Lanka, by using VAR model, they found evidence of spend and tax hypothesis. By using bond testing approach has reported tax and spend hypothesis for Singapore, Sri Lanka, and Indonesia in short run, the same were found for Nepal both in long run and short run. The spend-and-tax hypothesis were found for Indonesia and Sri Lanka in Long run. For the remaining countries, Philippines, Pakistan, India, Thailand, and Singapore neutrality have reported.

Hong [20] employed ECM and Johnson co-integration and used annual time series data from 1970 to 2007 in Malaysia. The researcher found co-integration between GE and GR. They found a unidirectional causal relationship from GE to GR.

Sanusi [21] examined the causal relationship between government expenditure and government revenues by using quarterly data from 1965–2019. He used linear and nonlinear models. The empirical findings suggests that non-linear and one-way causal relationship among the study GE and GR.

Guru-Gharana et al. [22] by using Toda and Yamamoto methodology examined the spending and revenues pattern of Greece and found causal unidirectional relationship from GR towards GE.

Narayan [23] by using Toda and Yamamoto approach estimate the relationship between GR and GE for twelve developing countries and found spend and tax hypothesis for Haiti and support for tax and spend hypothesis for Venezuela, Chile, Haiti, El Salvador, and Mauritius. Neutrality was reported for Ecuador, Uruguay, Guatemala, South Africa, and Peru.

Chang et al. [24] estimate the relationship between GR and GE for ten industrialized countries (United Kingdom, Japan, Canada, Thailand, Taiwan, New Zealand, South Korea, USA, Australia, and South Africa). The co-integration among GR and GE were reported for seven countries (United Kingdom, Australia, South Africa, Taiwan, Japan, USA, and South Korea). Causality results reveals a unidirectional relationship from government revenues to expenditures for, Japan, Taiwan, South Korea, UK, and USA. The same unidirectional causal relationship running from GR and GE was found for South Africa and Australia.

Afonso & Rault [25] estimates the causal relationship between government revenue and government spending in the European Union countries from 1960 to 2006. Their empirical results shows that selected EU countries have different pattern of tax collections and spending. The GE to GR was found for Italy and France, while GR to GE were reported for Germany, Austria, and Belgium.

Magazzino [26] investigated the causal relationship between government revenue and government expenditure in six West African countries. The results reveal that causality running from revenue to expenditure in Liberia, Sierra Leone, Gambia, and Nigeria while no causal relationship was found for the remaining two countries.

No two studies in the academic literature predicts the same causal relationship

among government revenues and Government expenditures while many papers contradict previous studies. This study is an attempt to increase the understandings of academia in relation to GR and GE in newly industrialized countries of south and eastern Asian countries.

3. Methodology

3.1. Data Source and Variables Calculations

Yearly data of main variables were collected of ten countries from Asia and Eastern Asian countries from 1980–2017 from Chinese Stock Exchange and Accounting Research Database (CSMAR). It has the main data source of Chinese listed firms. Table 1 gives details of variables calculations. All the variables are calculated at current and constant prices.

Total revenues and total expenditures are classified into, revenue and capital receipt, and revenue and capital expenditures. The revenue receipt is non-redeemable, or revenue titled with no future obligations while capital receipt is those creating liability and will decrease state assets in the future. Revenue expenditures include spending on state department's responsible and did not create physical assets while capital expenditures are direct expenditures on serving debts or spending social developments.

3.2. Unit Root tests

To check the causal associations of interest variables, the time series of variables are tested for stationarity. The Augmented Dickey Fuller are carried out to check weather series have unit root or not? If the data are having unit root, it is non-stationary, and do not have unit root and series is considered stationary. In this paper we have used auto regressive equation proposed by Luković & Grbić [27].

$$\Delta Y_\tau = \alpha_0 + \alpha_1 \tau + \alpha_2 Y_{\tau-1} + \\ + \sum_{i=1}^{n} \delta_i Y_{\tau-i} + \omega_\tau, \quad (1)$$

where Y_τ are the observed variables GR_τ and GE_τ, α_0, α_1, α_2, δ_i are the set of parameters which are estimated, and ω_τ a white nose error.

3.3. Toda and Yamamoto Test (TYT)

TYT is the Causality test to examine the causal relationship among two variables.

Granger [28] and Johansen & Juselius [29] proposed various causality tests to quantify the cause-and-effect relationship between two variables affecting each other with distributed legs. Granger Causality test is useful when we are interested in direction of causality not on magnitude of impact.

In this study we used robust granger causality test of Toda and Yamamoto [31]. This method has the flexibility of asymptotic chi-squared distribution. The causality test are carried conventionally by estimating Vector Autoregressive (VAR) models (Engle & Granger [30]).

For joint significance of variables Granger non-causality test recommends Wald F-test in unrestricted vector autoregressive (VAR) models. When time series

Table 1

Measurements

Variables	Abbreviation	Measures
Real Gross Domestic Product	RGDP	Total sum of goods and services produced valued at predetermined market prices
Government Revenues	GR	Primarily Industry + Secondary Industry + Industry + construction + wholesale, retail and catering trade + transportations, storage, post and telecommunication + other sectors
Government Expenditures	GE	Final consumption expenditures + household consumption expenditures + General government consumption expenditures + Gross capital formation+ gross fixed capital formation

data are co-integrated then Wald F-test is not valid for granger non-causality, because it lacks standard distribution (Toda & Yamamoto [31]).

They further proposed modified Wald test to restrict parameters of VAR model. Two steps are involved to run this method, first, determination of optimal leg length (S) and maximum order of integration (dmax) of variables are used in the model.

In this paper Akaike information criterion is used to determine optimal leg length (S) and ADF unit root test or maximum order of integration (*d*max). Once VAR (S) and dmax are obtained then VAR optimal leg length ($p = s + d\max$) at level will be estimated. Second, Wald test on the (S) coefficients matrix to draw inferences on Granger Causality. The above discussion is explained in the following equations:

$$\ln Y_\tau = \sigma_0 + \sum_{l=1}^{s+d\max} \omega_i \ln Y_{\tau-1} + \sum_{l=1}^{s+d\max} \partial_i \ln GR_{\tau-1} + \sum_{l=1}^{s+d\max} \gamma_i \ln GE_{\tau-1} + \varepsilon_{1\tau}; \quad (2)$$

$$\ln GR_\tau = \alpha_0 + \sum_{l=1}^{s+d\max} \alpha_i \ln GR_{\tau-1} + \sum_{l=1}^{s+d\max} \beta_i \ln GE_{\tau-1} + \sum_{l=1}^{s+d\max} \pi_i \ln Y_{\tau-1} + \varepsilon_{2\tau}; \quad (3)$$

$$\ln GE_\tau = \theta_0 + \sum_{l=1}^{s+d\max} \delta_i \ln GE_{\tau-1} + \sum_{l=1}^{s+d\max} \varphi_i \ln GR_{\tau-1} + \sum_{l=1}^{s+d\max} \tau_i \ln Y_{\tau-1} + \varepsilon_{3\tau}. \quad (4)$$

Ln GR is calculated by taking natural logarithm of government revenues and ln GE natural logarithm of government Expenditures. Ln Y is the natural logarithm of real gross domestic product (GDP). $\varepsilon_{1\tau}$, $\varepsilon_{2\tau}$, and $\varepsilon_{3\tau}$ are independent random errors having zero mean values and finite covariance matrix (Narayan & Narayan [32]).

4. Results of Stationarity and Co-integration

Table 2 show the augmented dickey fuller test results and p-value of each variable against null hypothesis. It was found that GDP, GR, and GE are non-stationary at level. All the three variables are stationary at order I (1) except China and Bangladesh which are stationary at I (2).

The null hypothesis is rejected and there is absence of unit root among interest variables, concludes stationarity of time series (Table 3).

The co-integrations result in Table 3 reveal that except Pakistan, all nine countries of South and Eastern Asia, Gross Domestic Product, government revenues and expenditures are co-integrated.

5. Discussion

As we were interested to check the causality among revenue and expenditures. Engle & Granger [28] and Johansen & Juselius [29] are not free of limitations, the pre-requests' include, unit root test and co-integration but sensitive to model specifications.

To overcome these limitations, we employ more robust causality test presented by Toda & Yamamoto [31]. Some caution is required while interpreting the causal relationships among three variables because in budget financing near elections, government officials in spite of tax financing switch to debt financing or deliberately lower taxes on goods to secure maximum number of seats (Hasan & Lincoln [33]).

Table 4 presents the results of Toda and Yamamoto Granger Causality of ten countries.

All three hypothesis were found in the selected countries and are accepted.

The results reveal that a unidirectional casualty is running from GR to GE for China, Pakistan, and Nepal. Similar results were reported by Park [34], Raza et al. [17], Hong [20], Yashobanta & Behera [18], Ikh-

san & Virananda [19], who examined causality run from GR to GE.

For Nepal the casualty run from GE to GR and validate the hypothesis of spend and tax hypothesis. Owoye [16] reported GE causes GR in G7 countries, Ghartey [35] found the same relationship for the developing countries. For remaining countries North Korea, South Korea, Mongolia, India, Bangladesh, and Sri Lanka there is no causal relation among government revenues and expenditures and hence exists neutrality GR and GE, it means GR and GE decisions are made independently. Our results are in line with findings of Narayan & Naraya, [32] in his work he reported neutrality in five out of nine countries included India.

For causal relationship between GDP and GR and GE, we found, bidirectional casualty between GDP and GE for China, North Korea, and Nepal, and a unidirectional casualty between GDP and GE for Sri Lanka. Same bidirectional casualty was found between GDP and GR for India, and unidirectional casualty were found between GDP and GR for China. Thus, we found causal relationship between taxes

Table 2

Stationarity Test

Country	Series	T-Stat at level	T-Stat at 1st Diff	T-Stat at 2nd Diff
China	GDP	5.248168	0.658842	–7.343104***
	TR	–2.964392	–1.903234	–2.53046
	TE	5.081935	0.286645	–7.219617***
Japan	GDP	–1.948312	–20.0339***	–
	TR	–3.111972	–19.32771***	–
	TE	–2.950205	–20.4438***	–
DPR_ Korea	GDP	–1.244868	–11.53631***	–
	TR	–1.150713	–11.19009***	–
	TE	–1.251863	–10.98609***	–
REP_Korea	GDP	–2.933823	–12.02503***	–
	TR	–2.55044	–11.40125***	–
	TE	–8.039899	–	–
Mongolia	GDP	5.163363	0.401205	–7.653374***
	TR	2.393275	–9.560818***	–
	TE	–0.749078	–13.12827***	–
Pakistan	GDP	4.273836	–13.52696***	–
	TR	4.135193	–13.74115***	–
	TE	3.880672	–13.41739***	–
India	GDP	4.126754	–3.802499***	–
	TR	3.546969	–3.625077***	–
	TE	3.462001	–3.386252**	–
Bangladesh	GDP	4.600870	0.626614	–5.13124***
	TR	4.774890	0.687782	–5.225345***
	TE	4.441068	0.513419	–4.446576***
Sri Lanka	GDP	3.775781	–9.344954***	–
	TR	3.572680	–9.537214***	–
	TE	4.330833	–9.117332***	–
Nepal	GDP	1.272942	–13.58352***	–
	TR	2.525390	–12.84435***	–
	TE	1.220347	–13.67587***	–

Source: Author Calculations
Note: (***), (**), and (*) implies statistical significance at 1%, 5%, and 10% respectively.

and expenditures in China, Pakistan, and Nepal.

The results are align with the findings of Chang et al. [24] and Yashobanta & Behera [18]. Increase in country expenditures are contributed to increase in revenues. The same results were reported by Nyamongo et al [36], who found a bidirectional causality between GR and GE. Expenditures are mainly focused on household well-being oriented as given in Tables 1, final consumption expenditures, household consumption expenditures, education, and health. Likewise, revenues are increased in response to increase in expenditures, the feedback causal effect were found in Nepal. Our findings detect one way causality running from taxes to expenditures for China, Pakistan, and Nepal. The feedback casualty for Nepal are matching the results of Narayan & Narayan [32].

Table 3

Co-integration test results

Country	Hypothesis	Trace Test	Prob	Eigen Max	Prob
East Asia					
China	H0 : r = 0	43.03438	0.0009	34.19810	0.0004
	H0 : r <= 1	8.836279	0.3807	6.584025	0.5395
	H0 : r <= 2	2.252254	0.1334	2.252254	0.1334
Japan	H0 : r = 0	33.40575	0.0184	18.94856	0.0984
	H0 : r <= 1	14.45719	0.0712	9.246658	0.2662
	H0 : r <= 2	5.210535	0.0224	5.210535	0.0224
North Korea	H0 : r = 0	37.67749	0.0050	31.38260	0.0013
	H0 : r <= 1	6.294889	0.6607	3.762730	0.8835
	H0 : r <= 2	2.532159	0.1115	2.532159	0.1115
South Korea	H0 : r = 0	29.91265	0.0485	21.67621	0.0419
	H0 : r <= 1	8.236440	0.4405	6.495703	0.5504
	H0 : r <= 2	1.740738	0.1870	1.740738	0.1870
Mongolia	H0 : r = 0	32.93761	0.0210	17.45260	0.1517
	H0 : r <= 1	15.48500	0.0502	10.53983	0.1788
	H0 : r <= 2	4.945171	0.0262	4.945171	0.0262
South Asia					
Pakistan	H0 : r = 0	22.70850	0.2607	13.31448	0.4237
	H0 : r <= 1	9.394027	0.3302	9.334001	0.2594
	H0 : r <= 2	0.060025	0.8064	0.060025	0.8064
India	H0 : r = 0	51.47725	0.0000	36.75872	0.0002
	H0 : r <= 1	14.71853	0.0652	13.05722	0.0769
	H0 : r <= 2	1.661316	0.1974	1.661316	0.1974
Bangladesh	H0 : r = 0	84.54188	0.0000	52.33004	0.0000
	H0 : r <= 1	32.21183	0.0001	29.47225	0.0001
	H0 : r <= 2	2.739583	0.0979	2.739583	0.0979
Sri Lanka	H0 : r = 0	56.52883	0.0000	43.34315	0.0000
	H0 : r <= 1	13.18568	0.1082	12.85967	0.0824
	H0 : r <= 2	0.326015	0.5680	0.326015	0.5680
Nepal	H0 : r = 0	52.50069	0.0000	45.28498	0.0000
	H0 : r <= 1	7.215707	0.5527	6.416472	0.5604
	H0 : r <= 2	0.799235	0.3713	0.799235	0.3713

Source: Author Calculations

Table 4

Granger Causality Test

Country	Null Hypothesis	F-Stat	Prob
China	TR > GDP	0.93999	0.4265
	GDP > TR	6.65589	0.0005
	TE > GDP	4.22208	0.0086
	GDP > TE	4.73453	0.0047
	TE > TR	9.27083	3.00E-05
	TR > TE	2.94800	0.0391
Japan	TR > GDP	1.10195	0.3547
	GDP > TR	1.36753	0.2604
	TE > GDP	0.60086	0.6167
	GDP > TE	0.66593	0.576
	TE > TR	0.97143	0.4116
	TR > TE	0.87413	0.4591
North Korea	TR > GDP	0.42678	0.7345
	GDP > TR	0.55673	0.6455
	TE > GDP	2.24106	0.0916
	GDP > TE	2.25623	0.0925
	TE > TR	0.86664	0.4629
	TR > TE	0.50991	0.6768
South Korea	TR > GDP	1.83848	0.1487
	GDP > TR	1.69610	0.1764
	TE > GDP	1.45231	0.2356
	GDP > TE	2.06622	0.1131
	TE > TR	1.43872	0.2394
	TR > TE	2.05864	0.1142
Mongolia	TR > GDP	1.26079	0.2952
	GDP > TR	1.12161	0.3469
	TE > GDP	0.43573	0.7282
	GDP > TE	1.25623	0.2968
	TE > TR	0.24860	0.862
	TR > TE	1.20255	0.3159
Pakistan	TR > GDP	12.9401	1.00E-06
	GDP > TR	11.7365	3.00E-06
	TE > GDP	1.03559	0.3827
	GDP > TE	0.91769	0.4373
	TE > TR	2.06086	0.1139
	TR > TE	2.36858	0.0786
India	TR > GDP	2.79447	0.04712
	GDP > TR	3.02862	0.03555
	TE > GDP	11.2403	5.00E-06
	GDP > TE	16.6461	4.00E-08
	TE > TR	12.5928	1.00E-06
	TR > TE	14.8867	2.00E-07
Bangladesh	TR > GDP	17.2035	2.00E-08
	GDP > TR	16.9850	3.00E-08
	TE > GDP	8.43648	8.00E-05
	GDP > TE	9.85678	2.00E-05
	TE > TR	18.5737	8.00E-09
	TR > TE	22.0665	5.00E-10
Sri Lanka	TR > GDP	1.42754	0.2426
	GDP > TR	1.19103	0.32
	TE > GDP	10.0039	2.00E-05
	GDP > TE	7.98022	0.0001
	TE > TR	11.5998	3.00E-06
	TR > TE	9.01739	4.00E-05
Nepal	TR > GDP	0.11441	0.9514
	GDP > TR	0.10221	0.9585
	TE > GDP	2.40069	0.0756
	GDP > TE	3.15595	0.0305
	TE > TR	2.75623	0.0525
	TR > TE	2.79803	0.0468

Source: Author Calculations

Yet no consistent and firm conclusion can be drawn from the causal relationship between GR and GE for most of the countries. Differences in results are the outcome of differences in political system, budget process, and model specifications.

6. Conclusion

The relationship between GR and GE is shaping the economic health and fiscal stability of a country. Government often involves in borrowing to cover budget deficits, and an imbalance in this relationship can results in unsustainable accumulation of debt. Understanding of GR and GE is important for policy makers to avoid budgets deficits.

We examined the GDP, GR and GE for ten countries. Nine out of ten countries have co-integration among GDP, GR and GE. For China, Pakistan, Nepal, GR causes GE and are consistent with tax-and-spend hypothesis.

The tax-and-spend hypothesis for China, Pakistan, and Nepal indicates the demand for goods and services is grown larger from 1980 to 2017, and hence widened government spending base.

However, this does not mean that lower taxes will cause lower expenditures, the government in situations of lower tax returns opts for debt financing rather than tax financing. For Nepal GE Granger causes GR and are consistent with spend-and-tax hypothesis. For Japan, South Korea, North Korea, Mongolia, India, Bangladesh, and Sri Lanka we found neutrality among GR and GE and are inconsistent with fiscal synchronization hypothesis.

The findings confirm that tax strategies in south and eastern Asian nations have little effect on reducing budget deficits and do not provide long-term solutions to fiscal issues. The bottom line of deficit issue is to reduce spending. In contrast, our findings support increase in taxes may be a good solution to budget deficit problem in China, Pakistan, and Nepal.

On the other hand, in Japan, South Korea, North Korea, Mongolia, India, Bangladesh, and Sri Lanka budget deficits can be reduced if revenues and expenditures are controlled simultaneously. It is important for the policymakers to take into account the elusive strategies needed to solve the fiscal difficulties in these countries. To deal with the budget deficits the study conclusion has the number of policy implications for the south and east Asian nations.

The study major implications are, *first*, according to the study, raising tax rates in countries like, Pakistan, China, and Nepal could be a good way to cut budget deficits. To enhance revenues and ensure financial sustainability, policymakers in these countries should think about enacting tax polies adjustments.

Second, the findings highlight the importance of government spending reduction as a key strategy to manage budget imbalances. To attain sustainable fascial results, policymakers in south and East Asian countries should place high priority to public spending and fiscal restraint.

Third, the study emphasizes the balance of both revenue generation and expenditure control for countries including Japan, South Korea, North Korea, Mongolia, India, Bangladesh, and Sri Lanka. A complete fiscal management approach for policymakers should be used by increasing income collection and reining in spending.

Fourth, the continual monitoring of fiscal indicators is important for policymakers to employ given the variety of fiscal difficulties in the region. They should modify and adopt their programs in response to shifting financial needs and shifting economic situations.

Fifth, countries of South and East Asia could gain for cooperation and sharing expertise. Engaging in knowledge and technology exchange with nations that have dealt with budget deficits.

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Empirical Studies of Taxation in BRICS Countries: Literature Review

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ABSTRACT

The cross-country studies in taxation could provide a number of unique advantages over national studies The paper aims to analyze existing empirical research devoted to tax issues in BRICS countries to classify them according to their aim and empirical base and answer the question: could BRICS countries really be compared in tax frame, and for what extend. The sample for this study includes all papers available in Science Direct, Google Scholar and E-Library databases, which include pair of words "tax" and "BRIC(S)" or "налог" and "БРИКС" simultaneously in the title, abstract, keywords. Literature sources were sorted by relevance and search depth was not limited. The literature review showed that studies devoted to taxation in BRICS countries have different approaches based on their aim and data. The most part of research is based on tradition approach (tax rates and tax legislation) only few research of taxes and related topics in BRICS are based on indices. We also separated several directions in studies related to taxation in BRICS countries: comparative description of taxation; tax avoidance and tax evasion and their determinants; examination of the particular tax or particular industry to find relevant experience to apply; examination the interaction between taxes and other variables (taxes and economic development; taxes and economic inequality; taxes and environment). The majority of articles do not aim to find some regularities for BRICS countries they only use these countries as random sample comparing them with G7 or MINT or other groups of countries. While almost the BRICS member countries are rapidly developing, they are diverse in culture, economic conditions and social and political structures. From this perspective we could not address to BRICS countries as a homogeneous group that could be used for observation in tax frame.

KEYWORDS

literature review, taxes, taxation, BRICS, tax indices, economic development; economic inequality, environment

JEL A14, H20, O57

УДК 336.22

Эмпирические исследования налогообложения в странах БРИКС: обзор литературы

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АННОТАЦИЯ

Межстрановые исследования в области налогообложения могут обеспечить ряд уникальных преимуществ перед национальными. Целью статьи является анализ существующих эмпирических исследований, посвященных проблемам налогообложения в странах БРИКС, их классификация в зависимости от цели и эмпири-

ческой базы, чтобы и ответить на вопрос: можно ли сравнивать страны налоговые системы этих стран и в какой степени. В выборку для данного исследования вошли все статьи, доступные в базах данных Science Direct, Google Scholar и E-Library, которые содержат одновременно пару слов «налог» и «БРИКС» в названии, аннотации, ключевых словах. Литературные источники сортировались по релевантности, глубина поиска не ограничивалась. Обзор литературы показал, что исследования, посвященные налогообложению в странах БРИКС, имеют разные подходы в зависимости от цели и данных. Большая часть исследований основана на традиционном подходе (налоговые ставки и налоговое законодательство), лишь немногие исследования налогов в БРИКС и связанных с ними тем основаны на индексах. Также мы выделили несколько направлений в исследованиях, связанных с налогообложением в странах БРИКС: сравнительное описание налогообложения; уклонение от уплаты налогов и уклонение от уплаты налогов и их определяющие факторы; изучение конкретного налога или конкретной отрасли, чтобы найти соответствующий опыт для применения; изучить взаимодействие между налогами и другими переменными (налоги и экономическое развитие; налоги и экономическое неравенство; налоги и окружающая среда). Большинство статей не ставят своей целью выявить какие-то закономерности для стран БРИКС, они используют эти страны лишь в качестве случайной выборки, сравнивая их с G7 или MINT или другими группами стран. Хотя большинство стран-членов БРИКС быстро развиваются, они разнообразны по культуре, экономическим условиям и социальным и политическим структурам. С этой точки зрения мы не можем рассматривать страны БРИКС как однородную группу, которую можно использовать для наблюдения в сфере налогообложения.

КЛЮЧЕВЫЕ СЛОВА
обзор литературы, налоги, налогообложение, БРИКС, налоговые индексы, экономическое развитие; экономическое неравенство, окружающая среда

1. Introduction

Awareness that national tax policies is connected with domestic and international economic activity has long history in Russia. On 22 of July (2 of August) 1763, Catherine the Great proclaimed Manifest "On the permission of all foreigners entering Russia to settle in whatever provinces they wish and, on the rights". "Foreigners that have settled themselves in Russia [to] erect Fabrics or Works, and manufacture there such Merchandizes as have not yet been made in Russia ..." the right to "sell and export said Merchandizes out of our Empire for 10 years, without paying any inland Tolls, Port Duties or Customs on the Borders ..."[1].

But a concept of international taxation does not exist until 1907, when in Genoa, Italy, a group of scholars held the first international conference to meet the new challenge of worldwide trade [1].

It should be noted that, tax convergence is slower than in other areas for many reasons. In 1944 the economic historian Karl Polanyi wrote that a "double movement" propels modern society. On one hand, governments seek to better the lives of their citizens by increasing economic prosperity through heightened ties with other countries. On the other hand, as market forces expand, they increasingly constrain government policy-making, and people demand that their governments protect them from the socially disruptive effects of those market forces [2]. This create numerous barriers prevented states from working together cooperatively in tax sphere; these barriers included heterogeneity of state interests, reluctance to cede national tax sovereignty, interest-group capture, and views that tax competition was normatively desirable [3].

Creation of the European Union and other regional economic communities such as the Eurasian Economic Union (EAEU), Shanghai Cooperation Organization (SCO); North American Free Trade Agreement (NAFTA), the Trans Pacific

[1] Complete collection of laws of the Russian Empire, since 1649: [Collection 1: to December 12, 1825]. St. Petersburg: In the printing house of the Second Department of His Imperial Majesty's Own Chancellery, 1830–1851. https://www.prlib.ru/item/358609

Partnership (TPP), Asia Pacific Economic Cooperation (APEC), Regional Comprehensive Economic Partnership (RCEP), the Association of Southeast Asian Nations (ASEAN) renewed the interest among public finance and international finance economists in the issues of tax harmonization and coordination.

However, new global bloc of countries which does not represent a region could redefine the global economic and political landscape. This is about Brazil, Russia, India, China and South Africa or the BRICS. As the framework of the world economy changes dramatically, the BRICS countries have expressed a strong urge to participate in and take action on international economic governance.

Many of BRICS' current members already have real GDP growth rates that are higher than their G7 counterparts, with current members having an average GDP growth of 189% to 2050 compared to the G7's average of 50%. BRICS' newly added members like Ethiopia (1,170% GDP growth projected by 2050) and Egypt (635% GDP growth projected by 2050) have even higher rates of potential economic growth, further raising the bloc's economic potential[2]. Both economic and political reasons generate popularity of BRICS research.

The rise of the BRICS (Brazil, Russia, India, China and South Africa) as major emerging powers has challenged existing important structures in the global economy. For this reason, there is an expectation that this restructuring may also occur in the tax sphere. Taxation is one potential area for cooperation between the BRICS countries.

The author hypothesis in spite of BRICSs are particularly interesting cases to analyze in the regard of taxation, the substantial differences among the BRICS prevent them from developing a unified and cohesive tax policy. From this perspective we could not address to BRICS countries as a homogeneous group that could be used for observation in tax frame.

[2] https://www.goldmansachs.com/intelligence/pages/gs-research/the-path-to-2075

This paper aims to analyze this developing literature by offering a cohesive framework of the existing empirical research devoted to tax issues in BRICS countries.

The paper is organized as follows: methodology of research is presented in the in the second part, in the third part general considerations regarding to comparison of tax systems are viewed, in the fourth part we examine several directions in comparative studies devoted to taxation in BRICS countries based on statistics and surveys, in the fifth part we examine comparative studies devoted to taxation in BRICS countries based on indices and BRICS Best Tax Practices and in final part we draw some conclusions from literature review.

2. Methodology

The sample for this study includes all papers available in Science Direct, Google Scholar and E-Library databases, which include pair of words "tax" and "BRIC(S)" or "налог" and "БРИКС" simultaneously in the title, abstract, keywords. Literature sources were sorted by relevance and search depth was not limited.

As can be expected, most of comparative research devoted to BRICS emerged after 2012.The BRIC is the group of five emerging economies viz. Brazil, Russia, India, China was formed in September 2006 and was called "BRICS" after the joining of South Africa in the year of 2010 and mechanism of BRICS tax cooperation was firstly initiated by India in 2012.

So far, we have examined research papers devoted to different aspects of taxes in the BRICS countries and tried to classify them according to their aim and empirical base trying to answer the question: could BRICS countries really be compared in tax frame, and for what extend.

3. General considerations regarding to comparison of taxation and tax systems

At the start, it should be noted that comparative tax studies aim to capture differences and similarities respect to the variables analyzed. The cross-country comparative approach provides a num-

ber of unique advantages over national studies: it can exploit institutional variation that does not exist within countries; draw on much larger variation than is usually available within any country; reveal whether any result is country-specific or more general. Such studies also have many limitations.

One of the most credited research in this field is Sedric Sandford's "Why tax systems differ: A Comparative Study of the Political Economy of Taxation" [4] which analyses and compares taxation in different countries, mainly developed countries. It looks at what tax systems have in common, how they differ and seeks to explain the similarities and the differences using tax rates and tax structure.

It must be noted that tax rates are the main indicator used for comparing the competitiveness of country tax systems. For example, the School of Public Policy at the University of Calgary provides an annual snapshot of countries' effective marginal tax rates (mainly to assess the competitiveness of Canada's corporate tax regime)[3], a similar approach, focused on G20 countries, was used by the Centre for Business Taxation at the University Oxford for assessing the UK corporate tax system[4]. The Heritage Foundation's Tax Burden Index is similar as its scoring is mostly derived from marginal tax rates on both personal and corporate income[5].

However, recently indices have become increasingly popular for comparing tax systems. They provide a simple and understandable way to evaluate and compare national tax systems at the aggregate level. The rankings and indices that are used to compare tax systems are primarily based on the assumption that a more competitive and less complex tax system is more efficient. They also allow countries to be ranked, making comparisons easier. They are increasingly being referred to by policymakers and stakeholders when pursuing tax reform. Wong et al. [5] offered detailed description of those indices.

Many indices use a composite indicator that combines several sub-indicators that measure various taxes and administrative processes. These include indices such as the World Bank and PwC Tax Paying, the Tax Foundation's International Tax Competitiveness Index, the Global Multinational Tax Complexity Project, and the VAT Compliance Burden Index. There are also sub-indices such as the IMD World Competitiveness Yearbook and the TMF Group Global Business Complexity Index. Other studies include tax perception surveys such as the World Bank Enterprise Surveys and Deloitte's Asia Pacific Tax Complexity Survey.

Databases such as the OECD Tax Administration Comparative Information Series and the USAID Tax Collection Database focus primarily on the efficiency and capacity of tax administration and can provide additional information for the analysis of tax systems. To benchmark tax administration performance, the International Monetary Fund (IMF) also developed a Tax Administration Diagnostic Assessment Tool (TADAT) score based on government spending and financial reporting data from the World Bank. However, TADAT assessments for different countries are not carried out simultaneously, which complicates cross-country comparisons. In general, indices aim to measure and aggregate a number of aspects of tax systems.

Therefore, they can be used to study tax systems within groups of countries or inter-country associations. The rankings and indices that have been produced to compare tax systems primarily operate off of an assumption that a more competitive tax system and a less complex tax system will both generate a more efficient tax system.

There are a number of cross-country comparisons established over recent years that seek to assess and compare multiple aspects of national tax systems. But we would concentrate only on studies devoted to BRICS countries.

[3] https://journalhosting.ucalgary.ca/index.php/sppp/article/view/69779

[4] https://core.ac.uk/download/pdf/288286506.pdf

[5] https://www.heritage.org/index/pdf/2020/book/index_2020.pdf

4. Empirical studies of taxation in BRICS countries

We could separate several directions in comparative studies devoted to taxation in BRICS countries. The most part of research is based on tradition approach (tax rates and tax legislation).

First direction is devoted to comparative description of taxation in BRICS countries.

For example, Bird [6] review the evolution and current state of sub national taxation in five large emerging countries i.e., BRICS.

Brauner & Pistone [7] examines the impact of shifting economic powers on the evolution of the international tax regime and on tax treaties that follow the OECD Model.

Yadav [8] made a comparison of BRICS countries on the basis of various tax related parameters such as tax revenue – GDP ratio, number of tax payments, time taken in tax compliance, profit tax paid by businesses, labor tax and contributions paid by businesses, other taxes paid by businesses to government, total tax rate imposed by countries on businesses.

The next part of literature considers the potential possibilities of changing the tax policy in one of BRICS countries based on other's countries experience.

For example, Jacobs et al. [9] try to determine the potential tax bias risk of oil and gas companies in BRICS countries exploring the effect of debt-equity tax bias on weighted-average cost of capital.

Maddox [10] examines the story surrounding India's proposed general anti-avoidance rules and how this episode has damaged investor confidence in the Indian system.

Emerging literature raises questions about the tax avoidance and tax evasion in BRICS countries and their determinants (Table 1).

Table 1

Articles devoted to tax avoidance and evasion in BRICS countries

Author	Purpose	Data	Result
Nguyen & Duong [11]	To examine the impact of social capital on the size of the shadow economy	The BIRCS countries over the period 1995–2014	The unemployment rate and tax burden positively affect the size of the shadow economy
McGee et al. [12]	To learn the attitude toward tax evasion in the four BRIC countries	World Values Survey data for Brazil, Russia, India and China collected between 2017–2021	Overall, the Chinese were most opposed to tax evasion, followed by the Indians, the Brazilians and the Russians
Cabello et al. [13]	To examine whether tax avoidance determinants result in different levels of avoidance depending on the economy and sector	A sample of firms from the G7 and BRICS countries (IMF, 2019)	There is no differences in tax avoidance levels between developed and emerging economies but rather between individual countries
Du & Li [14]	To analyze the tax avoidance and corporate social responsibility (CSR) performance nexus	Thomas Reuters EIKON database of publicly listed companies headquartered in BRICS countries from 2014 to 2020	Corporate tax avoidance is negatively associated with CSR performance
Gopalan & Rajan [15]	To propose an alternative framework to overcome the problem of offshore financing centers and tax havens in FDI flows statistics	Bilateral FDI inflows data with M&A data for Brazil, Russia, India, and China, for the period 2001–2012	Several offshore financing centers (OFCs) and tax havens emerge as top sources of FDI flows which provide a misleading picture of bilateral real linkages between countries
Lesage et al. [16]	To investigate the BRICs' willingness to accept the Automatic Exchange of Information rules	BRIC and G20	The BRICs' acceptance of the OECD rules resulted from pragmatic interests, together with the absence of coercive mechanisms within the OECD's Common Reporting Standard regime

The most part of Russian papers in this division examines the particular tax or particular industry in BRICS countries and consider the potential possibilities of changing the tax policy in the Russian Federation.

For instance, Bachurin [17] provides an overview of legal regulation of VAT in the BRICS countries, the current state of value-added taxation of financial services in the BRICS countries [18] or an overview of value-added taxation in the field of labor relations of the BRICS countries [19].

Vinnitskiy & Kurochkin [20] focus on some prospects of the international coordination of approaches of BRICS countries to cross-border taxation and other cross-border economic relations.

Kurochkin [21] analyzes the legal regimes of combating tax offences in the legislation of the BRICS countries using the example of tax evasion.

Rakov [22] examines problems of requalifying taxpayer's profits and operations in order to prevent tax avoidance in Brazil and Russia.

Table 2

Articles devoted to interconnection of taxes and economic development in BRICS countries

Article	Purpose	Data	Result
Fernández-Rodríguez et al. [24]	To study the determinants of Effective Tax Rate (ETR) in emerging economies	A sample of 7844 listed companies from the BRICS and MINT countries	Both business variables and institutional factors have a significant effect on the tax burden for firms in emerging countries
Fernández-Rodríguez & Martínez-Arias [25]	To study the determinants of the effective tax rate (ETR) for corporate taxation	A panel of 3,565 listed companies in the BRIC countries for 2000–2009	The ETR for one year depends on the tax burden borne the previous year
Fernández-Rodríguez et al. [26]	To study the relationship between the corporate effective tax rate (ETR) and several institutional factors	A panel of 25,878 listed firms in the G7 and the BRIC countries in 2010–2018	The statutory tax rate, government effectiveness, regulatory quality, rule of law, and open markets – affect all countries, whereas corruption control and economic freedom, affect only the BRIC countries
Halim & Rahman [27]	To examine the effects of the corporate tax rate on sustainable development	The BRIC and CIVETS countries in 2000–2021 years	The corporate tax rate is positively and significantly associated with the sustainable development goals (SDG)
Chakrabarti & Gruzin [28]	To determine the effects of corporate tax rates on capital structure in public nonfinancial companies	A Sample of BRICS companies over the period from 2010 to 2015	The effective tax rate has a negative relationship with the capital structure in Russia, India and South Africa
Chhabra et al. [29]	To study the impact of trade openness and output gap on inflation	BRICS countries trade statistics	A more open trade policy helps to reduce rising domestic inflation
Duong et al. [30]	To tests the hypothesis that corruption, shadow economy, and foreign direct investment (FDI) affect the BRICS economies' tax revenue collection	The data from the Transparency International, World Development Indicators, and Worldwide Governance Indicators for 2001–2017	The control of corruption has a strong positive impact on tax collection. Meanwhile, the shadow economy's size has a nonlinear relationship with the BRICS countries' tax revenue
Neog & Gaur [31]	To analyze the effects of economic and political variables on tax revenue performance	BRICS for the period 1996–2017	Economic development, trade openness and control of corruption are revenue-enhancing factors for BRICS, whereas the agriculture sector discourages the tax revenue performance

Kudryashova & Shashkova [23] analysed the tax incentives for the sustainable energy innovations announced in the BRICS countries documents.

The second broad part of literature examines interaction between taxes and other variables. This part of literature could be devoted at three sub-directions: (1) taxes and economic development; (2) taxes and economic inequality; (3) taxes and environment.

Various data are used to estimate interconnection of taxes and economic development in BRICS countries. The most part of research in this set of literature explore business data of listed companies (Table 2).

The topic of connection between taxes and inequality in BRICS countries is not so popular as previous one. Only three examples were founded.

Walayat et al. [32] observe the impact of globalization on net and market income inequalities for BRICS countries using pretax/transfer and the post-tax/transfer GINI indices as the measures of income inequality.

Cevik & Correa-Caro [33] investigates the empirical characteristics of income inequality in China and a panel of BRIC+ countries, with a focus on the redistributive contribution of fiscal policy.

Anikin & Tikhonova [34] aim to show that poverty and inequality have different natures in different BRICS countries and note the particular relevance of tax policies to combating poverty "in a way appropriate to the Russian context.

Recent years have seen great interest in the relationship between taxes and different aspects of green agenda: environmental sustainability, environmental protection, pollution reduction, renewable and clean energy development etc. This set of literature is presented in Table 3.

5. Research based on indices and government agencies documents

It was mentioned that indices have become increasingly popular for comparing tax systems. However, only few research of taxes and related topics in BRICS are based on indices.

For example, Bantwa [46] explores the impact of reforms made by BRICS nations on their performance using the secondary data collected from the website of World Bank for doing business project and "doing business reports" published by world bank.

Yarygina & Zhiglyaeva [47] study the legal and financial features of the BRICS trade and economic cooperation using trading floor indices.

Table 3

Articles devoted to interconnection of taxes and environment in BRICS countries

Article	Purpose	Data	Result
Wang et al. [35]	To study the impact of environmental regulations and fiscal decentralization on health outcomes in BRICS economies	Tax policy variables' and health indicators for four BRICS economies from 2000 to 2020	Total revenue and expenditure decentralization affect health outcomes positively, while tax revenue decentralization negatively impacts them
Yao et al. [36]	To evaluate the impacts of green monetary and fiscal policies on the sustainable development of fossil fuels resources in BRICS countries	Economic freedom index, green parts trade, and innovation index, renewable energy consumption in BRICS countries from 1995 to 2021	Green monetary policies have a greater impact on the development of clean energy compared to green fiscal policies
Dong et al. [37]	To examine the interactions between economic growth, green financing, green credit, renewable energy investment, geopolitical risk (GPR), and environmental sustainability	Panel data from BRICS countries) from 2000 to 2020	Adoption of renewable energy in BRICS countries is significantly and favourably impacted by geopolitical risk

End of Table 3

Article	Purpose	Data	Result
Yilanci et al. [38]	To investigate the effects of foreign direct investment and the trade openness on clean energy consumption	BRICS countries during the period 1985–2017	Trade openness influences clean energy consumption negatively in Russia, China, and South Africa. Proper environmental policies include the imposition of the carbon tax and subsidy on cleaner energy consumption design
Steenkamp [39]	To examine the energy landscape and energy taxation in the BRICS countries	Environmental taxes and structure of energy taxes in each of the BRICS countries	The common features of energy taxes could serve as a useful tool in helping countries to transition to clean energy
Haseeb et al. [40]	To unveil the liaison between human capital, trade openness, and environmental quality in the BRICS countries	Human capital, trade statistics and carbon dioxide emissions in the BRICS countries from 1998 to 2018	Imposing high tariffs and excise duties, changing tax structures, discouraging the inflow of polluted commodities, and encouraging green trade can help BRICS combat high environmental pollution
Meng & Li [41]	To study the role of efficient natural resource rents in mediating the financial sector's readiness for green development in the BRICS nations concerning carbon taxes	Carbon taxes and the distribution of natural resource rents in BRICS economies between 2000 and 2021	Effective management of natural resource rents combined with carbon taxing measures is essential for easing the transition to green development
Sadiq et al. [42]	To examine the effect of green finance, eco-innovation, renewable energy output, renewable energy consumption, and carbon taxes on carbon dioxide emissions in BRICS countries	Different factors and carbon emissions in BRICS countries in 2001–2020	Relationship of these factors with carbon emissions is negative in nature in BRICS economies. Government and economists need to initiate policies to impose carbon taxes
Chishti et al. [43]	To link fiscal and monetary policies with carbon dioxide emissions	Aggregate domestic consumer spending per capita, fossil fuel consumption, renewable energy consumption, carbon dioxide emissions in BRICS economies from 1985 to 2014	Expansionary fiscal policy intensifies the harmful repercussions of CO2e, contractionary fiscal policy serves as an effective measure to mitigate the detrimental effects of CO2e
Dippenaar [44]	To compare the tax instruments (both incentives and disincentives) applied in four BRICS countries to reduce their emissions from electricity generation	Tax instruments to reduce the emissions from electricity generation (direct or indirect taxes) in four BRICS countries, namely South Africa, China, Brazil and India	All the countries use incentives, rather than disincentives. They focus equally on the use of direct and indirect taxes, with the exception of South Africa
Li & Xu [45]	To investigate the determinants of ecological sustainability by considering fiscal policy, strict environmental governance, and green innovations in the BRICS countries	Fiscal policy, natural resources rent, environmental policy, green technologies, ecological footprint in the BRICS countries from 1990 to 2020	Fiscal policy and natural resources rent instigate the ecological footprint significantly

Bhat et al. [48] examine the dynamics of trade between India and the BRICS countries using the index of trade integration.

Not only scholars investigate tax issues in BRICS countries. Various tax administration issues are in focus of the five tax administrations. Meetings of heads and experts of tax administrations of the BRICS countries are held annually. A mechanism has also been created for the exchange of best practices to resolve a particular tax administration issue. In November 2022, the BRICS partners decided to create a collection of "The Best Tax Practices from the BRICS Countries", which presents case studies of the leading practices of each BRICS tax administration. It is planned that such a document will be published annually based on the results of meetings of heads and experts of tax services on the official websites of the tax administrations of the BRICS countries. The brief description of this case studies is presented in Table 4.

The literature review showed that studies devoted to taxation in BRICS countries have different approaches based on their aim and data. Generalized approaches to data used to explore tax-related issues is presented on Figure 1.

6. Conclusion

In this review, we analyzed existing empirical studies on tax issues in the BRICS countries. We separated several directions in studies related to taxation in BRICS countries: (1) comparative description of taxation in BRICS countries;

Table 4

BRICS countries reports about best tax practices

Country	Title	Aim
Brazi	Cooperative Compliance Program	To implement a more cooperative and transparent relationship between tax administration and large taxpayers
Russia	New Tax Debt Management Strategy	To encourage voluntary compliance by simplification of tax procedures for taxpayers and use of big data to ensure that tax collection is effective
India	Annual Information Statement (AIS)	To display complete information to the taxpayer with a facility to capture online feedback, promote voluntary compliance and enable seamless prefilling of return
China	Smart Individual Income Tax Reconciliation	To innovate and upgrade multiple aspects of the individual income tax system including tax collection and administration, electronic filing channels, tax refund processes and multi-party collaboration
South Africa	Taxpayer Compliance Evaluation and Monitoring	To identify areas of significant non-tax compliance across all tax types so that focused interventions could be developed and implemented accordingly

Note: Completed by the author using information from official cite of Federal Tax Service of Russia. https://www.nalog.gov.ru/rn77/about_fts/inttax/cooperation/

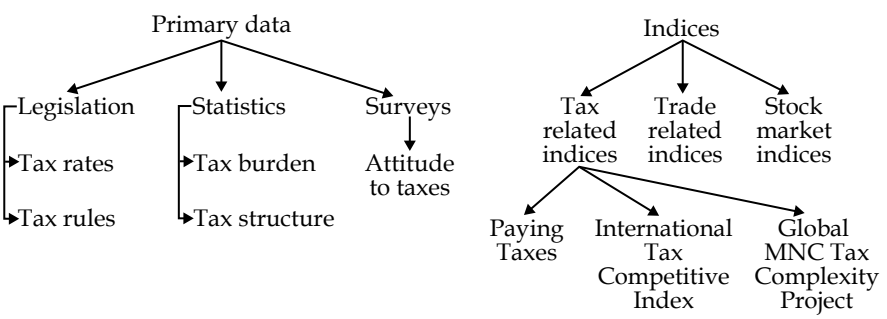

Figure 1. **Main approaches to data used to study taxation in the BRICS countries**

(2) tax avoidance and tax evasion in BRICS countries and their determinants; (3) examination of the particular tax or particular industry in BRICS countries to find relevant experience to apply; (4) examination the interaction between taxes and other variables (taxes and economic development; taxes and economic inequality; taxes and environment).

The literature review showed that studies devoted to taxation in BRICS countries have different approaches based on their aim and data.

Although, only some articles try to draw conclusions for BRICS as a united group. The majority of articles do not aim to find some regularities for BRICS countries they only use these countries as random sample comparing them with G7 or MINT or other groups of countries.

The reason is that in regional associations such as the, for example, EAEU, tax systems demonstrate greater similarity than in associations with large geographical distances as BRICS. So, it is hazardous to try to generalize too much about the BRICS member countries. While almost all are rapidly developing, they are diverse in culture, economic conditions and social and political structures. From this perspective we could not address to BRICS countries as a homogeneous group that could be used for observation in tax frame.

Literature review helped to demonstrate that taxation is the field where BRICS countries are working toward on their own, rather than as part of an integrated, coordinated effort on the part of the BRICS. So, we confirmed our hypothesis that BRICSs are particularly interesting cases to analyze in the regard of taxation, but the substantial differences among countries do not allow to observe BRICS countries as a homogeneous group in tax frame.

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Relationship Between the Tax Burden Structure and Citizens' Welfare in OECD Countries

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ABSTRACT
This research aims to examine the correlation between the tax burden structure and citizens' welfare in OECD countries in 2020 and 2021. The hypothesis tested suggests an interconnection between the tax burden structure and citizen welfare, particularly a direct relationship between the income tax share and welfare, and an inverse relationship between the share of indirect taxes and welfare. The study employs correlation-regression, cluster, and structural analysis methods, along with data from OECD.Stat and the World Bank. The calculations were performed by using the "Data Analysis" package in MS Excel for the years 2000, 2018–2019, and 2021. The resulting dataset, comprising 1,540 indicators of welfare and tax burden structure across 38 OECD countries, confirmed a significant connection between the two. The income tax share exhibited the most pronounced unidirectional relationship with welfare, while the share of indirect taxes showed a negative correlation. Conversely, the share of the corporate income tax, property taxes, and social security contributions displayed non-significant correlations with welfare levels. To further categorize OECD countries, the k-means method and the DATAtab web tool were employed based on the parameters of the relationship between welfare and the tax burden structure. In high-income OECD countries, the income tax share averages 37.6%, with indirect taxes comprising 24.1% while in lower-income countries the share of the income tax is 6–20% (average 14.8%), with indirect taxes comprising 35–53% (average 39.7%) of the tax burden. To foster the growth of citizens' welfare in Russia, it is advisable to increase the share of the income tax by enhancing the progressivity of its scale for the super-rich while maintaining the share of indirect taxes at the pre-crisis average level (≈25%).

KEYWORDS
citizen welfare, tax burden structure, income tax, indirect taxes, property taxes

JEL H21, H24, I31

УДК 336.22

Взаимосвязь между структурой налогового бремени и благосостоянием граждан в странах ОЭСР

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АННОТАЦИЯ
Цель исследования – определение взаимосвязи структуры налогового бремени и благосостояния граждан в странах ОЭСР в 2020 и 2021 гг. Гипотеза исследования состоит в том, что структура налогового бремени и благосостояние граждан взаимосвязаны. При этом доля подходного налога в структуре налогового бремени имеет прямую связь с благосостоянием, а доля косвенных налогов – обратную. В рамках проверки гипотезы применены корреляционно-регрессионный, кластерный, структурный анализ. Расчеты проведены с использованием пакета «Анализ данных» в MS Excel для 2000 г. 2018–2019 гг., и 2021 г. на основе данных OECD.Stat и World Bank Data. Сформированный Data Set индикаторов благосо-

стояния и структуры налогового бремени в 38 странах ОЭСР содержит 1540 показателей. Подтверждено наличие взаимосвязи между структурой налогового бремени и показателями благосостояния граждан. Наиболее тесная однонаправленная связь с уровнем благосостояния сложилась у доли подоходного налога в структуре налогового бремени. Доля косвенных налогов имеет отрицательную взаимосвязь с благосостоянием. По доле налога на прибыль корпораций, имущественных налогов и взносов на социальное обеспечение взаимосвязь с уровнем благосостояния не является существенной. Кластерный анализ стран ОЭСР методом k-средних с использованием web-разработки австрийских ученых DATAtab позволил выделить группы государств по параметрам взаимосвязи благосостояния со структурой налогового бремени. Для стран ОЭСР с высоким благосостоянием доля подоходного налога в налоговом бремени составляет 30–40% (в среднем 37,6%) при доле косвенных налогов – 16–30% (в среднем 24,1%), а для стран со сравнительно низким благосостоянием доля подоходного налога – 6–20% (в среднем 14,8%) при доле косвенных – 35–53% (в среднем 39,7%). Для обеспечения роста благосостояния граждан в России целесообразно повышение доли подоходного налога в налоговом бремени за счет усиления прогрессивности его шкалы для сверхбогатых при сохранении доли косвенных налогов на среднем докризисном уровне (≈25%).

КЛЮЧЕВЫЕ СЛОВА
благосостояние граждан, структура налогового бремени, подоходный налог, косвенные налоги, налоги на имущество

1. Introduction

The imperative to improve citizens' welfare is universally recognized at the current stage of human history. The importance of this task is underscored by the United Nations General Assembly through the Sustainable Development Goals for 2030.

According to the World Bank[1], despite the significant global progress achieved in poverty reduction by 2019, this trend took a downturn in 2020. The annual increase in the number of people living below the extreme poverty line was 70 million, and the global poverty rate reached 9.3%, increasing by 0.9 percentage points compared to 2019. This situation jeopardizes the achievement of UN Sustainable Development Goals #1 "No Poverty" and #10 "Reduced Inequality".

Taxes, along with social transfers, are critical instruments of state finance used to regulate the welfare of citizens. Tax burden is closely linked to welfare: depending on which function is prioritized – fiscal or stimulating, taxes can either diminish or augment welfare accordingly. Therefore, it is crucial to determine the guiding impact of the taxes in question.

The question of how citizens' welfare is connected to the structure of the tax burden, beyond just its size, is surrounded by active debate. On the one hand, provided that the level of welfare is high, the share of the income tax in the tax burden will increase as the proportion of indirect taxes decreases, given that as incomes rise, the marginal propensity to consume decreases. On the other hand, if the share of the income tax in the tax burden is large, a larger portion of current incomes will be extracted in the form of tax payments, reducing citizens' disposable incomes and diminishing their welfare. This means that there is a correlation between the structure of the tax burden and citizens' welfare, which can manifest itself in different ways.

In light of the above, the questions this study seeks to address are as follows. Is there a consistent correlation between the level of citizens' welfare and indicators of the tax burden structure? What are the main trends regarding this correlation in OECD countries? Which taxes primarily explain the dynamics of citizens' welfare in the structure of the tax burden? What are the possibilities of extrapolating

[1] https://www.vsemirnyjbank.org/ru/news/factsheet/2022/05/02/fact-sheet-an-adjustment-to-global-poverty-lines

the established relationship between the structure of the tax burden and the level of welfare to the Russian reality from the OECD countries?

The aim of the research is to determine the relationship between the structure of the tax burden and the welfare of citizens in OECD countries in 2020 and 2021.

The study hypothesizes that the structure of the tax burden is linked to the welfare of citizens. Specifically, the share of the income tax in the tax burden structure is directly correlated with welfare, while the share of indirect taxes is inversely correlated with welfare.

The article is structured as follows. The section "Literature review" describes prior research in the field of the economics of welfare and the relationship between the structure of the tax burden and citizens' welfare. The section "Methodology and Materials" outlines the methodological framework and data used for this study. The section «Results» presents the study's findings. The "Discussion" section contains the analysis of results and assesses their potential applicability to the Russian context. Some conclusions are drawn in the final section of the article.

2. Literature review

The welfare of citizens is a complex and multifaceted concept, and contemporary socio-economic and humanitarian knowledge has yet to establish a unified approach to its definition.

Hicks [1] demonstrated that an optimal distribution of resources among members of society is necessary to maximize their satisfaction from consuming goods and achieve welfare. Hicks' research is grounded in Pareto's theory [2], according to which an economic system reaches an optimum when the position of any participant in economic relations cannot be improved without simultaneously reducing the welfare of at least one participant in the economic system [3].

Pigou [4] investigated the impediments to achieving societal welfare, which he also attributed to the inequality among citizens. To address them, he proposed corresponding measures of government regulation, including progressive taxation, subsidies, and employment support [3].

In the mid-20th century, welfare economics laid the grounds for the concept of welfare state (later also the social state). This concept, as articulated by Galbraith [5] and Myrdal [6], remains a cornerstone for socio-economic policy-making in many developed countries.

In the 21st century, researchers have shifted their focus to identifying strategies to alleviate poverty and address citizen inequality, recognizing them as major obstacles to achieving overall welfare.

Stiglitz [7] explained poverty through "cumulative effects", which reduce economic mobility and limit opportunities for future generations.

Piketty [8] argued that poverty cannot be eliminated; it can only be reduced. Poverty, seen as an inherent characteristic not only of developing but also developed countries, is also explored by Milanovic [9] and Banerjee & Duflo [10].

Equally interesting is the approach that views welfare as a notion contrary to poverty or destitution. Towsend [11] and Sen [12] regard welfare as the ability to fully realize one's human potential, specifically as having sufficient resources to meet the established social standards of consumption [11] or a minimally acceptable lifestyle [12].

In addition to cumulative factors and inherited poverty, significant constraints on the growth of welfare include low- and middle-income traps as well as low intergenerational mobility.

Guriev & Treisman [13] pointed out that a major impediment to ensuring citizen welfare by the state is the inability of the national economy to maintain the transition from low-value-added to high-value-added sectors.

Piketty [8] and Corak [14] contend that limited intergenerational mobility, arising from inequalities in access to educational opportunities and from household income inequality, constrains the ability of subsequent generations to enhance their socio-economic status.

De la Croex & Doepke [15] argue that the decrease in welfare is a result

of inadequate spending on education and healthcare for the most disadvantaged groups. Fidrmuc & Gundacker [16] demonstrate that if such expenditures are reduced, this will lead to lower labor productivity and overall production volume.

Thus, economic welfare of citizens is defined as having sufficient resources to meet their needs, ensure an acceptable standard of living, and realize their human potential. Today, common measures for assessing welfare include traditional indicators, such as per capita GDP adjusted for purchasing power parity (PPP).

Karadjova & Trajkov [17] built regression models using per capita GDP indicators to demonstrate the correlation between welfare and economic growth.

Dorofeev [18] evaluated regional financial models for social security in Russia, employing the average per capita income as a key indicator. The objective was to devise solutions for improving citizen welfare.

In contemporary research, however, an increasingly common practice is to use the relatively new indicators of welfare that were developed in the late 20th century, such as the Human Development Index and its derivatives.

Kalimeris et al. [19] showed that welfare is determined not only by the quantitative aspect of GDP but also by its quality and by the dependence on resources to ensure growth.

Jin & Jakovljevic [20] used the Human Development Index to assess the correlation between fiscal decentralization and national development, concluding that moderate fiscal decentralization best contributes to growth.

The analysis of publications in scientometric databases shows that so far, the correlation between citizens' welfare and the structure of the tax burden has not been the primary focus of research. However, this does not imply that the scholarly community has overlooked the impact of taxes on citizens' welfare.

Puzule [21] argued that by receiving tax revenues, the government can enhance the level of citizens' welfare. In order to achieve this, taxpayers should make the most of the available tax incentives to reduce the tax burden [22].

Vylkova [23] examines the multifaceted impact of taxes on the economic welfare of citizens, considering both objective and subjective perspectives. She illustrated a positive correlation between welfare and tax revenues, as well as a negative correlation between welfare and tax administration. While highlighting the seemingly direct connection between taxes and welfare ("ceteris paribus, the larger the amount of tax collected, the higher the level of welfare of citizens"), she also notes that in citizens' perception, this relationship may appear inverse due to the obligatory nature of tax payments to the state.

When it comes to using fiscal tools to improve welfare, evidence suggests that developed countries adopt various strategies. These include implementing a tax-exempt minimum income, establishing a system of tax benefits and deductions, lowering the indirect tax rates on essential goods for the least affluent 50% of households. The middle 40% benefit from preferential indirect taxation, while the most affluent 10% are subject to taxes on wealth, non-labor (rent) income, and progressive taxation [3].

Lulaj & Dragusha [24] argue that the income tax system can contribute to the improvement of citizens' welfare.

Rothschild & Scheuer [25] demonstrate the positive role of the income tax in tackling income disparities and enhancing citizens' welfare through redistributive effects.

Bourguignon & Spadaro [26] emphasize that the system of tax exemptions plays a crucial role in reducing inequality and improving welfare through income taxation.

Conesa & Krueger [27] focus on the case of the United States to show that if the progressive income tax system is aligned with an optimal criterion, it would increase the welfare of 62% of citizens compared to the current level.

Benedek et al. [28] demonstrate that the income tax is one of the primary revenue-generating taxes in developed economies, which explains its significant impact on welfare.

Shephard & Blundell [29] contend that in developing countries and countries in the emerging market group, the role of the income tax is limited.

Koroleva [30] uses empirical data for the Russian economy to demonstrate a direct positive impact of the revenues from VAT collection on consumer spending.

Haibara [31] argues that indirect taxation can contribute to the improvement of welfare only if it is designed in a consumption-neutral manner.

Pugachev [32] demonstrates that indirect taxes in Russia do not have a significant impact on inequality reduction. To address inequality, it is advisable to differentiate VAT rates based on the consumption patterns of the most and least affluent citizens.

Muinelo-Gallo & Roca-Sagalés [33] in their analysis of the data for OECD countries from 1972 to 2006 show that indirect taxes are less effective in tackling inequality. Indirect taxes are more commonly used in low-income countries to mitigate the negative impact on welfare.

Guillaud et al. [30] examined the data on 22 OECD countries between 1999 and 2013 and found an insignificant influence of indirect taxes on inequality in comparison with direct taxes.

Pugachev [35] explored how the structure of the tax burden affects citizen inequality in OECD countries and found that the overall weight of the tax burden has a more substantial impact on citizen inequality than its specific structure. The change in the structure of the tax burden in OECD countries in 2020 compared to 2000 contributed to inequality alleviation due to the expanding share of the income tax (on average from 26.1% to 26.9%) and the decreasing share of indirect taxes (on average from 32.6% to 30.6%).

Thus, the broad spectrum of research examining the interplay between taxes, welfare, poverty, and citizen inequality, coupled with the absence of definitive evidence for a direct correlation between the tax burden structure and welfare, determines the significance of the chosen research direction.

3. Methodology and materials

The hypothesis was tested through correlation-regression analysis of the relationship between the welfare of citizens and the structure of the tax burden, which was broken down into individual taxes.

OECD countries were chosen as the research object because there is a unified statistical database on tax revenues, known as OECD.Stat. This database follows a consistent methodology and encompasses data dating back to 1965.

The trends in welfare dynamics in OECD countries with similar tax burden structures were determined through cluster analysis using the k-means method. For clustering, the web tool DATAtab[2] developed by Austrian researchers was used.

The k-means method, developed in the 1950s and 1960s, is a popular clustering method, as emphasized by Ikotun et al. [36]. The essence of this method is to minimize the sum of squared deviations of points from the cluster centers [37], which is demonstrated by Formula (1):

$$V = \sum_{i=1}^{k} \sum_{x \in S_i} (x - \mu_i)^2 \qquad (1)$$

where k is the number of clusters; S_i represents the obtained clusters; x, the coordinates of the points; and μ_i the coordinates of the cluster center.

The correlation between indicators of citizen welfare and the structure of the tax burden was examined with the help of correlation-regression analysis. The study relies on 5 indicators of welfare, drawing on the official statistical data from the World Bank: these include 4 indicators from the sections "World Development Indicators" (GDP per capita (y_1) and GNI per capita, PPP (y_2)) and "Wealth Accounts" (total wealth per capita (y_3) and human capital per capita (y_4)). To eliminate the inflation factor, the real GDP per capita growth rate (y_5) was also calculated by using the World Bank Data GDP deflator.

The selected indicators cover different aspects of citizens' welfare, including traditional economic measures like GDP and

[2] https://datatab.net/

GNI, as well as wealth and human capital. These indicators are compiled by the World Bank using a consistent methodology for all countries.

Total wealth is calculated as the sum of produced natural capital, human capital, and net foreign assets. Human capital is calculated as the present value of the future earnings of the working population over their lifetime. The indicators of citizens' welfare under investigation do not include measures of inequality, such as the Gini coefficient, because their relationship with the structure of the tax burden in OECD countries is discussed in a separate study [35]. This way we can concentrate on evaluating the relationship between the tax burden structure and the welfare of citizens, as expressed through its key indicators.

Tax burden at the macroeconomic level is understood as the ratio of total tax revenues to GDP, which has become a standard measure in contemporary empirical research. The structure of the tax burden is examined by individual types of taxes.

Ensuring equal proportions of individual taxes in GDP (representing the tax burden structure) and the equal proportions of individual taxes in the total tax revenues of the consolidated budget (as indicated in Equations (2) and (3)) allows for a more systematic calculation of the indicators reflecting the tax burden structure based on the distribution of tax revenues in the consolidated budget. Therefore, official OECD.Stat data on the structure of tax revenues in OECD countries have been used as indicators of the tax burden structure.

Since the tax burden is determined by the ratio of tax revenue to GDP,

$$\frac{X}{Y} = \frac{\sum_{i=1}^{n} x_i}{Y} \qquad (2)$$

where X is the sum of total tax revenues, Y is GDP, and x_i is the i-th tax paid, then the structure of the tax burden is determined by the shares (i) of individual taxes in the GDP, which are identical to the shares (i) of individual taxes in total tax revenues.

$$\frac{x_i / Y}{X / Y} = \frac{x_i \cdot Y}{Y \cdot X} = \frac{x_i}{X}. \qquad (3)$$

Examining how taxes are distributed within the tax burden structure enables us to conduct correlation-regression analysis. This approach mitigates the challenge of multicollinearity between indicators, such as the share of tax revenues in GDP and GDP per capita.

The calculations were carried out with the help of the "Data Analysis" package in MS Excel for the years 2000 and 2021, the latter being the latest year for which statistical data are available at the time of the study. The year 2019 was included to eliminate the influence of the coronavirus crisis. Additionally, data for the year 2018 were used for the indicators of total wealth and human capital, since it is the last available period in the World Bank Data for these metrics.

Table 1 below contains the details regarding the welfare indicators of citizens, the tax burden structure, and the sources of statistical data used in the study.

The data set created for this research includes 1,540 statistical indicators related to the welfare of citizens and the structure of the tax burden in 38 OECD countries. Based on this data set, a total of 78 dependencies were tested through correlation-regression analysis.

4. Results

Out of 78 tested dependencies, a statistically significant correlation was found in 38. The real GDP per capita growth rate showed no correlation with any indicators of the tax burden structure (y_5). When we shift from the actual shares of taxes in total tax revenues to examining their changes (to ensure comparable measurements of the factor and outcome), we see that there is no significant correlation with y_5. Furthermore, there was no statistically significant correlation with all the welfare indicators for the factor x_5 – the share of corporate income tax in total tax revenues. The multicollinearity check revealed a strong correlation between the share of the income tax and the share of direct

taxes in total tax revenues. Summary data on the correlation coefficients and the strength of the relationships on the Chaddock scale are presented in Table 2.

The share of the income tax exhibits a noticeable unidirectional correlation with welfare indicators in OECD countries, with this correlation strengthening from 2000 to 2018–2021: $0.5 < r < 0.7$. In 2018, a strong correlation was established for human capital and total wealth indicators on the Chaddock scale: $r > 0.7$.

In the structure of tax revenues, a statistically significant moderate ($0.3 < r < 0.5$) positive correlation is observed only in 2000 for GDP, GNI, and human capital per capita. Even though wealth is a source of revenue from property taxes, there is no statistically significant correlation with total wealth per capita.

A positive correlation is also established for the share of direct taxes in the structure of tax revenues. This correlation is evident for GDP and GNI in all time intervals ($0.5 < r < 0.7$) and is particularly strong ($r > 0.7$) for total wealth and human capital.

A unidirectional or positive correlation indicates that the increase in the welfare of citizens in OECD countries is accompanied by an increase in the share of the income tax, property taxes, and the total amount of direct taxes in tax revenues. The correlation between the share of indirect taxes and social security contributions with welfare indicators is negative. This means that an increase in their share is associated with a decrease in the welfare of citizens.

In 2000, there was a distinct negative correlation between the proportion of indirect taxes and welfare indicators ($0,5 < r < 0,7$). By 2018, 2019, and 2021, the correlation strengthened and became strong ($r > 0.7$) for GNI and human capital.

The correlation between social security contributions and tax revenues showed statistical significance in relation to the indicators of welfare only for human capital in 2000, both for human capital and total wealth in 2018, and for GDP in 2019 and 2021. In all these cases, the correlation was moderate ($0.3 < r < 0.5$). There is no statistically significant relationship with GNI in any of the years, and the same holds true for GDP and total wealth in 2000 concerning social security contributions.

The summarized data on the determination coefficients obtained during the analysis are presented in Table 3.

Table 1

Indicators of citizens' welfare and the structure of the tax burden

Indicators	Identifier	Source of data and period
GDP per capita (in current USD)	y_1	World Bank Data[1], 2000, 2019, 2021
GNI per capita, PPP (in current international USD)	y_2	
Total wealth per capita (in prices of 2018, USD)	y_3	World Bank Data[2], 2000, 2018
Human capital per capita (in prices of 2018, USD)	y_4	
Real GDP growth rate per capita	y_5	World Bank Data[3], 2000, 2019, 2021
Share of the income tax in total tax revenues	x_1	OECD.Stat[4], 2000, 2018, 2019, 2021
Share of property taxes in total tax revenues	x_2	
Share of indirect taxes in total tax revenues	x_3	
Share of direct taxes in total tax revenues	x_4	
Share of corporate income tax in total tax revenues	x_5	
Ratio of social security contributions to tax revenues	x_6	

Compiled by the author by using:
[1] https://databank.worldbank.org/indicator/NY.GDP.PCAP.CD/1ff4a498/Popular-Indicators#
[2] https://databank.worldbank.org/source/wealth-accounts/Type/TABLE/preview/on
[3] https://databank.worldbank.org/indicator/NY.GDP.PCAP.CD/1ff4a498/Popular-Indicators#
[4] https://stats.oecd.org/viewhtml.aspx?datasetcode=Rev&lang=en

The share of the income tax showed a stronger correlation with GDP and GNI in 2019 and 2021, the determination coefficient R^2 reaching 0.423. Therefore, the variation in GNI per capita in OECD countries in 2019 is explained by the change in the share of the income tax in tax revenues by 42.3%. As for the relationship with total wealth and human capital, the coefficient of determination R^2 rose to 0.55 and 0.591 in 2018. This implies that the change in the share of the income tax by 55% and 59.1% explains the variation in the levels of welfare, especially in terms of total wealth and human capital per capita, respectively.

Figure 1 graphically illustrates the relationship between human capital per capita and the share of the income tax in the tax revenues of OECD countries in 2018. It should be noted that this relationship is the most significant among those obtained.

Table 2

Matrix of correlation coefficients (r) between the indicators of citizen welfare and the tax burden structure in OECD countries in 2000–2021

Factor	Share in total tax revenues	y_1 GDP per capita	y_2 GNI per capita in PPS	y_3 Total wealth per capita	y_4 Human capital per capita
		2000			
x_1	Income tax	0.515	0.473	0.618	0.641
x_2	Property taxes	0.454	0.419	n/s	0.392
x_3	Indirect taxes	–0.641	–0.686	–0.568	–0.557
x_4	Direct taxes	0.66	0.613	0.687	0.711
x_6	Social security contributions	n/s	n/s	n/s	–0.377
		2018			
x_1	Income tax			0.742	0.769
x_2	Property taxes			n/s	n/s
x_3	Indirect taxes	n/a		–0.696	–0.701
x_4	Direct taxes			0.702	0.731
x_6	Social security contributions			–0.391	–0.436
		2019			
x_1	Income tax	0.63	0.65		
x_2	Property taxes	n/s	n/s		
x_3	Indirect taxes	–0.669	–0.739	n/a	
x_4	Direct taxes	0.646	0.542		
x_6	Social security contributions	–0.457	n/s		
		2021			
x_1	Income tax	0.623	0.636		
x_2	Property taxes	n/s	n/s		
x_3	Indirect taxes	–0.647	–0.73	n/a	
x_4	Direct taxes	0.625	0.55		
x_6	Social security contributions	–0.459	n/s		

Note: Abbreviations: n/a – no data; n/s – statistically not significant correlation.
The color shading in the cells indicates the tightness of the correlation on the Chaddock scale:

Moderate (0.3–0.5) | Noticeable (0.5–0.7) | High (0.7–0.9)

Compiled by the author by using the World Bank Data (https://databank.worldbank.org/source/wealth-accounts/Type/TABLE/preview/on, https://databank.worldbank.org/indicator/NY.GDP.PCAP.CD/1ff4a498/Popular-Indicators#) and OECD.Stat (https://stats.oecd.org/viewhtml.aspx?datasetcode=Rev&lang=en, https://rosstat.gov.ru/folder/13723).

The graphs are presented for both linear (dashed line) and nonlinear (solid line) regression. Among nonlinear functions, the quadratic function best describes the relationship, which is graphically represented by a parabola with branches facing downward. The coefficient of determination for it was 0.647, meaning that the change in the share of the income tax in total tax revenues by 64.7% is associated with a change in the level of human capital per capita, which is 5.6% higher than for the linear regression. The parabolic shape of the relationship suggests that it aligns with A. Laffer's concept [38]. Beyond a certain point, further increases in the tax burden from the income tax result in a reduction in the level of welfare.

The OECD countries under consideration were grouped into clusters using the k-means method. As a result, three clusters of countries were obtained. The first cluster includes the 5 most developed

Table 3

Matrix of determination coefficients (R^2) between the indicators of citizens' welfare and the structure of the tax burden in OECD countries in 2000–2021

Factor	Share in total tax revenues	y_1	y_2	y_3	y_4
		GDP per capita	GNI per capita in PPS	Total wealth per capita	Human capital per capita
		2000			
x_1	Income tax	0.265	0.224	0.382	0.41
x_2	Property taxes	0.206	0.089	n/s	0.154
x_3	Indirect taxes	0.411	0.471	0.323	0.31
x_4	Direct taxes	0.436	0.418	0.471	0.506
x_6	Social security contributions	n/s	n/s	n/s	0.142
		2018			
x_1	Income tax			0.55	0.591
x_2	Property taxes			n/s	n/s
x_3	Indirect taxes		n/a	0.485	0.492
x_4	Direct taxes			0.493	0.534
x_6	Social security contributions			0.153	0.19
		2019			
x_1	Income tax	0.397	0.423		
x_2	Property taxes	n/s	n/s		
x_3	Indirect taxes	0.448	0.546	n/a	
x_4	Direct taxes	0.376	0.294		
x_6	Social security contributions	0.209	n/s		
		2021			
x_1	Income tax	0.389	0.405		
x_2	Property taxes	n/s	n/s		
x_3	Indirect taxes	0.419	0.533	n/a	
x_4	Direct taxes	0.093	0.003		
x_6	Social security contributions	0.211	n/s		

Note: Abbreviations: n/a – no data; n/s – statistically not significant correlation.
Compiled by the author by using the World Bank Data (https://databank.worldbank.org/source/wealth-accounts/Type/TABLE/preview/on, https://databank.worldbank.org/indicator/NY.GDP.PCAP.CD/1ff4a498/Popular-Indicators#) and OECD.Stat (https://stats.oecd.org/viewhtml.aspx?datasetcode=Rev&lang=en, https://rosstat.gov.ru/folder/13723).

countries – the United States, Canada, Australia, Switzerland, and Iceland. The income tax accounts for a large share of their tax revenues (30–40%) and they also have the highest level of human capital, ranging from 500–800 thousand USD per capita in 2018 prices. In Figure 1, countries of the first cluster are marked with turquoise triangles.

The second cluster comprises developed European countries as well as Japan and Israel, – in total, 13 states. The share of the income tax in these countries is 20–30% with the level of human capital ranging from 200,000 to 500,000 dollars per capita in 2018 prices. Countries in the second cluster are marked on the graph with light blue squares.

The third cluster is mainly composed of new OECD countries, less economically developed states such as Chile, Colombia, Turkey, Greece, Spain, Portugal, and countries of the former socialist bloc. While the share of the income tax in these countries is low (6–20%), the human capital per capita does not exceed $200,000 in constant 2018 prices. These countries are marked with blue dots.

The detected multicollinearity of the share of direct taxes and the share of the income tax in tax revenues makes it impractical to analyze the relationship between welfare indicators and the share of direct taxes in more detail.

The correlation with welfare indicators also increased for the share of indirect taxes by 2018, 2019, and 2021 (Table 3). In 2000, the coefficient of determination (R^2) for the relationship with GDP and GNI reached 0.471, and in 2019, it was 0.546: 54.6% of the variance in GNI per capita is associated with changes in the share of indirect taxes in tax revenues. The connection with human capital and total wealth was less tight, with $R^2 = 0.323$ in 2000 for total wealth and $R^2 = 0.492$ for human capital in 2018. This means that 49.2% of the variation in the tax burden from indirect taxes is related to changes in human capital.

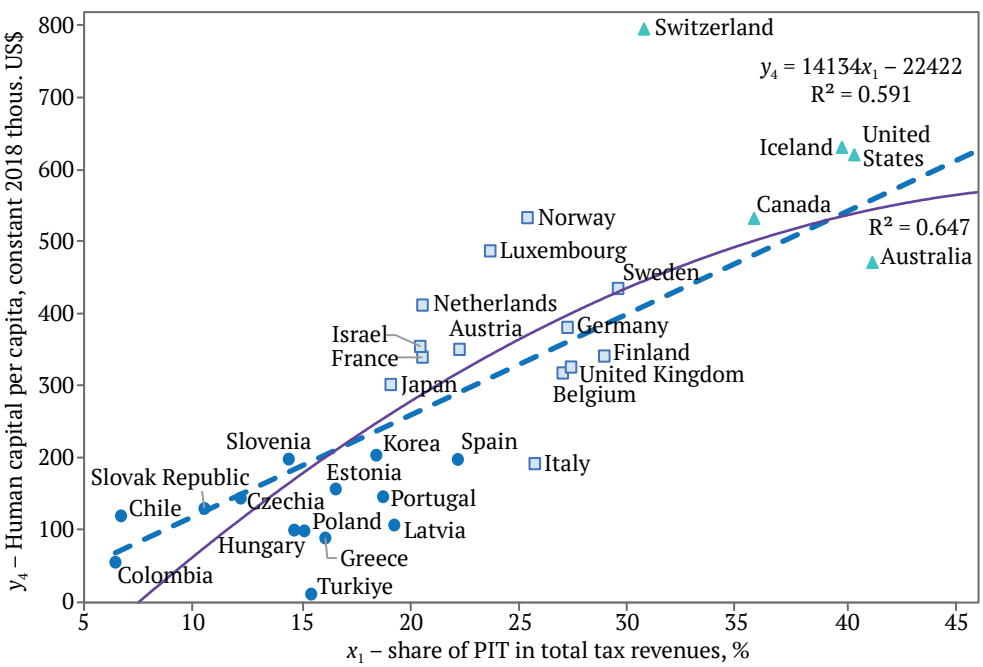

Figure 1. **Correlation between human capital per capita and the share of the income tax in the tax revenues of OECD countries in 2018**

Compiled by the author by using the World Bank Data (https://databank.worldbank.org/source/wealth-accounts/Type/TABLE/preview/on) and OECD.Stat (https://stats.oecd.org/viewhtml.aspx?datasetcode=Rev&lang=en, https://rosstat.gov.ru/folder/13723)

The relationship between GNI per capita at PPP and the share of indirect taxes in the tax revenues of OECD countries in 2021 is shown in Figure 2.

The graph is presented only for linear regression. When testing for nonlinearity, we found no significant increase in the coefficient of determination compared to linear regression. R^2 for linear regression was 0.533, which means that a 53.3% change in the share of indirect taxes in total tax revenues leads to a change in GNI per capita at PPP in OECD countries.

As a result of clustering, three clusters of states were identified. The first cluster includes 6 of the most developed countries – the United States, Switzerland, Luxembourg, Norway, Denmark, and Ireland. These countries have the highest GNI per capita at PPP, ranging from $67,000 to $85,000 annually. This level is achieved with a relatively low share of indirect taxes in tax revenues (16-30%). In Figure 2, countries in the first cluster are marked with turquoise triangles. The second cluster comprises developed European countries as well as Canada, Korea, Japan and Israel, – in total, 17 states. The share of indirect taxes for countries in this group is 21–34%, with GNI per capita in PPP ranging from $41,000 to $63,000 annually. Countries in the second cluster are marked on the graph with light blue squares. The third cluster is primarily composed of new OECD member countries, less economically developed nations, including Chile, Colombia, Turkey, Greece, Portugal, and countries from the former socialist bloc, totaling 13 states. These countries are characterized by a high share of indirect taxes (35–53%) and GNI per capita at PPP of less than $45,000 per year. In Figure 2 these states are marked with blue dots.

The results of the correlation analysis suggest a connection between the structure of the tax burden and indicators of citizens' welfare. Over time, in OECD countries from 2000 onwards, this connection has strengthened, and the COVID-19 crisis did not impact this relationship. The tightest unidirectional connection with welfare is shown by the share of the income tax in tax revenues. For example, in 2018 in OECD countries, a change in the share of the income tax by 55% and 59.1%

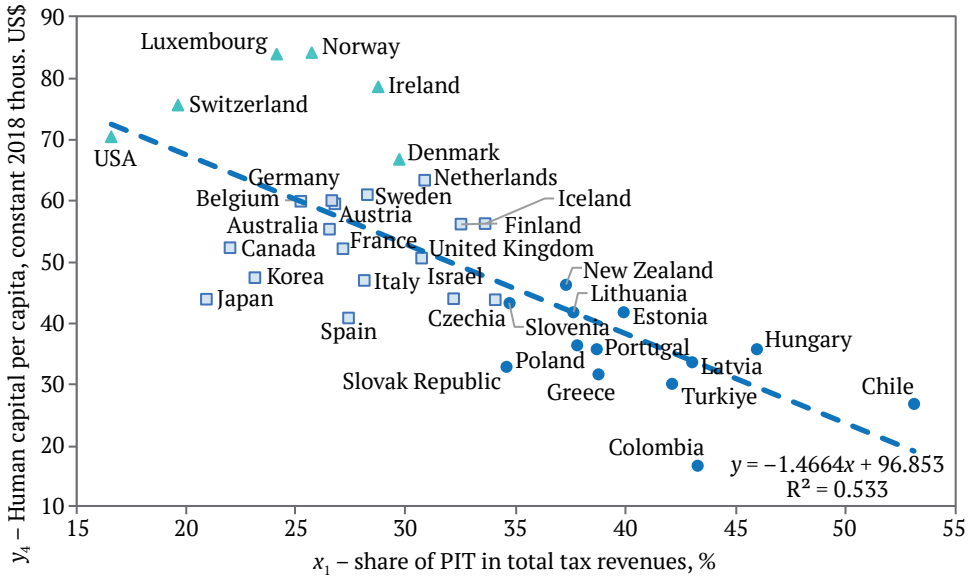

***Figure 2*. Correlation between GNI per capita, PPP, and the share of indirect taxes in the tax revenues of OECD countries in 2021**

Compiled by the author by using the World Bank Data (https://databank.worldbank.org/indicator/NY.GDP.PCAP.CD/1ff4a498/Popular-Indicators#) and OECD.Stat (https://stats.oecd.org/viewhtml.aspx?datasetcode=Rev&lang=en, https://rosstat.gov.ru/folder/13723)

explains the corresponding change in welfare indicators – total wealth and human capital per capita. The share of indirect taxes has a significant negative correlation with the level of welfare. Thus, in 2021, the change in the share of indirect taxes in total tax revenues by 53.3% is associated with a change in GNI per capita at PPP.

As for the share of property taxes and social security contributions, no significant correlation was found. The share of direct taxes in tax revenues exhibits multicollinearity with the share of the income tax. Therefore, we can draw the following conclusion. A greater emphasis on the income tax, coupled with a reduced reliance on indirect taxes in tax revenues, corresponds to a higher level of welfare among citizens. Conversely, countries with higher levels of welfare tend to rely more on the income tax and less on indirect taxes for their tax revenues. The same holds true for the opposite conclusion: a lower share of the income tax and a higher share of indirect taxes in tax revenues correspond to a lower level of citizen welfare. Countries with lower levels of welfare tend to rely more on indirect taxes and less on the income tax in their tax revenues.

By clustering OECD countries, we identified groups of states and specific parameters that support the results of the correlation-regression analysis mentioned earlier. For countries with a high level of citizen welfare, the share of the income tax in tax revenues is 30–40% (on average 37.6%) while indirect taxes account for 16–30% (on average 24.1%). In contrast, the share of the income tax in OECD countries with a comparatively lower level of welfare is 6-20% (on average 14.8%), while indirect taxes in these countries make up 35–53% (on average 39.7%).

5. Discussion

The study confirms the hypothesis that the tax burden structure and welfare are interconnected: specifically, the share of the income tax in the tax burden correlates directly with welfare indicators, while the share of indirect taxes has an inverse relationship.

By studying OECD countries, we identified groups of nations with different combinations of the income tax and indirect taxes in their tax burden, aligning them with variations in welfare levels. In this context, it is interesting to compare these results with the tax burden structure in other countries, particularly Russia. Russia, as a BRICS member state with a transitional economy, holds considerable potential in contributing to the UN Sustainable Development Goals through its tax policy, as highlighted by Halim & Rahman [39].

In recent years in Russia, the average share of the income tax was 19.3% (ranging from 17.2% to 23.4%), while indirect taxes accounted for 25% (ranging from 17.7% to 30.6%) (see Figure 3).

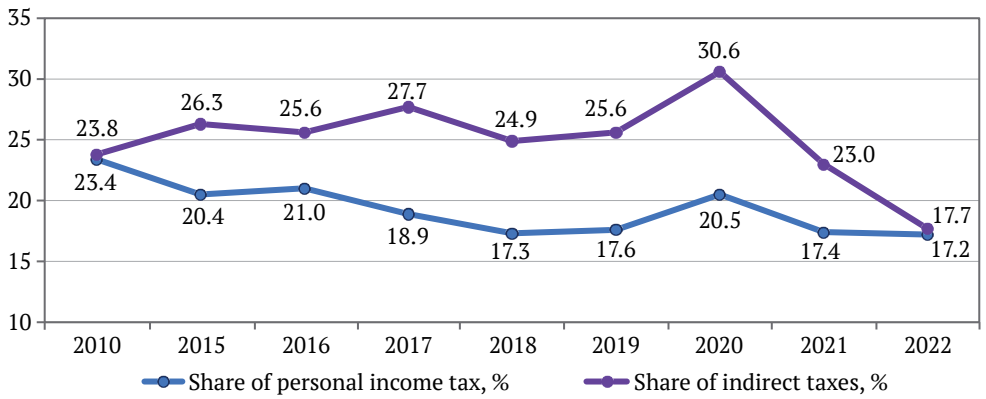

***Figure 3*. Dynamics of the share of the income tax and indirect taxes in Russia's tax revenues from 2010 to 2022, %**

Compiled by the author by using the Federal Tax Service data (https://www.nalog.gov.ru/rn77/related_activities/statistics_and_analytics/forms/)

Judging by the share of indirect taxes (25%), Russia belongs to the first cluster of countries – 16–30% (on average 24.1%), even though its citizens' welfare is significantly lower. On the other hand, if we look at the share of the income tax (19.3%), Russia tends towards the third cluster – 6–20% (on average 14.8%), countries with a relatively low level of welfare. In 2021 and 2022, the share of indirect taxes significantly decreased compared to 2020, dropping from 30.6% to 17.7% (this figure tends to be quite volatile in general). This reduction, coupled with a decrease in the share of the income tax from 20.5% to 17.2%, correlates with the decline in the welfare of Russians during the crisis period.

To foster the growth in welfare in Russia, it is necessary to raise the share of the income tax in the tax burden by increasing the progressivity of its scale for the super-rich citizens. The current mild progressivity fails to address this task, as shown by Mayburov [40], while maintaining the share of indirect taxes at the pre-crisis average level (≈25%).

This study builds upon the idea put forward by Vylkova [23] about the multifaceted impact of taxes on the welfare of citizens. She underscores a distinction that is crucial for this research, moving beyond the simplistic view of a one-way connection ("the larger the amount of tax collected, the higher the level of welfare of citizens") [23].

This study's findings, suggesting that tax revenues can be used to improve welfare, are consistent with those of Puzule [21], Lulaj & Dragusha [24], Rothschild & Scheuer [25]. Additionally, they highlight the vital role of the income tax, as shown by Benedek et al. [28]. Regarding indirect taxation, our empirical study did not confirm the potential positive impact on welfare suggested by Haibara [31]. In the clustering process, the study relied on the works of Aydin [3], Benedek et al. [28], and Shephard & Blundell [29].

The study does not claim to provide a comprehensive analysis of all the factors influencing well-being. Instead, it demonstrates that there is a relationship (though not unidirectional) between welfare and the structure of the tax burden and identifies the determinants shaping this relationship. There is much room for discussion concerning the selection of indicators that reflect factors influencing welfare, the identification of taxes constituting the tax burden structure, and the method of clustering countries.

6. Conclusions

The above-described results lead us to the following conclusions.

1. Welfare is a nuanced concept; when examined from the economic perspective, it implies the availability of sufficient resources enabling citizens to meet their needs, maintain an acceptable standard of living, and unlock their human potential.

2. The structure of the tax burden and indicators of citizens' welfare are interconnected. Compared to 2000, this relationship strengthened in OECD countries by 2018–2021. Thus, the coefficient of determination (R^2) between the share of the income tax and human capital per capita increased from 0.41 in 2000 to 0.591 in 2018, while the share of the income tax rose slightly from 24.1% to 24.4% on average across OECD countries. Similarly, the relationship between the share of indirect taxes and welfare indicators strengthened by 2018–2021: in 2000, R^2 for the correlation with GDP and GNI reached 0.471, and in 2019, it was 0.546. Regarding human capital and total wealth, the connection was less tight (R^2 = 0.492 for human capital in 2018), while the share of indirect taxes reduced from 33.4% to 31.9% on average across OECD countries. These results confirm that the improvement of citizens' welfare in OECD countries from 2000 to 2020 is associated with an increase in the share of the income tax and a decrease in the share of indirect taxes. The tightest positive correlation is observed between welfare and the share of the income tax (the correlation coefficient r reaches 0.769, and the coefficient of determination R^2 in linear regression is 0.591). A negative correlation is observed with the share of indirect taxes (r reaches –0.739, and R^2, 0.533).

The relationship between welfare and the share of property taxes in the tax bur-

den weakened. In 2000, it was moderately unidirectional concerning GDP, GNI, and human capital per capita (R^2 up to 0.201). However, in 2018–2021, no statistically significant correlation was observed, despite the fact that the share of property taxes increased from 5.5% to 5.8% on average across OECD countries. The relationship between welfare and social security contributions strengthened since 2000, reaching a moderate level (R^2 up to 0.211). The correlation between welfare and the share of the corporate income tax has not been established.

The shares of direct taxes and the income tax exhibit multicollinearity.

3. The k-means clustering of OECD countries helped identify three clusters based on the correlation between welfare indicators and the tax burden structure. Countries were divided into those with high, medium, and low levels of welfare and human capital development. The differentiation is also linked to varying proportions of the income tax and indirect taxes in the tax burden structure.

In general, for OECD countries with a high level of citizen welfare, the share of the income tax is 30–40% (on average 37.6%), while the share of indirect taxes is 16–30% (on average 24.1%). For OECD countries with a comparatively lower level of citizen welfare, the share of the income tax is 6–20% (on average 14.8%), and the share of indirect taxes, 35–53% (on average 39.7%).

4. The study of the relationship between the structure of the tax burden and welfare in Russia has shown that to ensure an increase in welfare, it is necessary to increase the share of the income tax by enhancing the progressivity of its scale for the super-rich citizens. This should be done while maintaining the share of indirect taxes at the pre-crisis average level (≈25%).

Promising avenues for further research include the identification of the optimal structure of the tax burden to enhance citizens' welfare, especially achieving the balance between direct, indirect, and property taxes in emerging markets, developing countries, and countries implementing tax reforms. Additionally, it would be productive to investigate the correlation for specific countries over a long period, which can be accomplished with the help of the proposed methodology.

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Asymmetry Effect of Tax and Public Debt on Private Consumption Spending in Russia

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ABSTRACT

According to the Ricardian Equivalence theory, private consumption spending is unaffected by the debt vs tax mode of deficit financing. The study re-examines the "Ricardian Equivalence" hypothesis in Russia by using private consumption spending as the dependent variable and government expenditure, government borrowing, tax, and income as the independent variables. The Ricardian position offers an intriguing issue in the Russian setting. If the Russian economy exhibits Ricardian equivalence, the private sector will shift its spending habits and boost its savings, rendering the policy reforms ineffectual. The ARDL and NARDL models used yearly time series data between 1988 and 2022. The results refute the Ricardian Equivalence and support the Keynesian perspective that financing the fiscal deficit (debt vs tax) does affect private consumption spending. The estimates support a strong long-run and short-run link between the variables. Estimates confirm that tax and borrowing mode of deficit financing negatively influences Russia's consumption spending. It shows that short-run disequilibrium converges to long-run equilibrium in the ARDL model at a rate of 85.3% and in the NARDL model at a rate of 28.6%. The study concludes that the deficit financing strategy should be carefully devised and supported. Implementing an expansionary fiscal policy will influence the overall private demand of Russia. A tendency to rely too much on tax and borrowings as a financing technique negatively influences private consumption spending. This study contributes to the pool of literature on "Ricardian Equivalence" and deficit financing by providing new data on how to formulate fiscal policies that are efficient at financing deficits and sustainable by making prudent expenditures without endangering the nation's private consumption.

KEYWORDS

ARDL, NARDL, consumption spending, deficit financing, Ricardian equivalence, government borrowing, fiscal policy, fiscal deficit, Russia

JEL H3, H5, H6, H62, F31, F63

УДК 336.131

Влияние асимметрии налогов и государственного долга на расходы на личное потребление в России

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АННОТАЦИЯ

Согласно теории рикардианской эквивалентности, расходы на частное потребление не зависят от соотношения государственного долга и налогов при финансировании дефицита бюджета. В данном исследовании гипотеза

«рикардианской эквивалентности» пересматривается для России с использованием в качестве зависимой переменной расходов на личное потребление, а в качестве независимых переменных – государственных расходов, государственных заимствований, налогов и доходов. Рикардианская гипотеза ставит интригующую проблему в российских условиях. Если российская экономика демонстрирует рикардианскую эквивалентность, то частный сектор изменит свои привычки в отношении расходов и увеличит сбережения, что сделает политические реформы неэффективными. В моделях ARDL и NARDL использовались данные временных рядов с 1988 по 2022 г. Полученные результаты опровергают рикардианскую эквивалентность и подтверждают кейнсианскую точку зрения, согласно которой финансирование бюджетного дефицита (долг по сравнению с налогами) действительно влияет на расходы на личное потребление. Оценки подтверждают наличие сильной долгосрочной и краткосрочной связи между переменными. Также расчеты подтверждают, что налоговый и заемный способы финансирования дефицита отрицательно влияют на потребительские расходы россиян. Показано, что краткосрочное неравновесие сходится к долгосрочному равновесию в модели ARDL со скоростью 85,3%, а в модели NARDL – со скоростью 28,6%. В исследовании делается вывод о том, что стратегия финансирования дефицита бюджета должна быть тщательно продумана. Проведение экспансионистской фискальной политики окажет влияние на совокупный частный спрос в России. Тенденция слишком сильно полагаться на налоги и заимствования в качестве метода финансирования негативно влияет на расходы на личное потребление. Данное исследование вносит вклад в литературу по «рикардианской эквивалентности» и финансированию дефицита, предоставляя новые данные о том, как проводить фискальную политику, эффективную для финансирования дефицита и устойчивую за счет разумных расходов без угрозы для частного потребления страны.

КЛЮЧЕВЫЕ СЛОВА
ARDL, NARDL, потребительские расходы, финансирование дефицита, рикардианская эквивалентность, государственные заимствования, фискальная политика, бюджетный дефицит, Россия

1. Introduction

Private consumption has accorded a multitude of emphasis in modern economics. Private consumption is a result of the involvement of the government and other market participants [1]. The essential and fundamental for the country's progression to sustainable economic expansion is private consumption, which corresponds to an economy free of deficits and in equilibrium [1; 2]. An important concern in macroeconomics is how the budget deficit affects private consumption [2; 3].

There are three different viewpoints regarding the effect of deficit financing on private consumption. According to the Keynesian school of thought, private consumption is affected by fiscal deficits and the way they are financed [4]. According to the Ricardian Equivalence theory, private consumption is unaffected by the fiscal deficit and the resources often used to finance it. However, according to neoclassical viewpoints, the rise in interest rates and the debt financing of the deficit might reduce private spending [5–8].

In the endogenous growth theory context, contemporary theoretical ideas on the effects of fiscal policy parameters and macroeconomic variables are largely based on R. Barro's work [5; 9; 10]. According to the endogenous growth model, government spending boosts economic growth by, on the one hand, managing domestic demand and, on the other, cutting production costs or increasing the utilisation efficiency of production inputs [11].

At the same time, expansionary fiscal policy (maintaining high government expenditures) requires a corresponding level of tax or debt burden which, in turn, has a negative effect on growth. Since the

method used to finance deficits determines a fiscal policy's overall impact, the Ricardian equivalence hypothesis – also known as "Barro-Ricardian Equivalence" by Buchanan in his paper "Barro on the Ricardian Equivalence Theorem" – must meet certain requirements [12].

In the public finance literature, there are divergences of opinion on how to fund the deficit and its consequences. Others contend that increasing domestic government debt via debt financing increases interest rates. Foreign debt is undesirable since it puts a country's solvency in danger. Other adverse effects will result from the alternative ways to pay for government expenses using money [13]. In developing countries, one of the cornerstones of short-term stabilisation and medium-term adjustment strategies is reducing the amount of the deficit [2; 3].

Ricardian and Keynesian schools of thought have different policy consequences; if Ricardian Equivalence is valid, fiscal policy will be ineffectual. Contrary if the Ricardian Equivalence does not hold, it does matter how the government finances its expenditures. As deficit financing would raise domestic interest rates, create inflation, and increases private consumer spending, it would displace private investment and impede growth [14].

Around the world, fiscal policy has been a major factor in fostering stability and economic progress. If the Ricardian equivalence is valid for the Russian economy, households will shift their expenditure patterns and increase their savings, rendering the policy reforms ineffectual [15–17].

The primary objective of the research is to provide empirical evidence to support the Ricardian equivalence in the Russian context.

Which can be further *hypothesized* in the Russian context.

Ricardian Equivalence Preposition:

$H0_A$: Government Borrowing has no impact on private consumption spending.

$H0_B$: Government Tax policy has no impact on private consumption spending.

Keynesian Preposition:

$H1_A$: Government Borrowing will impact private consumption spending.

$H1_B$: Government Tax policy will impact private consumption spending.

If $H0_A$ and $H0_B$ hold when the private sector of Russia behaves according to the Ricardian theory. Contrary, if private sector alters its consumption spending due to a change in government borrowing and tax policy, then Keynesian proposition holds ($H1_A$ and $H1_B$ will be confirmed).

2. Literature Review

A growing number of studies have examined the efficacy of these hypotheses. However, the findings of these empirical investigations are inconsistent and debatable across nations, data, and techniques. Most of this research focuses on industrialised nations [2].

2.1. Russia's Fiscal Imbalance

Initially, productivity was lower in countries like Russia (excluded from global integration). Russia's economic development began its upward trend in 1998 after the Union of Socialist Soviet Republics (USSR) collapsed in 1991, which diminished GDP per capita. However, there was significant fluctuation along the way [18; 19].

The root of Russia's economic issues lies within itself; in 2014's first half, the Russian economy slowed down even more than in 2013, when it had the lowest GDP growth at 1.3%. The problem was made worse in 2017 when the GDP growth rate continued to shrink, and the workforce decreased by 0.5% to 0.7% annually during the decade prior, posing a further danger to slow economic development by 0.5 percentage points. Russia's GDP growth rate was 2.8% in 2018, 2.12% in 2019, 2.12% after COVID-19, and 2.6% in 2020 before rising to 4% in 2021 [11].

Russia's discretionary fiscal policy involves altering taxes and expenditures for the government. In order to boost or decrease its domestic demand, the government implements either expansionary or constricting fiscal policies. In 2000,

Russia's Structural Balance[1] as a percentage of GDP was 2.6%; by 2004, it had increased to 4.7% of GDP. In 2015 and 2017, the structural Balance was –3.07% and –1% of GDP, respectively. In 2022, it increased to 0.07% of GDP due to high government spending and the special military operations in Ukraine (Figure 1).

Such a trend in Russia's structural balance creates pressure on macroeconomic variables like domestic consumption, savings, and general price levels [20]. Increasing taxes or borrowing will be necessary to cover this fiscal imbalance (from the domestic market or international institutions). Russian government debt as a percentage of GDP decreased from 44% in 2001 to 9.9% in 2009, and it will reach 16% in 2022 (see, Figure 1). The average debt from 1999 to 2022 was 21.3% of GDP. With an average revenue from taxes of 34.5% of GDP from 1999 to 2022, the tax revenue exhibits a trend that is the reverse of the government debt from 2009 on (see Figure 1).

Russia has gradually put into operation several measures that support fiscal stability. As a former superpower rose from hibernation, Russia aimed to progressively strengthen its economy [21]. Since 2014, Russia has been in a globalisation stage but has faced two challenges. The first was that trade and commerce in Russia were heavily impacted by the drop in commodity prices, with curves declining in many industries. The second was the Russia's special military operations in Ukraine the worsened its relations with the West, which included sanctions and countersanctions. Russia has been progressively improving since 2019 due to deliberate budgetary measures which led to a steady decline in domestic inflation, fiscal deficit and increase in tax revenue [20; 22; 23].

Around the world, fiscal policy has been a major factor in fostering stability and economic progress. If the Ricardian equivalence is valid for the Russian economy, households will shift their expenditure patterns and increase their savings, rendering the policy reforms ineffectual [15–17]. The primary objective of the research is to provide empirical evidence to support the Ricardian equivalence in the Russian context.

[1] The IMF calculates and reports structural Balance as a percentage of GDP. Structural balances are expressed as a percentage of potential outputActual output less prospective output expressed as a percentage of potential output is the output gap. The impacts of transitory fiscal initiatives, the impact of changes in interest rates and debt-service costs, as well as other non-cyclical changes in net lending/borrowing, all affect the structural balance. (https://www.imf.org/en/Publications/WEO/weo-database/2022/October)

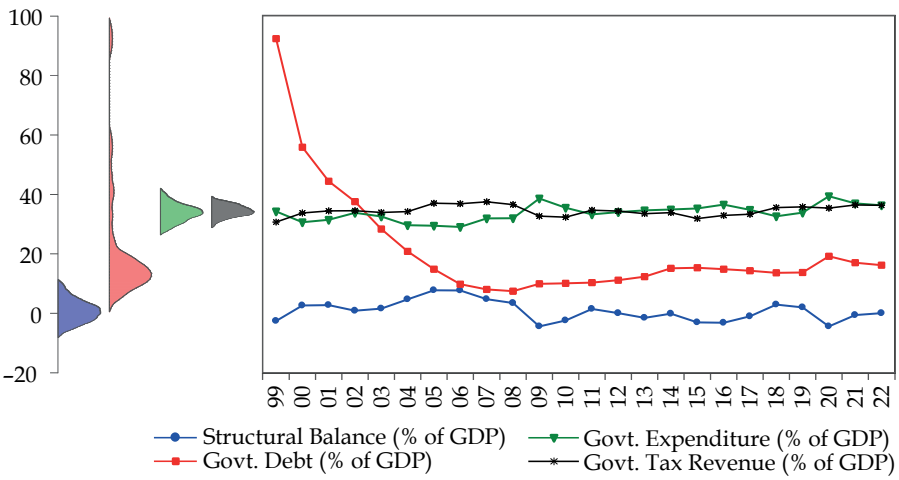

Figure 1. **Trends of Russian Structural Balance, Government Revenue and Government Expenditure as per cent of GDP**

Source: World Economic Outlook data by International Monetary Fund (IMF). Available at: https://www.imf.org/en/Publications/WEO/weo-database/2022/October

2.2. Imperial Studies

Early studies [24], demonstrated that financing a deficit will significantly affect private consumption [7], suggested that the standard approach does not consider people's rational expectations and would support Ricardian equivalence. Consumption-saving behaviour is based on a person's rational expectations about the impact of fiscal measures. Kormendi's consolidated method received several comments and replies [25–31].

Modigliani & Sterling [30; 31] criticized Kormendi [7] contended that Ricardian equivalence and the life-cycle theory were incompatible with Kormendi's definition, and that wealth, taxation, and government spending all had an impact on consumption.

Seater & Mariano [32] have estimated the consumption function and their findings are consistent with the Ricardian equivalence hypothesis.

Kormendi & Meguire [8] eased the constraints imposed by Modigliani & Sterling and therefore dismissed the restrictions.

Feldstein & Elmendorf [26] concluded that the increase in taxes had a significant impact on consumer expenditure and that the increase in government spending would have no impact on consumption, which would invalidate the Ricardian equivalence. In addition, they argue that the results of Kormendi's study favour the Ricardian equivalence due to the inclusion of the Second World War years. These were years characterized by scarcity, rationing, and patriotic self-restraint appeals, which led to an abnormally high rate of savings at a time when government budget deficits were huge.

Butkus et al. [33; 34] found that increase in public debt to GDP ratio is more likely to result in a positive debt effect on private consumption and investment.

A positive relationship between public debt and private consumption and economic growth was found in China [35]. Sardoni [36] rejects Ricardian Equivalence on two grounds first is the economic role of the state as merely 'parasitic'. Second the unwarranted extension of the microeconomic analysis of debts to the macro-economic level. Further, Banday & Aneja [37] and Pickson & Ofori-Abebrese [38] add found that government may help increase the rate of economic growth and guarantee a steady and sustainable ratio of the public debt to GDP by reorganising its spending.

Study done by Magazzino [39] found no evidence of Ricardian proposition in Russia. Contradicting to the results of Magazzino, a study by Polbin & Sinelnikov-Murylev [40] measure the impact of fiscal policy on aggregate consumption of Russia. Study uses simultaneous equation model on time series data from 1999 to 2019 and the estimates supports Ricardian equivalence hypothesis.

Molefe & Mah spanning the period 1995 to 2019, which was derived from OECD and IMF, this current study discovered a positive and significant relationship between both short- and long-term interest rates in BRICS economies. Moreover, the results of the study revealed a negative and significant relationship between GDP and fiscal deficits. These results confirmed that fiscal deficits hypothetically crowd out private investment and consumption through increased effects on interest rates. Therefore, the implementation of policy mix (interaction between monetary policy and fiscal policy [41] rejects Ricardian hypothesis in all BRICS countries. They found that results confirmed that fiscal deficits hypothetically crowd out Russia's private investment and consumption through increased effects on interest rates.

Joy & Panda [42] studies measured the sustainability of public debt among BRICS (Brazil, Russia, India, China, and South Africa) countries. They concluded that the region's nations must take the essential steps to manage their debt and finances efficiently in order to enhance their primary balance. In adding, regardless of their ideology and political obligations, governments must prioritise economic responsibility [43].

Based on a brief review of the literature, the empirical study that tried to determine how deficit financing affected

private consumption came up with conflicting findings, possibly as a result of the technique, research duration, and sample size. Furthermore, there are very clear gaps that the studies conducted in the Russian context to examine the impact of deficit financing on the economy empirically have also yielded mixed results [39–44]. This study explores the connections between Russia's deficit finance, trade openness, and private consumption using the ARDL and NARDL approaches.

3. Methodology

The Keynesian and Neoclassical viewpoints assert that the private sector is short-sighted, and that deficit financing will consequently have an effect on private consumption [6; 8; 14].

Contrarily, the Ricardian equivalence postulates that because the households are discerning and forethoughtful, deficit financing will not have an influence on consumption expenditure [5]. This is so that households can account for the potential tax that the present debt will entail. They will also evaluate the fact that because debt financing is being used in its place by the government, the future tax's present value is equal to the current tax advantage [5; 6].

The lifetime utility function of the life cycle income hypothesis states that the individual lifetime utility ω will be the accumulation of utility $\sigma(PCS_t)$ from consumption throughout the duration of a consumer's life (where t is the time range from 1 to T):

$$\omega = \sum_{t=1}^{T} \sigma(PCS_t). \quad (1)$$

With the caveat that any outstanding debt must be settled at the end of the individual's life, it is thus assumed that individuals could borrow funds and invest it at an exogenous rate. Each person's budget will therefore be constrained by:

$$\sum_{t=1}^{T} PCS_t \le \tau_0 + \sum_{t=1}^{T} Y_t, \quad (2)$$

where, τ_0, represents an individual's wealth, while Y_t represents their income. According to Eq. (2) everyone will adhere to the spending limit evenly and since consumption will have a positive marginal utility, the Lagrangian maximisation function will be:

$$\mathcal{L} = \sum_{t=1}^{T} \sigma(PCS_t) + \\ + \lambda\left(\tau_0 + \sum_{t=1}^{T} Y_t - \sum_{t=1}^{T} PCS_t\right). \quad (3)$$

Eq. (4) represents the overlapping generation prepositions of Ramsey [45] and Diamond [46] for rational individual [5]:

$$PCS_t + \frac{PCS_{t+1}}{1+\varphi} = Y_t + \frac{Y_{t+1}}{1+\varphi}. \quad (4)$$

Where, φ is the discounting rate; $PCS_{t+1} / (1 + \varphi)$ and $Y_{t+1} / (1 + \varphi)$ represents the present value of private consumption spending and income respectively. By incorporating tax impact in Eq. (4) we get Eq. (5):

$$PCS_t + \frac{PCS_{t+1}}{1+\varphi} = \\ = (Y_t - TAX_t) + \frac{(Y_{t+1} - TAX_{t+1})}{1+\varphi}. \quad (5)$$

However, if there is a budget deficit at time t, where $TAX_{t+1} < TAX_t$ = Government Spending (GS) and $\Delta TAX = TAX_t - TAX_{t+1}$ and if we consider $GOVB_t$ to represent the government borrowing, the rise in an individual's disposable income will be equal to $GOVB_t = \Delta TAX$.

Assuming that the debt would mature in the following year, TAX_{t+1} is the tax due, and it is also the case that the individual will earn interest in addition to the principal amount of $GOVB_t$, i.e. $(1 + \varphi)\, GOVB_t = GOVB_{t+1}$:

$$PCS_t + \frac{PCS_{t+1}}{1+\varphi} = (Y_t - TAX_t) + \\ + \left(\frac{Y_{t+1} - TAX_{t+1}}{1+\varphi}\right) + (1+\varphi) GOVB_t. \quad (6)$$

LHS of eq. (6) shows that an individual's consumption spending includes current as well as future consumption. *RHS* of eq. (6) equates the total tax revenue (current + future tax revenue), receipts of interest, and principal amount of government debt.

The government budget constrain can be written as follow:

$$\int_{t=0}^{\infty} e^{-\varphi t} GOVEXP_t dt \leq \leq -GOVB(0) + \int_{t=0}^{\infty} e^{-\varphi t} TAX_t dt. \quad (7)$$

Where, government expenditure ($GOVEXP_t$) is less than equal to the government borrowings debt ($GOVB$), and the present value of tax at ($e^{-\varphi t}$) and government borrowings.

The budget deficit is the change in rate of stock of debt $GOVB_t$ (see, Eq. (8)):

$$GOVB_t = [GOVEXP_t - TAX_t] + + \varphi(GOVB) \cdot GOVB_t. \quad (8)$$

The overlapping generation model of government budget will be (see, Eq. (9)):

$$TAX_t + \frac{TAX_{t+1}}{1+\varphi} = GOVEXP_t + + \frac{GOVEXP_{t+1}}{1+\varphi} + (1+\varphi)GOVB_t. \quad (9)$$

The private sector faces challenge for temporal optimization i.e. $MAX\ \omega = \sigma(PCS_t PCS_{t+1})$, Subject to Eq. (6) and Eq. (9), the choice of optimization based on Eq. (6) and Eq. (9) for private and government respectively. A fiscal deficit today will result in future tax obligations as the burden of the deficit falls on the next generation, which in turn lowers their welfare.

According to the Ricardian equivalence hypothesis, government borrowing cannot change private consumption spending (as they are rational and far-sighted). The private sector may predict future government spending by substituting Eq. (9) into Eq. (6) we get Eq. (10):

$$\left\{PCS_t + \frac{PCS_{t+1}}{1+\varphi}\right\} = \left\{Y_t + \frac{Y_{t+1}}{1+\varphi}\right\} + + \left\{GOVEXP_t + \frac{GOVEXP_{t+1}}{1+\varphi}\right\} - - \left\{TAX_t + \frac{TAX_{t+1}}{1+\varphi}\right\} + (1+\varphi)GOVB_t. \quad (10)$$

The real budget constraint on the private sector is demonstrated in Eq. (10); taxes and deficits are not taken into account. Accordingly, the private sector's optimal conduct is akin to the Ricardian equivalence in that it depends on new revenue, financial restrictions, and government spending but not on deficit or taxation. Current private consumption spending (PCS_t), as defined by Keynesian school of thought, will alter as a result of changes in government spending and the method used to fund it (taxes vs. debt). By shifting the responsibility for debt repayment on the next generation, the present generation will benefit at their expense.

Private consumption spending may be determined to be a function of government expenditure, borrowing, tax revenue, and income [5; 7; 17; 24; 47] is as follow:

$$PCS_t = = f(GOVEXP_t, GOVB_t, TAX_t, Y_t), \quad (11)$$

where, PCS is private consumption spending at time t, $GOVEXP$ is government expenditure at time t, $GOVB$ is government borrowing at time t, TAX is tax revenue at time t, and Y as domestic income at time t.

3.1. Econometric Model

The study investigates the relationship between the private consumption spending and mode of deficit financing. We used the Auto-Regressive Distributed Lag (ARDL) and Non-linear Auto-Regressive Distributed Lag (NARDL) for the investigation [48]. Hence, Eq. (12) represents the ARDL and NARDL long-run equation of private consumption spending:

$$PCS_t = \gamma_0 + \gamma_1 GOVEXP_t + + \gamma_2 GOVB_t + \gamma_3 TAX_t + \gamma_4 Y_t + \varepsilon_t. \quad (12)$$

We estimate the ARDL model (see Eq. (13)) for private consumption spending in order to look into the cointegration between the variables given in Eq. (12):

$$\Delta PCS_t = \alpha_0 + \sum_{t=1}^{n} \alpha_{1i} \Delta PCS_{t-i} + + \sum_{t=1}^{n} \alpha_{2i} \Delta GOVEXP_{t-i} + \sum_{t=1}^{n} \alpha_{3i} \Delta GOVB_{t-i} + + \sum_{t=1}^{n} \alpha_{4i} \Delta TAX_{t-i} + \sum_{t=1}^{n} \alpha_{5i} \Delta Y_{t-i} + + \beta_1 PCS_{t-1} + \beta_2 GOVEXP_{t-1} + + \beta_3 GOVB_{t-1} + \beta_4 TAX_{t-1} + \beta_5 Y_{t-1} + \varepsilon_t. \quad (13)$$

In this case, Δ stands for the first difference operator. The ARDL model's short-run and long-run coefficients are represented by $\alpha_1 \ldots \alpha_5$ and $\beta_1 \ldots \beta_5$; ε_t represents the white noise terms.

The Eq. (14) presents the error correction model to represent the rate of adjustment to the long-run equilibrium, as shown below:

$$\begin{aligned}\Delta PCS_t = \alpha_0 + \sum_{t=1}^{n}\alpha_{1i}\Delta PCS_{t-i} + \\ + \sum_{t=1}^{n}\alpha_{2i}\Delta GOVEXP_{t-i} + \\ + \sum_{t=1}^{n}\alpha_{3i}\Delta GOVB_{t-i} + \sum_{t=1}^{n}\alpha_{4i}\Delta TAX_{t-i} + \\ + \sum_{t=1}^{n}\alpha_{5i}\Delta Y_{t-i} + ECT_{t-1} + \varepsilon_t.\end{aligned} \quad (14)$$

The ARDL establish only linear relationship. Hence, we further estimate the NARDL model [49; 50] to capture the long-run and short-run asymmetric relationship of government borrowing and tax on the private consumption spending in the presence of other explanatory variables specified in Eq. (12):

$$\begin{aligned}PCS_t = \theta_0 + \theta_1 GOVEXP_t + \\ + \theta_2^+ GOVB_t + \theta_3^- GOVB_t + \\ + \theta_4^+ TAX_t + \theta_5^- TAX_t + \theta_6 Y_t + \varepsilon_{t^-}.\end{aligned} \quad (15)$$

Eq. (15) divides the *GOVB* and *TAX* into two categories: positive and negative effects of *GOVB* and *TAX* on *PCS*. Here, our parameters are θ_0, θ_1, θ_2^+, θ_3^-, θ_4^+, θ_5^-, θ_6; $GOVB_t = GOVB_0 + GOVB_t^+ = GOVB_t^-$ and $TAX_t = TAX_0 + TAX_t^+ = TAX_t^-$ are the vector of unknown LR parameters. Where + and – signify the "partial sum of positive and negative variation" in GOVB and TAX, respectively:

$$\begin{aligned}GOVB_t^+ = \sum_{j=i}^{t}\Delta GOVB_t^+ = \\ = \sum_{j=1}^{t} Max(GOVB_j, 0) \,|\, GOVB_t^- = \\ = \sum_{j=i}^{t}\Delta GOVB_t^- = \sum_{j=1}^{t} Min(GOVB_j, 0).\end{aligned} \quad (16)$$

$$\begin{aligned}TAX_t^+ = \sum_{j=i}^{t}\Delta TAX_t^+ = \\ = \sum_{j=1}^{t} Max(TAX_j, 0) \,|\, TAX_t^- = \\ = \sum_{j=i}^{t}\Delta TAX_t^- = \sum_{j=1}^{t} Min(TAX_j, 0).\end{aligned} \quad (17)$$

Where $\Delta GOVB_t^+$, $\Delta GOVB_t^-$, ΔTAX_t^+, ΔTAX_t^- are computed as positive and negative shocks of government borrowings and tax. By pursuing the approach of Patel & Mehta and Shin et al. [49; 50] the following equation represents a nonlinear ARDL model that incorporates the short-run and long-run asymmetric relationship between PCS, GOVB and TAX in the presence of other explanatory variables:

$$\begin{aligned}\Delta PCS_t = \alpha_0 + \sum_{i=1}^{n}\alpha_{1i}\Delta PCS_{t-i} + \\ + \sum_{i=1}^{n}\alpha_{2i}\Delta GOVEXP_{t-i} + \\ + \sum_{i=1}^{n}\alpha_{3i}\Delta GOVB_{t-i}^+ + \\ + \sum_{i=1}^{n}\alpha_{4i}\Delta GOVB_{t-i}^- + \sum_{t=1}^{n}\alpha_{5i}\Delta TAX_{t-i}^+ + \\ + \sum_{t=1}^{n}\alpha_{6i}\Delta TAX_{t-i}^- + \sum_{i=1}^{n}\alpha_{7i}\Delta Y_{t-i} + \\ + \beta_1 PCS_{t-1} + \beta_2 GOVEXP_{t-1} + \\ + \beta_3 GOVB_{t-i}^+ + \beta_4 GOVB_{t-i}^- + \\ + \beta_5 TAX_{t-i}^+ + \beta_6 TAX_{t-i}^- + \\ + \beta_7 Y_{t-1} + \varepsilon_t.\end{aligned} \quad (18)$$

Where *n* denotes optimal lag order and

$$\sum_{i=1}^{n}\alpha_{1i} \text{ to } \sum_{i=1}^{n}\alpha_{7i}$$

denotes the short-run relationship of explanatory variables with positive and negative shocks of GOVB and TAX on PCS. Whereas β_1 to β_7 measure the long-run relationship of the same. After estimating Eq. (18), the short run and long run asymmetries can be estimated using Wald test.

Now, the restricted error correction model for NARDL is proposed as follows:

$$\Delta PCS_t = \sum_{i=1}^{n} \psi_{1i} \Delta PCS_{t-i} + \\ + \sum_{i=1}^{n} \psi_{2i} \Delta GOVEXP_{t-i} + \\ + \sum_{i=1}^{n} (\psi_{3i}^{+} \Delta GOVB_{t-1}^{+} + \psi_{3i}^{-} \Delta GOVB_{t-1}^{-}) + \\ + \sum_{i=1}^{n} (\psi_{4i}^{+} \Delta TAX_{t-1}^{+} + \psi_{4i}^{-} \Delta TAX_{t-1}^{-}) + \\ + \sum_{i=1}^{n} \psi_{5i} \Delta Y_{t-i} + ECT_{t-1} + \varepsilon_t. \quad (19)$$

Where ψ_{1i} to ψ_{5i} are the short-run coefficients, whereas ψ_{3i}^{+}, ψ_{3i}^{-} and ψ_{4i}^{+}, ψ_{4i}^{-} denotes the positive and negative shocks of *GOVB* and *TAX* respectively.

3.2. Data and Variables

The analysis takes into account the time series data of the variables from 1988 to 2022; the variable representation and descriptions is presented in listed in Table 1. The GDP deflator deflates the nominal variables into real ones (2004-05 constant price).

4. Results

The average PCS, GOVEXP, GOVB, TAX, and Y values are 69.201, 18.023, 18.455, 13.238 and 3.202, respectively (Table 2). Each underlying variable's standard deviation is lower than its mean value, indicating steady variance across the sample period. The Jarque-Bera test statistic supported the normal distribution of all the variables. Primary evidence of the relationship between private consumption expenditure, government borrowings, tax, and income is asserted by the correlation estimates between private consumption expenditure (PCS) and GOVEXP (0.0.847), GOVB(–0.284), TAX(–0.663), and Y(0.870) [24; 26; 33–36].

In order to determine the magnitude and trajectory of the relationship between private consumption spending, modes of financing the deficit, government expdeniture and income, the ARDL and NARDL is used. The main restriction of ARDL and NARDL states that the series shouldn't be integrated at order I(2) in order to prevent spurious results [49; 51]. The stationarity of the series is examined using the ADF and PP. The outcomes of the unit root test are shown in Table 3.

The stationary at I(1) is confirmed by the ADF and PP findings at a 1% level of significance. No series is I(2), which meets the first criterion of ARDL and NARDL, according to the findings of unit root testing.

Table 4 displays the test estimates for the ARDL and NARDL bound test. The ARDL and NARDL estimated F-Statistics exceed the 99% upper bound, suggesting that the null hypothesis of no cointegration is rejected and that there is both linear and nonlinear cointegration among the variables being studied [49; 51].

Table 1

Variable Representation and Description

Variable	Variable representation	Dependent/ Independent	Description
Private Consumption Spending	PCS	Dependent	Final consumption expenditure is the sum of private final consumption expenditure as a percentage of GDP
Government Expenditure	GOVEXP	Independent	Total expenditure of central government percentage of GDP
Government Borrowings	GOVB	Independent	Total of government debt (domestic) as a percentage of GDP
Tax Revenue	TAX	Independent	Tax revenue refers to compulsory transfers to the central government for public purposes as a percentage of GDP
Income	Y	Independent	The annual percentage growth rate of GDP

Source: World Economic Outlook data by International Monetary Fund (IMF) Retrieved from https://www.imf.org/en/Publications/WEO/weo-database/2022/October

Table 2

Descriptive Statistics and Correlation Matrix

	PCS	GOVEXP	GOVB	TAX	Y
Mean	69.201	18.023	18.455	13.238	3.202
Median	69.102	17.916	13.891	13.244	4.300
Maximum	75.423	20.786	48.983	16.622	8.499
Minimum	65.821	16.435	6.495	9.183	–7.799
Std. Dev.	2.436	0.977	13.463	2.223	3.064
Skewness	0.603	1.222	1.232	0.021	-1.033
Kurtosis	3.065	4.854	3.006	2.096	3.991
Jarque-Bera	1.278	8.237	5.059	0.682	4.595
Probability	0.527	0.162	0.796	0.710	0.100
Correlation Matrix					
PCS	–				
GOVEXP	0.847*	–			
GOVB	–0.284**	–0.333	–		
TAX	–0.663*	0.486*	0.021	–	
Y	0.870*	0.800	0.259	–0.626*	–

Note. *, **, *** indicates significant at 1%, 5% and 10% level of significance, respectively.
Source: Authors' calculations from EViews

Table 3

Results of Unit Root Tests

Variables	ADF		PP	
	Level form			
	Intercept and trend	Intercept	Intercept and trend	Intercept
PCS	–3.3624	–3.3104	–3.2848	–3.3926
GOVEXP	–3.9119**	–3.8135*	–3.8763**	–3.5047*
GOVB	–1.3316	–2.1492	–1.1476	–2.5418
TAX	–3.1264	–1.4466	–2.3209	–1.4466
Y	–3.8768	–3.1625	–3.7854	–3.1625
	First Differenced			
	Intercept and trend	Intercept	Intercept and trend	Intercept
PCS	–4.8869*	–4.9927*	–10.5773*	–9.8577*
GOVEXP	–5.3261*	–5.5067*	–10.6185*	–10.8624*
GOVB	–3.8717*	–3.0801*	–4.0595*	–3.0806*
TAX	–3.6051*	–3.8641*	–3.9031*	–3.9577*
Y	–5.5550*	–5.7536*	–11.8796*	–12.1089*

Note. *, **, *** indicates significant at 1%, 5% and 10% level of significance, respectively.
Source: Authors Calculation using EViews

Table 4

ARDL and NARDL Bound test Results

F-Statistics	ARDL		NARDL	
	7.832*		8.983*	
Significance	Lower Bound	Upper Bound	Lower Bound	Upper Bound
10%	2.2	3.09	1.99	2.94
5%	2.56	3.49	2.27	3.28
1%	3.29	4.37	2.88	3.99

Note. *, **, *** indicates significant at 1%, 5% and 10% level of significance, respectively.
Source: Authors Calculation using EViews

The estimations of the long-run and short-run coefficients of the ARDL and NARDL co-integrating equations, namely Eqs. (12), (14), and (15), and (19), are shown in Table 5 accordingly.

The ARDL estimates shows significant and positive long-run as well as the short-run relationship between government spending (GOVEXP) and private consumption spending. The coefficient of government expenditure shows that 1% increase in government expenditure will lead to 0.98% (in the long-run) and 0.27% (in the short-run) increase in private consumption spending respectively. The long-run coefficient value of government borrowing (GOVB), which is negative and significant, indicates that a 1% rise in government debt entails 0.07% (in the long-run) and 0.13% (in the short-run) decrease in private consumption spending. The private sector will substitute its current spending with investments in secured government debt securities.

It is clear that private consumption spending of Russia rejects the Ricardian preposition and is not unconcerned with the debt-based method of funding the fiscal deficit [33–35; 42]. A 1% rise in tax will result in a 0.04% fall in private consumption spending in long-run, and 0.31% in short-run.

The findings corroborate earlier research that found that using taxes to finance the fiscal deficit will lower private sector consumption [24; 26; 39; 41]. The positive and significant coefficient value of income asserts that 1% increase in income will increase consumption spending in the long-run as well in short-run by 0.39% and 2.04% respectively.

Table 5 also reports the results of the NARDL estimation indicating the short-run (Eq. (19)) and long-run (Eq. (15)) coefficients. In terms of the asymmetric impact of government borrowings (GOVB) on private consumption spending, the results show that positive shocks in GOVB lead to a decrease in PCS and negative shocks increase in PCS.

Furthermore, every 1% increase in GOVB leads 0.42% decrease in PCS and 1% fall in GOVB will increase PCS by 0.02% in the long-run and 0.34% in the short-run, this clearly indicates government borrowing from domestic debt market lead to crowding out effect and will also negatively impact the private consumption spending, which asserts Keynesian preposition in Russian context [33; 42; 43].

Every 1% increase in TAX results in a 0.89% reduction in PCS in long-run and 2.54% reduction in PCS in the short-run. Furthermore, any reduction in TAX will not necessary will increase PCS in the long-run (as the coefficient in insignificant) a result, the magnitude and direction of causality between negative TAX and PCS obviously warrants additional investigation. In short run negative shock in TAX will increase the PCS by 0.04%. The results of other explanatory variables are similar to the ARDL model.

The error correction term in the dynamic model represents the adjustment rate to long-run equilibrium. For both ARDL and NARDL models, the error correlation term (ECM) is signification (statistically) and negative indicating a stable long-term association between variables [52]. It shows that short-run disequilibrium converges to long-run equilibrium in the ARDL model at a rate of 85.3% and in the NARDL model at a rate of 28.6%. This shows that the ARDL model offers a faster adjustment to the equilibrium of long-run relationships.

In Table 5, the model's diagnostics are also presented. Both models are determined to be compatible by the model diagnostic estimates. With an R-Square of 0.96 and an adjusted R-Square of 0.86, the NARDL model fits the data better. The R^2 of the estimated consumption function in line with the previous studies on the Ricardian equivalence. These studies have estimated the aggregate consumption function and have observed similar R^2 values: Kormendi [7] adjusted $R^2 = 0.999$; Bernheim & Bagwell [53] adjusted $R^2 = 0.91$; Moore [13] adjusted $R^2 = 0.9917$; and Feldstein & Elmendorf [26] adjusted $R^2 = 0.99$. The LM test and Jarque-Bera support no serial correlation amongst the residuals. In Ramsey functional form, the model fits well and has no heteroscedasticity.

Table 5

Results of short-run and long-run relationship using ARDL and NARDL model

Variables	ARDL	NARDL
	Coefficient (Prob.)	Coefficient (Prob.)
Long Run Coefficients		
GOVEXP	0.983 (0.012*)	0.807(0.004*)
GOVB	–0.017 (0.000*)	–
GOVB_POS	–	–0.420 (0.040**)
GOVB_NEG	–	0.025 (0.017**)
TAX	–0.048 (0.046**)	–
TAX_POS	–	–0.892(0.026**)
TAX_NEG	–	1.165 (0.133)
Y	0.389 (0.066***)	0.313(0.000*)
Constant	45.430 (0.000*)	53.085 (0.067***)
Short Run Coefficients		
Δ(PCS (–1))	0.052 (0.053**)	0.234 (0.014*)
Δ(GOVEXP)	0.247 (0.206)	0.011(0.009*)
Δ(GOVEXP (–1))	–0.011 (0.989)	–
Δ(GOVB)	–0.138 (0.002*)	–
Δ(GOVB (–1))	0.116 (0.895)	–
Δ(GOVB_NEG)	–	0.304 (0.003*)
Δ(GOVB_NEG (–1))	–	0.271 (0.020**)
Δ(TAX)	–0.315 (0.000*)	–
Δ(TAX(–1))	–1.529 (0.000*)	–
Δ(TAX_POS)	–	–2.544 (0.001*)
Δ(TAX_POS (–1))	–	1.376 (0.217)
Δ(TAX_NEG)	–	0.047 (0.078***)
Δ(TAX_NEG (–1))	–	0.271 (0.203)
Δ(Y)	2.043 (0.000*)	0.637 (0.000*)
Δ(Y(–1))	0.637 (0.003*)	–
ECT(–1)	–0.853 (0.000*)	–0.286 (0.000*)
Diagnostic tests		
$Wald_{LR}$ Asymmetry (GOVB)	–	34.689 (0.000*)
$Wald_{SR}$ Asymmetry (GOVB)	–	4.319 (0.026**)
$Wald_{LR}$ Asymmetry (TAX)	–	39.486 (0.000*)
$Wald_{SR}$ Asymmetry (TAX)	–	6.184 (0.090***)
R-squared	0.8906	0.963
Adjusted R-squared	0.7894	0.869
Normality [Jarque-Bera (p-value)]	0.920 (0.631)	0.767 (0.681)
Serial correlation [LM Test F-statistic (p-value)]	0.291 (0.752)	2.368 (0.241)
Heteroscedasticity [Breusch-Pagan-Godfrey (p-value)]	0.809 (0.563)	1.207 (0.448)
Ramsey RESET Test [F-statistic (p-value)]	1.079 (0.319)	0.768 (0.430)

Note. *, **, *** indicates significant at 1%, 5% and 10% level of significance, respectively.
Source: Authors Calculation using EViews

Figures 2 and 3 for both models show the results of the CUSUM and CUSUMSQ tests used to determine the model's stability. Long-run estimates' stability is confirmed by the model's apparent resilience during structural breaks. To confirm the long-run and short-run asymmetry, we performed the Wald test. The significant Wald test confirms the long-run and short-run asymmetric nexus between government size and trade openness. Further, the cumulative dynamic multiplier is used to assess the short- and long-run asymmetric influence of GOVB and TAX on PCS (see Figure 4). It estimates the percentage point change in PCS due to one percent positive

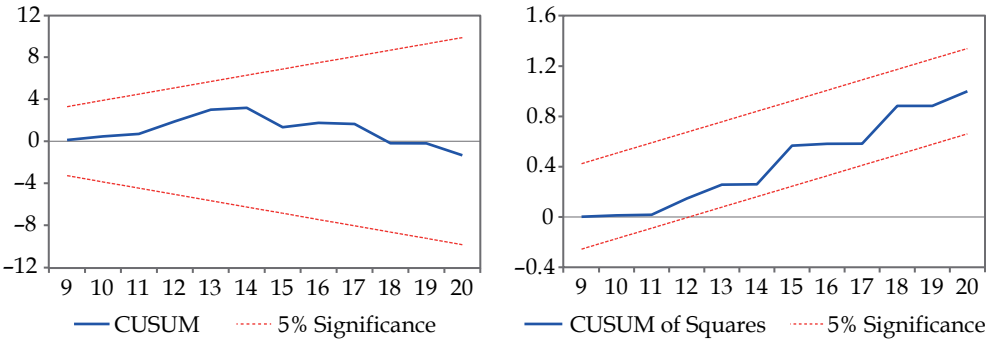

Figure 2. **ARDL Plots of CUSUM, CUSUM of squares**

Source: Authors Calculation using Eviews

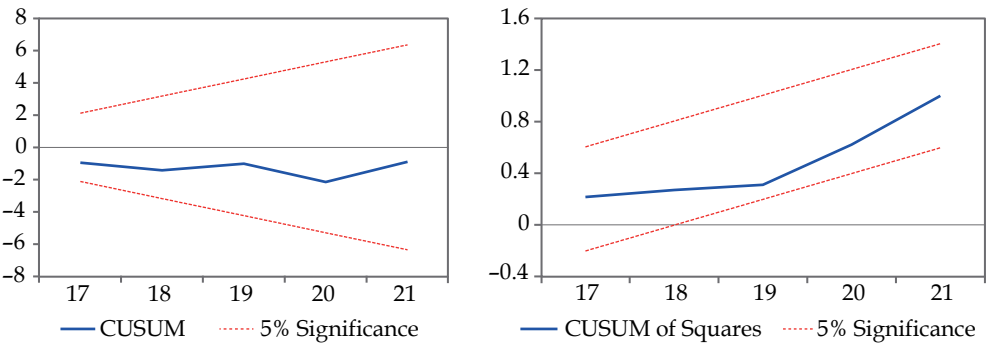

Figure 3. **NARDL Plots of CUSUM, CUSUM of squares**

Source: Authors Calculation using Eviews

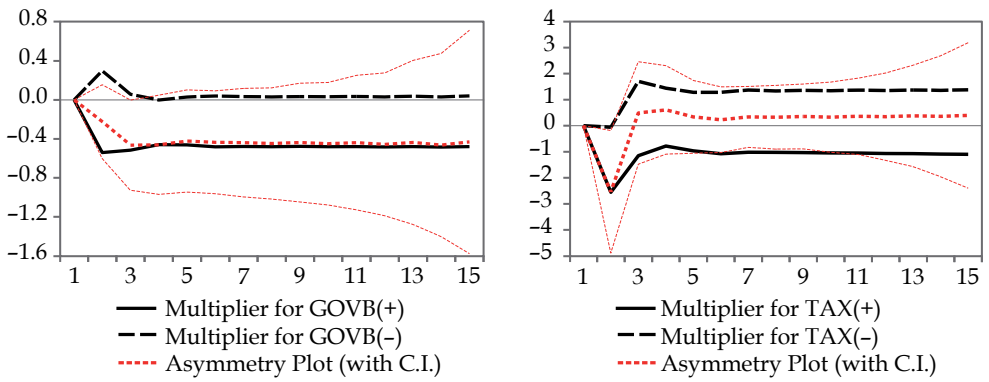

Figure 4. **NARDL Dynamic Asymmetric Multiplier**

Source: Authors Calculation using Eviews

and negative shocks in GOVB and TAX. It demonstrates that GOVB and TAX have negative impact on PCS. This finding is consistent with the long-run NARDL relationship. The net effect of GOVB and TAX (thick, red-dashed line) is negative.

5. Discussion

The current study examines the long-run and short-run relationship using yearly time series data on private consumption spending, government expenditure, government borrowing, tax, and income. At the I(1) order of integration. The long-run association among the variables is confirmed by the ARDL and NARDL bound test. The impact of deficit financing on private consumer spending in Russia is measured by aggregate consumption.

According to ARDL and NARDL, estimates indicate that increasing government expenditure will lead to increased private consumption, making increasing government spending an effective fiscal strategy for demand management. Since the government borrowing and tax coefficients are not zero (substitute), private consumption is not Ricardian (rejecting $H0_A$ and $H0_B$).

The coefficients of tax (of ARDL and NARDL models) show negative impact of tax policy on Russian private consumption function, which asserts Keynesian preposition by accepting $H1_A$.

Additionally, tax funding will affect people's consumption and reduce demand. Russian private sector is susceptible to the tax-based method of funding the deficit. Similarly, the negative coefficients of government borrowing (of ARDL and NARDL models) accepts $H1_B$ and supports Keynesian preposition.

It can be inferred from the study that the deficit financing strategy should be implemented with the required caution due to the possibility of crowding out of private investment in Russia due to excessive government borrowing. Which, in turn, will obstruct economic development and capital accumulation. The Russian consumers' sensitivity to tax and debt financing methods supports the Keynesian proposition.

6. Conclusion

Implementing an expansionary fiscal policy will influence the overall private demand of Russia. A tendency to rely too much on borrowings as a financing technique negatively influences private consumption spending.

However, moving resources from the future to the present can be aided by carefully using public debt as a source of deficit financing. The Russian government intends to finance its deficit via tax revenue. If so, it will also have a negative effect on private consumption spending, rejecting $H0_A$ and $H0_B$.

This study contributes to the pool of literature on "Ricardian Equivalence" and deficit financing by providing new data on how to formulate fiscal policies that are efficient at financing deficits and sustainable by making prudent expenditures without endangering the nation's private consumption.

This study also provides a starting point for future research on the connection between consumption spending and deficit finance.

This study may be extended by considering the panel of comparable economies since a global analysis may be more insightful than a country-specific analysis. The aggregate consumption model used for the study can also be extended by incorporating the variables such as liquidity contains and the efficiency of the domestic debt market.

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Effectiveness Assessment of Tax Benefits in Terms of Reduced Rates of Insurance Contributions for IT-companies in Russia

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ABSTRACT

The relevance of the research topic is determined by new changes to the taxation treatment of IT companies, applied by the Russia Federation in 2021, which are called the IT maneuver. Previously, in 2010, IT organizations benefited in terms of reduced rates of insurance contributions to the pension, medical and social insurance funds. To make informed decisions on further stimulation of the IT industry, it is important to determine the effectiveness of tax benefits already provided. The purpose of this paper is to quantify the economic effect of IT benefits on the economic performance of IT companies. The hypothesis of the study means that IT companies using this support get an incentive for development and demonstrate better economic performance compared to other businesses in the industry. The business that has received additional financial resources due to savings on insurance contributions can use them to increase employee remuneration, expand its business (resulting in growth in the number of employees and revenues) or, at least, achieve greater profitability. The methodology of the study is as follows. The enterprises applying the insurance benefit were identified according to the sample of enterprises in the IT sector. Further, a comparison was made in respect of economic indicators of the benefit recipients and indicators of companies from the same industry having no benefits. Main findings of the quantitative analysis show a significant outperformance of economic growth for companies applying the IT benefit compared to those companies having no benefit. Practical relevance of the obtained findings means that the benefit on insurance contributions for software developers is a significant factor in the development of Russian IT-industry as a whole. The scientific impact of the conducted research involves the creation and application of a methodology for reliable determination of the insurance benefit among the enterprises of the IT sector.

KEYWORDS

tax benefits, IT industry, IT-technology, tax expenditures, income tax, innovative benefits, import substitution in IT

JEL L86, H71

УДК 336.22, 338.22

Оценка результативности налоговых льгот в виде снижения тарифных ставок страховых взносов для IT-компаний в России

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АННОТАЦИЯ

Актуальность темы исследования определяется тем, что в 2021 г. в России приняты новые изменения в режим налогообложения ИТ-компаний, которые получили название ИТ-маневра. До этого с 2010 г. для организаций в области информационных технологий была введена льгота в виде пониженных тарифов

страховых взносов, зачисляемых в фонды пенсионного, медицинского и социального страхования. Для того чтобы принимать обоснованные решения относительно дальнейшего стимулирования ИТ-отрасли, необходимо выяснить результативность уже предоставленных налоговых льгот. Цель данной работы – дать количественную оценку экономического эффекта влияния ИТ-льготы на экономические показатели предприятий ИТ-отрасли. Гипотеза исследования состоит в том, что ИТ-компании, воспользовавшиеся данной поддержкой, получают стимул для развития и демонстрируют лучшие экономические показатели по сравнению с остальными предприятиями отрасли. Предприятие, получившее дополнительные финансовые ресурсы за счёт экономии на уплате страховых взносов, имеет возможность направить их на увеличение оплаты труда сотрудников, расширение бизнеса (выражающееся в росте численности сотрудников и выручки) или, по крайней мере, достигнет большей прибыльности. Методика исследования заключается в следующем. По выборке предприятий в сфере ИТ выделены предприятия, применявшие льготу по страховым взносам. Далее произведено сравнение экономических показатели получателей льгот с показателями компаний из той же отрасли, но не имевших льготы. Основные результаты количественного анализа показывают значительное опережение роста экономических показателей у компаний, применяющих ИТ-льготу, по сравнению с компаниями, у которых отсутствовала эта льгота. Практическая значимость полученных результатов заключается в подтверждении того, что льгота по страховым взносам для разработчиков программного обеспечения является существенным фактором развития российской ИТ-отрасли в целом. Научный результат проведенного исследования состоит в создании и применении методики достоверного определения наличия льготы по страховым взносам среди предприятий сектора ИТ.

КЛЮЧЕВЫЕ СЛОВА
налоговые льготы, ИТ-отрасль, информационные технологии, налоговые расходы, налог на прибыль, инновационные льготы, импортозамещение в ИТ

1. Introduction

In Russia, since January 1, 2010, a benefit in terms of reduced rates of insurance contributions to the Pension Fund (PFR), Medical Fund (FCMIF) and Social Fund (SIF) has been in effect for Russian organizations engaged in information technology (IT)[1]. This benefit has initially been established in the law "On Insurance Contributions" and from January 1, 2017 in Chapter 34 of the Tax Code of the Russian Federation.

The point of the benefit is the possibility for IT companies to apply a general insurance contribution rate of 14% (7.6% from 2021) instead of 30% for organizations using the standard rate. To apply this benefit, an organization must meet three criteria.

Firstly, it is the state accreditation as an organization conducting activities in the IT sphere.

Secondly, the share of income from allowable activities must be at least 90% in the total of all incomes earned by the organization for the reporting (accounting) period.

Thirdly, the average headcount for the estimated (reporting) period must be at least seven employees.

From 2021, the scope of the granted benefit has been expanded due to an even greater reduction in the overall rate of insurance contributions paid by IT companies, 7.6% instead of the 14% rate in effect from 2010–2020[2].

Moreover, there are plans to expand the perimeter of the benefit: in accordance with the Executive Order of the President of the Russian Federation of March 2, 2022. The Government of Russia has been instructed to take measures aimed at granting tax benefits, including to accredited organizations receiving income from the

[1] As of January 1, 2010, the unified social tax was reformed into insurance contributions.

[2] Federal Law of 31.07.2020 No. 265-FZ (ed. of 23.11.2020) "On Amendments to Part II of the Tax Code of the Russian Federation".

distribution (placement) of advertising or provision of additional services using applications and online services of these organizations or incomes associated with the sale, installation, testing and maintenance of domestic solutions in the field of information technology[3].

Providing insurance contributions benefit to IT organizations is reasonable if IT companies using this support receive an incentive for development and demonstrate better economic performance compared to the rest of the industry. This study analyzes the economic effect of the benefit in terms of reduced rates of insurance contributions for IT companies, which was in effect in 2010–2020 (IT benefit).

The purpose of this study is to quantify the economic effect of the impact of IT benefits on the economic performance of IT companies.

The hypothesis of the study is that IT-companies using insurance contributions benefits get an incentive for development and demonstrate better economic performance compared to the rest of the industry.

The suggested hypothesis is tested using the following *method*. We make a sample of companies in the IT sector, find out which of them applied the insurance contributions benefits and compare their economic and financial indicators with those companies from the same industry that did not enjoy the benefit. A company that has received additional funds due to savings on the payment of insurance contributions, can direct them to increase the remuneration of employees, business expansion (expressed in growth of the number of employees and revenues) or at least, will achieve greater profitability.

2. Literature review

Burman & Phaup [1] show that the institution of tax expenditures emerged in the 1960s almost simultaneously in Germany and the USA.

Bogacheva & Fokina [2] argued that the tax expenditure concept was coined by Surrey in 1967 while serving as Deputy Secretary of the U.S. Treasury. Surrey used it in an internal instruction where the goal was to prepare a list of income tax preferences and benefits similar to the objectives of program expenditures. In the 1980s, the practice spread to virtually all OECD states and a number of developing countries.

Surrey [3] as the developer of the tax expenditure concept argued that any tax consists of two elements (parts). The first part represents structural norms required for the normal functioning of the tax. The second part presents the norms introducing special benefits, i.e. tax incentives or tax subsidies, which represent a deviation from the standard (optimal, reference) structure of taxes and are designed in favor of specific industries, activities or groups of taxpayers.

Burman [4] noted that such deviations take many forms, such as permanent exclusion from taxable income, deductions, deferral of tax liability, tax credits or special tax rates. Whatever their form, these deviations from the normative structure of taxes represent budgetary expenditures, however, made through the tax system rather than through direct payments from the budget, loans or other forms of state aid.

Mankiw & Weinzierl [5] used the definition of tax expenditures through the concept of a reference or optimal tax system, recognizing any deviation from this reference as tax expenditure in terms of a tax benefit, deduction, exemption, etc.

Piketty et al. [6] understood as a fair reference tax system the redistribution of income aimed to equalize the households' incomes.

Weinzierl [7] understood by a fair reference tax system the redistribution in favor of less affluent groups of households, consistent with the principle of "equal sacrifice."

Shmakov [8] showed that the Kaldor-Hicks economic improvement criterion is used with a fair reference tax system, thereby, redistribution of income (including with-

[3] Executive Order of the President of the Russian Federation of 02.03.2022 No. 83 "On Measures to Ensure Accelerated Development of the Information Technology Industry in the Russian Federation".

drawals to the budget) can be considered an improvement if the party that benefited from the redistribution of income can compensate in full the losses of the other party.

Feldstein [9] noted that to assess the macroeconomic effects of tax policy requires counting on the behavior of taxpayers (changes in investment decisions or consumption) at the micro level.

Djankov et al. [10] show that higher taxes on enterprises have a negative impact on investment in production and provoke an increase in informal economic activity.

Darnihamedani et al. [11] showed that tax increases are negative especially for new small companies.

Venâncio et al. [12] justified that tax increases are also negative for high-skilled employment.

Malinina [13] conducted a scrupulous analysis of these definitions and identified four characteristic features: 1) confirmed lost tax revenues (reduction of budget revenues), 2) consequence of established tax benefits and exemptions relative to the standard normative structure of taxes, 3) focus on the implementation of goals of the state socio-economic policy, 4) an alternative to direct state expenditures.

Mayburov [14] recognizes as redundant the second two signs of identification of tax expenditures in the study [13], while introducing another criterion, that is, creating advantages for certain types of activities or groups of taxpayers.

Belev et al. [15] showed that a specific feature of social contributions in Russia is the link between social contributions on behalf of an employee and the social benefits to which that employee is entitled.

Therefore, it is reasonable to consider social contributions as a tax type, i.e., it is important to emphasize the gratuitousness of these payments. Thus, social contributions along with PIT, are taxes on labor income. Consequently, the concept of tax expenditures is also applicable to benefits for IT companies.

Although benefits for IT companies have existed for a number of years, we did not find a large number of academic articles analyzing the economic effect of such benefits. Most articles on "taxes and IT" have appeared recently after the announcement of the first package of measures to support the IT industry in 2020, but they are more publicistic, describing the content of the proposed (introduced) measures, their purpose and possible effect. However, there are indications on the effectiveness of tax benefits as a tool to support technology and improve the competitiveness of the industry [16].

A number of studies provide a deeper semantic analysis of IT industry support measures, but there are no quantitative assessments of their impact on industry performance.

Gromov [17] analyzes the specifics and tax incentives issues for small IT companies. The author concludes that the bulk of tax benefits is concentrated in medium and large IT companies, which make up about 1% of the entire industry.

Kazarin & Svechnikova [18] analyzed the impact of regional tax benefits on the development of IT companies in 2016–2018. Authors conclude that provision of such benefits is not always the optimal measure to increase the level of IT companies' development and that a comprehensive approach is required to solve this problem.

Milogolov & Berberov [19] analyzed the effectiveness of the VAT tax exemption for IT companies for 2012–2016. Authors formulated a proposal to repeal this benefit due to significant distorting effects and opportunities for tax evasion, as well as the inconsistency of this benefit with the objectives of tax policy in terms of creating a level playing field for taxation in the e-commerce industry and the lack of clear signals to confirm the effectiveness of this benefit.

Liubkina et al. [20] point to the critical importance of government support for software developers in emerging markets.

Yigitcanlar et al. [21] justified that Brazilian software companies that took advantage of government subsidies and benefits were more likely to become nationally competitive.

This being said, we could not find any works on the analysis of the economic impact of benefits on the IT industry in terms of reduced rates of insurance contributions for Russian IT companies.

The motivation for granting tax exemptions to a certain industry is diverse. Being one of the instruments of fiscal policy, tax benefits are applied within its scope in accordance with the priorities of economic development.

On the one hand, they can be incorporated into tax design to achieve greater neutrality of the tax system in the context where current taxes for some reason distort the decisions of economic agents.

Awasthi & Engelschalk [22] concluded that if a significant part of enterprises in an industry is involved in informal economic activity due to excessive tax and administrative burden, the reduction of tax costs is one of the factors of "whitewashing" of this industry.

On the other hand, taxation features including benefits contribute to creation of non-neutrality in certain areas of economic activity.

Harju & Kosonen [23] proved that owing to a lower tax burden some activities become more attractive, contributing to their accelerated development.

Other activities (usually socially undesirable, such as those related to environmental pollution) are discouraged by higher tax burdens.

Klemm [24] showed that lower tax rates are increasingly driven by tax competition for business location.

Fischeret et al. [25] concluded that lowering tax rates is also an instrument of international competition for skilled labor.

Fink & Miguelez [26] proved that in a globalized economy, wage differences are becoming a more important factor in the migration of skilled employees, increasing the importance of payroll tax benefits.

For these reasons, the effectiveness of a sectoral tax benefit should be assessed in accordance with the extent the benefit provision contributes to the achievement of the intended economic development objectives.

Kostić **[27]** proved that reduction of taxes on qualified IT workers in Serbia contributes to growth of investments in human capital.

Manelici & Pantea [28] concluded that for Romania lowering taxes on skilled IT workers also contributes to growing investment in human capital, aiming to develop the IT industry up to the level of Western European countries.

Kromann et al. [29] proved that growth in software development and automation can help to increase overall productivity across industries.

With regard to objectives with which benefits on insurance contributions (or unified social tax) were introduced specifically for IT-companies, the legislative documents for adopting federal laws in Russia, introducing benefits for IT-companies, first on a unified social tax, then on insurance contributions, do not contain information on the purpose of the given benefits and expected results.

In this situation, let us address the goals facing the Russian economy in 2006–2010, when this benefit could have been offered during implementation of these goals, and first of all it is about the road to innovation of the economy.

Academic articles, devoted to innovation of the Russian economy, note the need for measures of state support.

Yusupova & Khalimova [30], analyzing the high-tech business in Russia, concluded that companies that could potentially form the basis of the leadership core will not be able to maintain their positions while developing independently.

Such companies need support and incentives. The importance of state support for leading high-tech companies, which was confirmed by the regression analysis, has also been noted.

Golichenko [31] noted the importance of creating a complete and consistent system of financial incentives at the beginning of the investment stage, which would contribute (including through targeted grants and tax benefits) both to creation of absorptive capacity in the business environment and diffusion of technologies.

Tax benefits as a tool for economic innovation are as well considered by international organizations in their works. For example, the OECD report [32] notes that if tax benefits are only intended to promote R&D in large stable firms, it can significantly reduce the effect of redistribu-

tion of innovation rents in favor of young enterprises and slow the innovation development of the country as a whole.

In later years, two other trends emerged in the Russian economy and politics, whereby state support for the IT industry was also reasonable, i.e. import substitution and national security.

If it is about the first trend, the supporters of import substitution usually put forward the argument of young industries, according to which the emerging and promising industries require support during the start-up phase.

Zagha & Nankani [33] concluded that for success of such policies, it is crucial to strike a balance between supporting producers and promoting competition.

At the same time, as a strategy, the import substitution does not correspond either to the current stage of development of global economy or to the status of development of Russian economy. This being said, it may be used as a tool in the arsenal of economic policy, in particular, in the struggle to concentrate on its territory the most profitable operations of the global technological cycle.

Zagashvili [34] stated that import-substitution diversification, which implies substitution of one well-known product with a similar one, loses to creative diversification aimed at creating innovation: new opportunities, products, technical solutions, materials and modes of production.

According to researchers, in the area of national security, the Russian Federation is currently exposed to serious risks due to cyber-threats focused on its financial institutions with a goal to weaken the economy and increase socio-economic unrest and tension.

Shkodinsky et al. [35] recommend the Russian authorities and the management centers for financial institutions continue developing their own software and digital products, banking infrastructure, as well as promoting the Runet segment among the people of Russia and CIS countries as a safe and politically neutral platform for creating and developing digital economy based on their own high-tech solutions and services.

Pishchik & Alekseev [36] concluded that in Russia and other countries of the Customs Union, growth of cybercrime is one of the major threats to the stable functioning of national payment infrastructures and credit-financial systems on the whole.

As shown in Table 1, the benefit in terms of reduced rates of the insurance contributions is the largest among other tax preferences granted to IT companies. Therefore, we focus on this benefit and intend to find out how its application contributes to growth of economic indicators of IT companies.

Thus, according to authors, benefits on insurance contributions effective from 2007 to 2020 (unified social tax) for IT companies were in compliance with modernizing of economy, as well as tasks of import substitution and national security.

Table 1

Estimates of tax expenditures on IT-benefits by Ministry of Finance of Russia, billions of rubles

Type of benefit	Actual						Estimates on 2020			
	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024
Reduced contribution rates for IT	18.6	26.1	28.1	49.5	60.2	72.1	92.1	118.5	126.8	135.5
VAT exemption for software and databases	22.0	24.9	27.8	34.7	50.4	65.9	14.4	16.2	18.7	20.4
Reduction of IT income tax rate	–	–	–	–	–	–	16.0	16.9	17.9	19.4
Accelerated depreciation for computer equipment	0.03	0.05	0.06	0.06	0.06	0.07	0.07	–	–	–

Source: own estimates based on data released by the Ministry of Finance of Russia (https://minfin.gov.ru/ru/document/?id_4=134382-informatsiya_o_normativnykh_tselevykh_i_fiskalnykh_kharakteristikakh_nalogovykh_raskhodov_rossiiskoi_federatsii)

3. Methodology

3.1. Selection of companies for analysis of the economic effect of the IT benefit

The IT industry includes companies with their main activity corresponding to industry codes (OKVED) 62 (Development of computer software, consulting services in this field and other related services) and 63 (Information Technology Activities). However, contribution exemption is granted only to organizations that comply with the requirement that 90% of their income comes from software and database development. However, the activity aimed at software development is marked by the industry code 62 and, more specifically, code 62.01 (Software development), while codes 62.02, 62.03 and 62.09 denote related but different activities. Moreover, the sample includes code 63.11 involving "Activities to create and use databases and information resources".

The possibility to receive contribution exemptions under codes 62.01, 62.03, 62.09 and 63.11 has been confirmed by explanations of the Ministry of Digital Development regarding conditions for obtaining accreditation as an IT company[4].

To analyze the economic effect of IT benefits, one can only use indicators of those companies for which the necessary data are available. The most complete data on Russian companies required for such an analysis can be found in the SPARK system[5]. Since data on insurance contributions by individual company are only available from 2017 onwards, we can examine the availability of the IT benefit and the evolution of economic performance over 2017–2020. For this purpose, a sample of companies with activity codes 62.01, 62.02, 62.03, 62.09 and 63.11 (a total of 161.137 companies in the SPARK system, including for code 62.01-67.709 companies) was drawn, for which there are data available from the report on financial results, in particular on revenue for at least one period of 2017–2020 (53.371 companies).

To apply the methodology used to determine the IT benefit based on the ratio of insurance contributions, only those were chosen from the mentioned variety of companies, for which data are available not only on revenue, but also on insurance contributions to the pension fund for at least one period out of 2017–2020 (46.655 enterprises). This leaves 42.776 legal entities for further study as a result of these intersections.

3.2. Division of companies by benefits

3.2.1. Differences in the amounts of contributions paid

The absence of a register of enterprises receiving this benefit makes it difficult to analyze the economic impact of IT benefits. Another challenge for the study is that in addition to the special contribution benefits for IT companies the latter could benefit from a number of other privileges provided for in chapter 34 of the Tax Code.

Having analyzed the provisions of fiscal law, it has been concluded that organizations active in the field of information technology in 2017–2020 could have applied one of the following insurance contribution rates:

1) standard rate;
2) IT benefit;
3) rate for organizations applying simplified tax system (STS) (repealed since 2019);
4) rate for small and medium businesses (SME) (in force since March 1, 2020);
5) rate for special economic zone (SEZ);
6) rate for free economic zone (FEZ);
7) rate for advanced development zone (ADZ);
8) rate for free port of Vladivostok (FPV);
9) rate for Skolkovo.

Main parameters of contribution rates for the above categories are shown in Tables 2, 3 and 5, and the thresholds for the application of limit rates are shown in Table 4.

Since it is our task to assess the effect of the special benefit for IT companies (rather than other preferential treatment

[4] https://digital.gov.ru/ru/activity/govservices/1/
[5] https://spark-interfax.ru/

available to a number of IT companies), we need to separate companies that apply IT benefit not only from companies applying standard rate, but from all other companies in the sample, applying some or other preferential rates of insurance contributions.

To begin with, we have excluded from the sample the residents of those territories enjoying special tax regime (Table 5). The exception implied the TIN of organizations in the initial sample in the registers of territories with a special tax regime. Thus, the initial sample included 819 members of special territories.

Next, we have considered a sample that contains four categories of organizations: 1) using standard contribution rate, 2) IT benefit, 3) rate for simplified system and 4) rate for SME. This sample contains 41,957 enterprises.

Note, however, that data are available for a smaller number of companies for each specific period (Table 6).

Table 2

Nominal and limit insurance contributions

Year	Standard rate			Rate for organizations on the simplified system			Special rate for IT companies		
	Pension fund	Social fund	Medical fund	Pension fund	Social fund	Medical fund	Pension fund	Social fund	Medical fund
2016	22% within limit value + 10% above limit value	2,9% within limit value; above – 0%	5,1%	20%	0%	0%	8% within limit value; above – 0%	2% within limit value; above – 0%	4%
2017									
2018									
2019				No benefit	No benefit	No benefit			
2020									

Note: * For certain types of activity, including IT, for enterprises with income not exceeding Rb79 million per year
Source: compiled by authors from the Tax Code

Table 3

Rate parameters for small and medium businesses

Year	Benefit for SME		
	Pension fund	Social fund	Medical fund
2020 (as from April 1, 2020)	Within minimum wage* – standard rates. Above minimum wage – 10%**	Within minimum wage* – standard rates. Above minimum wage – 0%**	Within minimum wage* – standard rates. Above minimum wage – 5%**

Note: * The value of minimum wage in 2020 was Rb12,130 per month
** Within limit value; over – 0%
Source: compiled by authors from the Tax Code

Table 4

Tax base limits for application of contribution rates

Year	Maximum base value	
	For contributions to pension fund, Rb	For contributions to social fund, Rb
2016	796 000	718 000
2017	876 000	755 000
2018	1 021 000	815 000
2019	1 150 000	865 000
2020	1 292 000	912 000

Source: compiled by authors from the Tax Code

Based on the insurance contribution rates provided for in Chapter 34 of the Tax Code[6] and indicated above in Tables 2 and 3, we shall calculate effective insurance contribution rates for the pension, medical and social funds depending on the salary of the employee for each of the four categories of organizations (Figure 1).

Taking into account different dynamics of changes in the effective rates of contributions to the funds, the following division method seems to be promising:

Step 1. Calculate for each organization in the sample the theoretical effective rates of insurance contributions based on the average wage of the organization and rates established by the Tax Code.

Step 2. Calculate for each organization in the sample the actual effective contribution rates as a quotient of actual contributions to the funds and labor costs.

Step 3. Determine for each organization the type of contribution rate it applies, based on the proximity of the actual effective contribution rate to the appropriate type of theoretical effective contribution rate.

However, we rejected this method of division because, firstly, only a small

[6] From January 1, 2017. insurance contributions are regulated by Chapter 34 of the Tax Code, while from January 1, 2010, to December 31, 2016. they were regulated by certain federal laws.

Table 5

Contribution rates for residents of special tax territories

Year	Skolkovo residents			SEZ residents			Residents of the territories of advanced development, free port of Vladivostok, special economic zone in the Kaliningrad region, free economic zone		
	Pension fund	Social fund	Medical fund	Pension fund	Social fund	Medical fund	Pension fund	Social fund	Medical fund
2017	14% within limit value, no tax above limit value	0%	0%	8% within limit value, no tax above limit value	2% within limit value	4%	6% within limit value, no tax above limit value	1.5% within limit value	0.1%
2018				13% within limit value	2.9% within limit value	5.1%			
2019				20% within limit value	2.9% within limit value	5.1%			
2020	No benefit								

Source: compiled by authors from the Tax Code

Table 6

Available data for each of the periods under consideration

Available data	Period			
	2017	2018	2019	2020
Insurance contributions	31765	33251	33310	32720
Revenues*	24619	25755	27061	28745
Profit*	25660	27198	28858	29587
Staff number*	–	30039	31223	29759
Labor remuneration*	2294	2618	3109	3851

Note: * For this and for the previous period (to calculate the change in the indicator for the period)
Source: own calculations

fraction of the IT companies in the SPARK sample has the payroll data necessary to calculate an effective contribution rate. Secondly, the effective contribution rate for the enterprise as a whole cannot be accurately determined based on the average wage in the enterprise, since the contribution for each individual employee depends on his/her personal salary. Therefore, such a straightforward approach related to calculating effective rates greatly limits the analysis ability and reduces the accuracy and statistical significance of results.

At the same time, it is possible to use a different approach to establish the fact of using the IT benefit. Depending on the type of benefit and the amount of the employee's salary, certain correlations are observed between the amounts of contributions to pension, medical and social funds, which Figure 2 shows.

This method has the advantage, as the contributions to the pension, medical and social funds are listed for massively larger number of companies (comparable to financial results), allowing a more complete statistical analysis.

Figure 2 shows that the ratio of contributions to pension and medical fund can be a factor for separating the standard mode of payment of insurance contributions (no benefits) and IT benefits, since using standard rates, the ratio of pension / medical fund changes in the range of 2.5–4.31, while having IT benefits it is in the range of 0.5–2.0.

The accuracy of separating companies using IT benefit from those using standard contribution rates is confirmed, as these ranges do not intersect. Moreover, this fact solves the problem that different employees of the same enterprise can have different salaries and, consequently, the ratio of contributions to pension / medical fund: however, within one enterprise their ratios will fall into one of two disjoint ranges. Thus, the average pension / medical fund ratio for this enterprise will be in the same range.

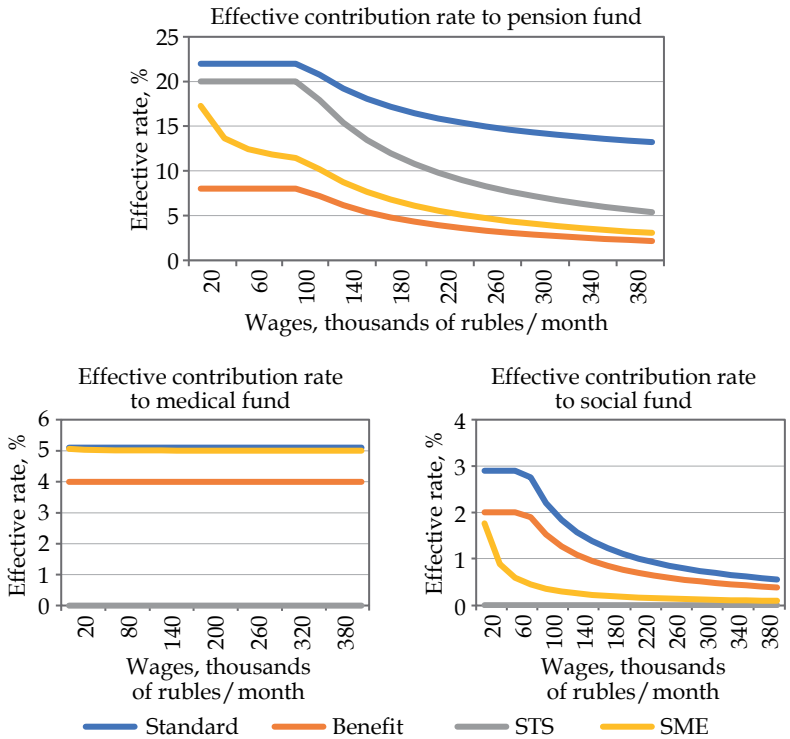

Figure 1. **Effective contribution rates depending on the employee's salary**

Source: own calculations

The benefit under the simplified system was determined in 2017 and 2018 according to non-zero contributions to the pension fund and zero contributions to the medical and social fund. In 2019, this benefit was abolished, which resulted in a change in the payment mode of insurance contributions for companies that applied it.

In the first month of 2019, they paid contributions for organizations on the simplified system, and for the remaining 11 months they paid new rates (standard or possible IT-benefit). For salaries not exceeding Rb108,000 per month a change of rates for the simplified system to standard rates provides ratio of pension fund / medical fund as 4.67.

Figure 3 shows ratios between pension fund / medical fund for other transition options and other salary levels.

3.2.2. Benefit identification

Having calculated the values of the pension fund / medical fund contributions ratios for the sample of IT companies, let us construct charts of distribution of the number of companies based on the value of this ratio (Figure 4).

A more detailed study of the presented distributions has revealed that in most cases the sample companies' actual pension fund / medical fund contributions ratios fall into one of the two ranges: (1) 0.25–2.13 with IT benefit; (2) 2.13–7.0 without benefits. It is evident that on the border of the specified ranges the chart height is minimal and the two peaks relate to the pension fund / medical fund contributions ratios of 2.0 and 4.31 (the values are relevant to a wide range of salaries from the minimum wage to Rb108,000).

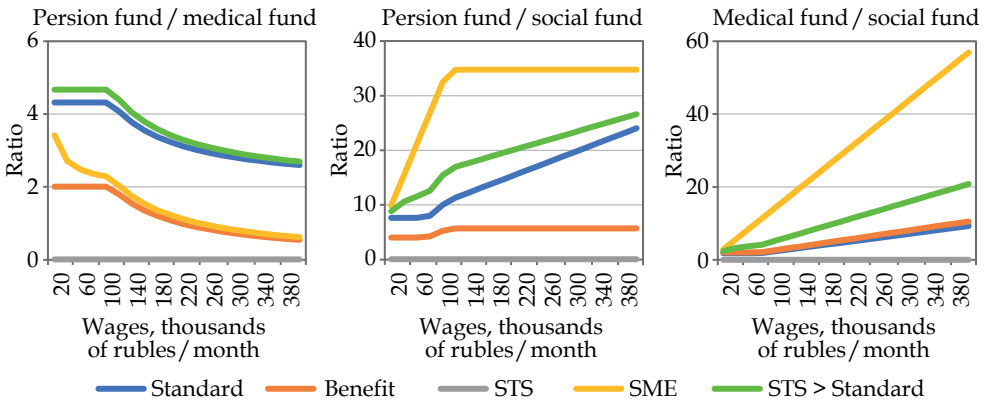

Figure 2. **Ratio of contributions to pension, medical and social funds according to the employee's salary**

Source: own calculations

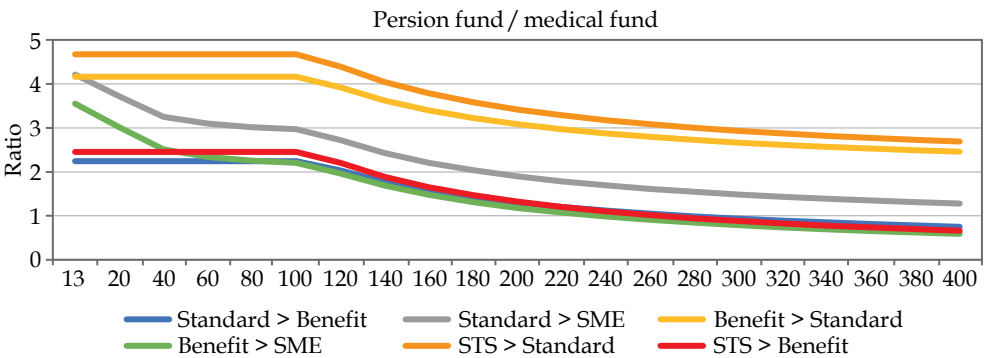

Figure 3. **Ratio between pension fund/medical fund in case of a change of contribution mode**

Source: own calculations

As regards the simplified system benefit which existed till 2019, the pension fund / medical fund contributions ratio was not determined (because contributions to the medical fund were equal to zero) and, consequently, the companies observing the simplified system were not to be included in this distribution. If a company switches over to the benefit under the simplified system after paying contributions at standard (or preferential) rates, its contributions to the medical fund are above zero (payment for the last month of the previous year), however, the pension fund / medical fund ratio for such a company will be equal to 14.2–45.5 (15.3-57.0 in case of a switchover from IT benefit).

In Figure 4, the third peak can be explicitly seen in the 2019 distribution: it is a portion of companies which had to shift from the simplified system benefit to the standard regime of insurance contributions payment (it corresponds to the pension fund / medical fund ratio of 4.67).

We created Table 7 to better demonstrate the number of companies, which shifted between the ranges.

The year 2020 saw a dramatic fall in the number of companies applying contribution rates, which were typical of low salaries under the standard rate with the pension fund/medical fund ratio of about 4.3 (a decrease of 10,000 companies) and the pension fund/medical fund ratio of 4.5–4.7 (a decrease of 1,000 companies). By contrast, the number of companies with the pension fund/medical fund ratio of 2.5–4.2, typical of a shift from standard rates to the benefit for SME, increased (growth by the same 11,000 companies).

Due to close proximity of effective rates of insurance contributions with benefit for SME for salaries of up to Rb280,000 per month and standard effective rates with salaries of Rb120,000–Rb400,000 per month (see Figure 2), we have no reliable statistical instrument to identify which companies applied the benefit for SME. However, we identify a number of companies

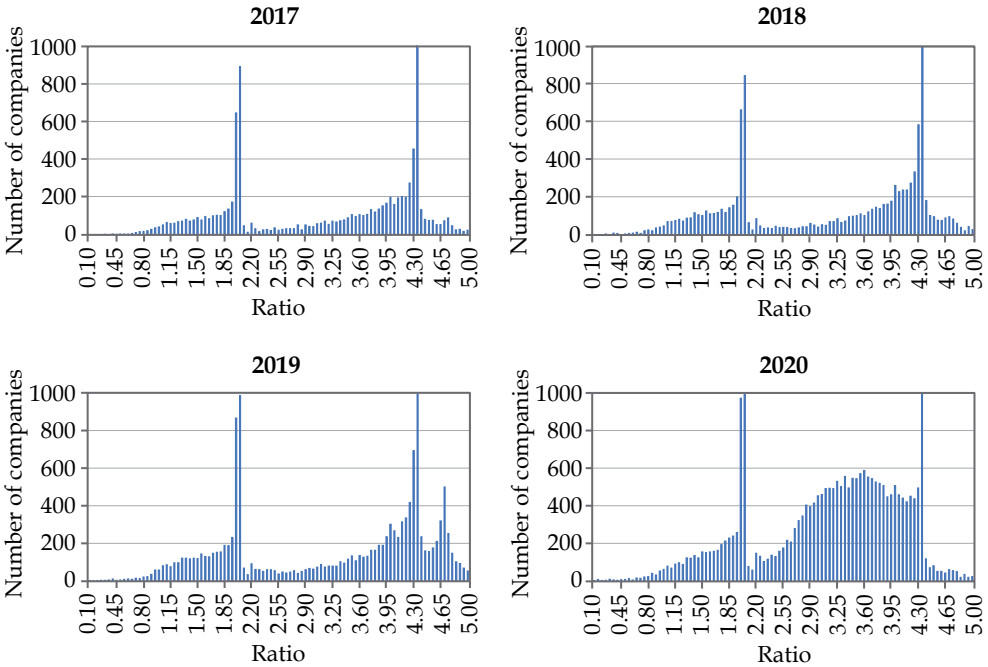

Figure 4. **Distribution of companies based on to the pension fund/medical fund contributions ratios**

Note: the number of companies in the column with the pension fund / medical fund ratio of 4.31 exceeds 15,000 companies and goes beyond the chart scale limit.

Source: own calculations

that shifted from the standard regime to the benefit for SME on the basis of reduction in their contributions to the pension fund as compared to the medical fund.

According to the data shown in Table 8, the share of companies in the IT industry, which took advantage of IT benefit was gradually growing from 11.2% in 2017 to 16.8% in 2020. If counting is based on the number of companies having the title to the benefit (with a staff of at least 7 employees), the number of companies applying the IT benefit is much higher: from 27.9% in 2017 to 41.7% in 2020.

Despite the reduced insurance contributions rates within the scope of the IT benefit, the share of contributions payable by companies with IT benefit is even more noticeable: from 32.0% in 2017 to 43.8% in 2020.

Overall, a regularity is observed that this benefit is more often used by small and large companies with a staff of over 50 employees (Figure 5).

At the same time 60–80% of IT companies with a staff of under 10 employees did not have benefits on insurance contributions, while only 30% of mid-sized and large companies did not receive them. This might mean that small IT companies either experience problems with an access to preferential taxation or have no need in receiving benefits on insurance contributions.

Table 7

A change in the number of companies in the ranges of the pension fund/medical fund ratio

Contributions ratio	Number of companies in range				Change in number of companies year on year		
	2017	2018	2019	2020	2018	2019	2020
from 0 to 0.25	6	6	17	16	0	11	–1
from 0.25 to 2.13	3544	4025	4765	5493	481	740	728
from 2.13 to 2.5	228	329	443	928	101	114	485
from 2.5 to 4.2	3220	3733	4342	15325	513	609	10983
from 4.2 to 4.5	18000	18014	20424	9869	14	2410	–10555
from 4.5 to 4.75	354	430	1463	262	76	1033	–1201
from 4.75 to 7.0	505	633	1218	459	128	585	–759
Over 7.0	344	598	401	269	254	–197	–132

Source: own calculations

Table 8

The results of classification on the basis of the regime of insurance contributions payment, number of companies

Insurance contributions payment regime	2017	2018	2019	2020
Simplified system (medical fund contributions = 0)	5 564	5 483	237	99
IT benefit (pension fund/medical fund from 0.25 to 2.13)	3544	4025	4765	5493
Standard rates (pension fund/medical fund from 2.13 to 7.0)	22307	23139	27890	21800
Benefit for SME (in 2020 pension fund/medical fund decreased by 1.0 or more)				5043
Other	350	604	418	285
Overall (data are available on insurance contributions)	31765	33251	33310	32720
Share of companies with IT benefit, %	*11.2*	*12.1*	*14.3*	*16.8*
Including those from number of companies having title to benefit based on size criteria, %	*27.9*	*30.6*	*35.8*	*41.7*
Share of insurance contributions attributable to companies with IT benefit, %	*32.0*	*35.9*	*39.1*	*43.8*

Source: own calculations

Benefit beneficiaries are mainly companies whose types of activities are identified by the following codes: 62, 62.01, 62.02, 62.09, 63.11, 62.11.1. The presence of other types of activities in this list can be justified both by inaccuracy in attributing companies to a certain type of activity and classification errors. In any case, the share of such companies among benefit recipients does not exceed a fraction of a percent.

The accuracy of determination of IT benefit existence on the basis of the applied method can be verified in respect of that sample portion on which the data on the number of employees and labor remuneration are available. Based on this data, we can calculate an average salary per employee, as well as an effective rate of contributions to the pension fund (Table 10). The received effective rate is compared

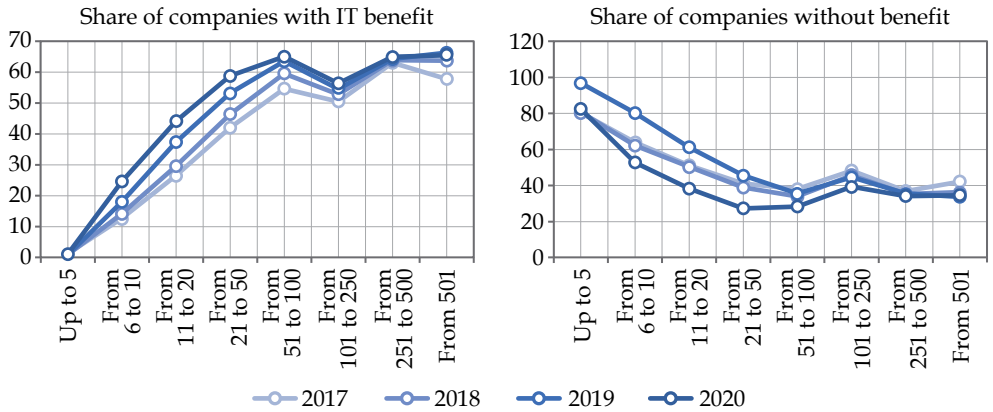

Figure 5. **The share of companies with IT benefit depending on the number of employees**

Source: own calculations

Table 9

IT benefit beneficiaries distribution based on industry codes

Industry code	Number of companies in sample	Number of benefit beneficiaries, year on year			
		2017	2018	2019	2020
62	2586	349	365	400	440
62.01	19243	2162	2520	3029	3503
62.02	5051	246	264	337	406
62.02.1	39	3	2	5	6
62.02.2	8	1	1	1	0
62.02.3	11	0	0	0	0
62.02.4	12	0	1	0	0
62.02.9	47	1	1	2	3
62.03	285	2	2	3	6
62.03.1	15	1	1	1	1
62.03.11	2	1	1	1	1
62.03.12	8	0	0	0	0
62.03.13	52	1	1	4	5
62.03.19	5	0	0	0	0
62.09	6609	250	286	342	392
63.11	2871	53	67	73	94
63.11.1	5080	474	513	567	635
63.11.9	33	0	0	0	1

Source: own calculations

with the theoretical rate of pension fund contributions corresponding to the calculated average salary (according to the rules from Table 2).

As seen from Table 10, the difference between the realized effective rate of pension fund contributions and its theoretical value does not surpass 5 percentage points (p.p.) for 97–98% of companies in respect of which we have determined the existence of the IT benefit.

Though the theoretical value is received with a considerable error due to inequality of labor remuneration of individual staff members (about 3 p.p.), the possible error remains much below the difference between the standard and preferential rates of pension fund contributions (from 10 p.p. to 14 p.p.), thus excluding incorrect classification because of this error.

3.3. Economic effect evaluation procedure

For evaluating the economic effect of IT benefit, let us compare growth rates of economic performance of companies which took advantage of IT benefit and the relevant control sample indicators, that is, those companies which did not have benefits on insurance contributions and paid them at standard rates. For each year of the 2017-2020 period, we compare the dynamics of four indicators:

– average staff number;
– revenues;
– profit before tax;
– labor remuneration.

A relative increase in one of the indicators is calculated for each group for the same year. For example, for companies with the benefit in 2018, percentage revenues gain in 2018 on 2017 were calculated and this increase is compared with relevant revenues gain of companies which did not have the benefit in 2018.

As each year of the specified period a different number of companies received the benefit, there may be cases where a company which did not have the benefit one year started to use it next year and vice versa. In some cases, the data are unavailable on a company in one of the periods under review. For these reasons, the compared samples composition changes from year to year, however, with this change taken into account, it is feasible to identify the impact of IT benefit on economic indicators' dynamics in the studied industry.

4. Results

Figure 6 presents the findings of comparison of economic indicators' dynamics of companies with and without IT benefit across the entire sample of companies (small, mid-sized and large companies with industry codes 62 and 63.11). The height of each column in the chart shows a percentage increase year on year in the relevant indicator; specified in the middle is the number of companies on which the indicator is aggregated.

It can be seen that the findings were received on the basis of aggregated data on several thousand companies. If we compare these values with the number of companies with IT benefit and the standard rates on contributions that were initially included in the sample (see Table 8), we can find out for which share of the sample companies the data on the relevant financial indicator correspond to. For example, the results of

Table 10

The share of companies with IT benefit where the difference between the actual and theoretical effective rates of pension fund contributions is within a margin of error

	2017	2018	2019	2020
Companies with determined existence of IT benefit	3544	4025	4765	5493
Including those with available data on salaries and headcount	680	833	1 160	1 195
Including difference between actual and theoretical effective rates of pension fund contributions from –5 p.p. to +5 p.p.	668	811	1 130	1 162
Share of companies within specified limits	98.2%	97.4%	97.4%	97.2%

Source: own calculations

calculation of an increase in the number of headcount in 2019 include 95% of companies with IT benefit (4,536 companies out of 4,765 companies), notably, these companies account for Rb31.0 bn out of Rb32.0 bn of insurance contributions paid by benefit beneficiaries, as well as 85% of companies with standard rates (23,715 companies out of 27,890 companies); they account for Rb47.1 bn worth of insurance contributions out of Rb49.5 bn paid by companies with standard rates. In other words, the obtained results are based on the data regarding the bulk of the IT industry.

Figure 7 shows how with several conditions regarding the availability of data applied only a portion of the sample is left.

To take into account the possible specifics of development of individual types of activities, let us calculate relevant indicators only for software companies, that is, those with industry code 62.01 (Figure 8).

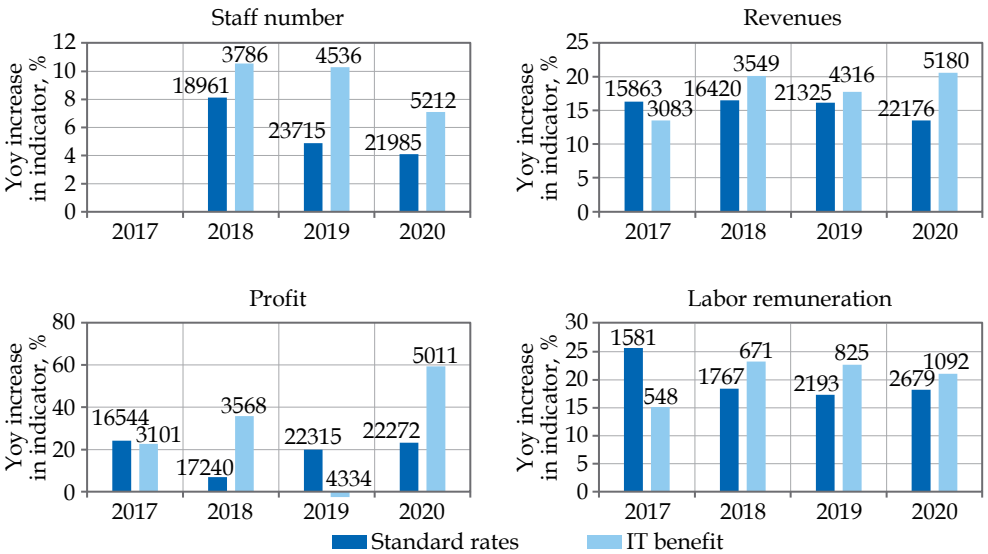

Figure 6. **Comparison of dynamics of economic indicators of companies with and without IT benefit across the entire sample of companies**

Source: own calculations

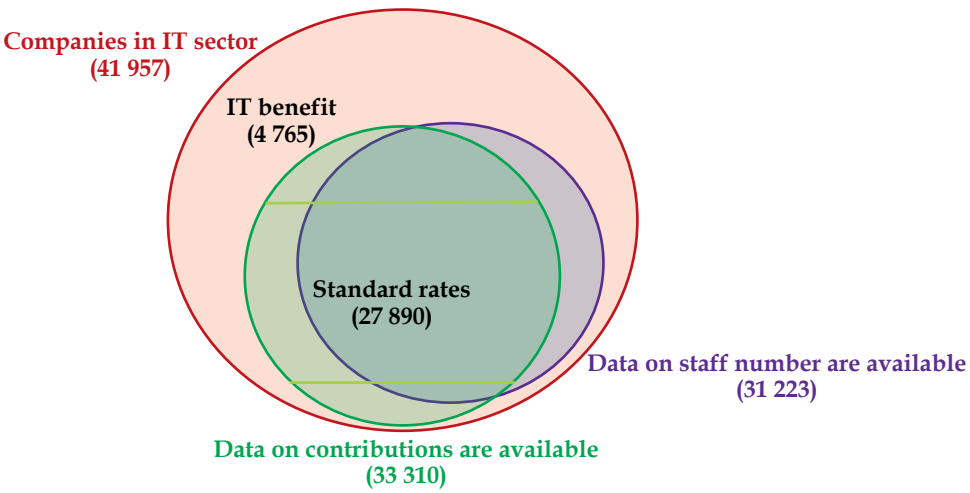

Figure 7. **The result of application of several conditions to the IT companies sample in 2019**

As we have found out above that the IT benefit is mainly used by mid-sized and large companies, let us consider in Figure 9 this category of software companies separately in order to take into account the possible effect of the size of a company on its rates of development. If this effect is strong enough, it may happen that all large and mid-sized companies grow faster as compared with companies with benefit.

5. Discussion

The results of the first calculation (see Figure 6) suggest that the IT industry in Russia is growing at higher rates relative to indicators of the Russian economy as a whole (for comparison, in 2017–2020 the average annual output growth in goods and services in the economy and average growth in gross profit were equal to 6.3% and 8.0%, respectively). All surveyed

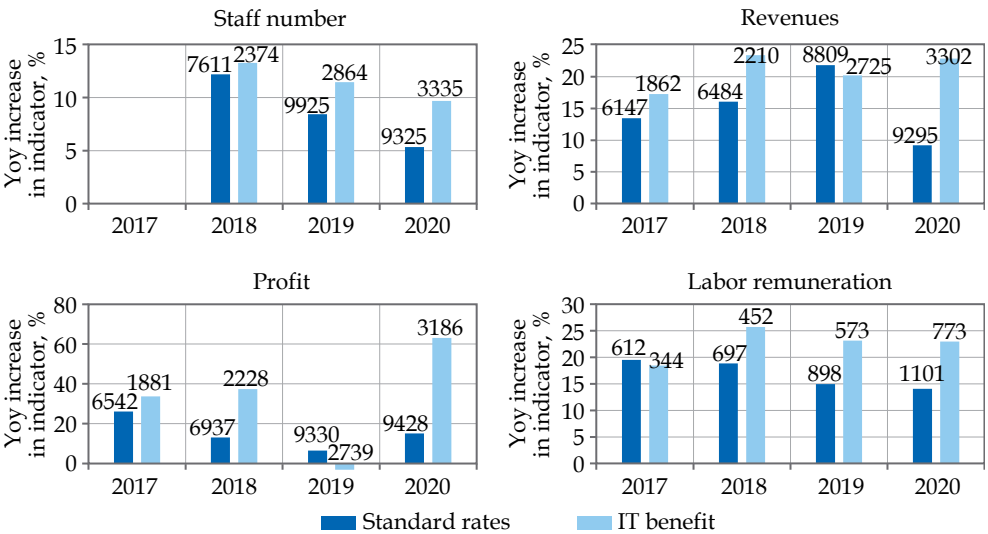

Figure 8. **Comparison of dynamics of economic indicators of software companies with and without IT benefit (industry code 62.01)**

Source: own calculations

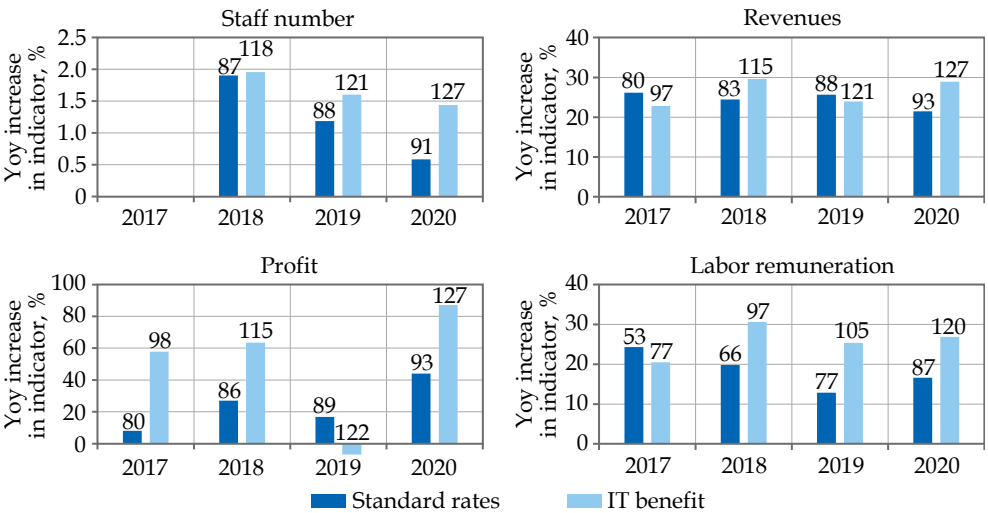

Figure 9. **Comparison of dynamics of economic indicators of mid-sized and large software companies (industry code 62.01) with and without IT benefit**

Source: own calculations

indicators saw growth: average staff number, revenues, labor remuneration (higher growth rates relative to those of staff number suggest an increase in salaries) and profit, though our method of calculation does not take into account new companies which emerged on the market.

In these conditions, companies with IT benefit see consistently higher growth rates of economic indicators by contrast with companies without benefits on insurance contributions.

As regards growth in staff number, "benefit holders" are ahead of "non-benefit holders" on average by 50% (9.3% of average annual growth against 5.7%).

Also, the advantage of having the benefit is evident both in average annual growth in revenues (18.0% against 15.6%) and growth in profit (28.8% against 18.6%).

Labor remuneration indicators are somewhat less reliable (owing to a lack of data, evaluation was made only in respect of 17% and 8% of companies with and without IT benefit, respectively), but higher with companies having the benefit (20.5% against 19.9%).

As seen from intra-sectoral specifics taken into account (see Figure 8), software companies are growing faster than the average across the IT industry as a whole; also, this sample confirms the hypothesis on advanced growth in all indicators of IT companies with the benefit on insurance contributions, that is, an increase in staff number (11.5% against 8.7%), revenues (20.9% against 15.1%), profit (32.8% against 15.2%) and labor remuneration (22.6% against 17.9%).

The results of the last calculation (see Figure 9) support the previous findings that the IT benefit is an important factor for considerable growth in economic indicators of companies, including large and mid-sized software ones. Further, the advantage of the IT benefit is even more explicit in this case in respect of all indicators: annual average staff number (16.7% against 12.3%), revenues (26.3% against 24.4%), labor remuneration (25.9% against 18.4%) and, particularly, profit (50.4% against 24.0%).

Let us consider on a separate basis the dynamics of indicators of small software companies in Figure 10.

Despite more volatile dynamics, Figure 10 shows the advantage of IT benefit beneficiaries if average values of growth indicators are compared: staff number (8.3% against 7.7%), revenues (15.6% against 8.8%), profit (14.3% against 9.7%) and labor remuneration (15.8% against 15.2%).

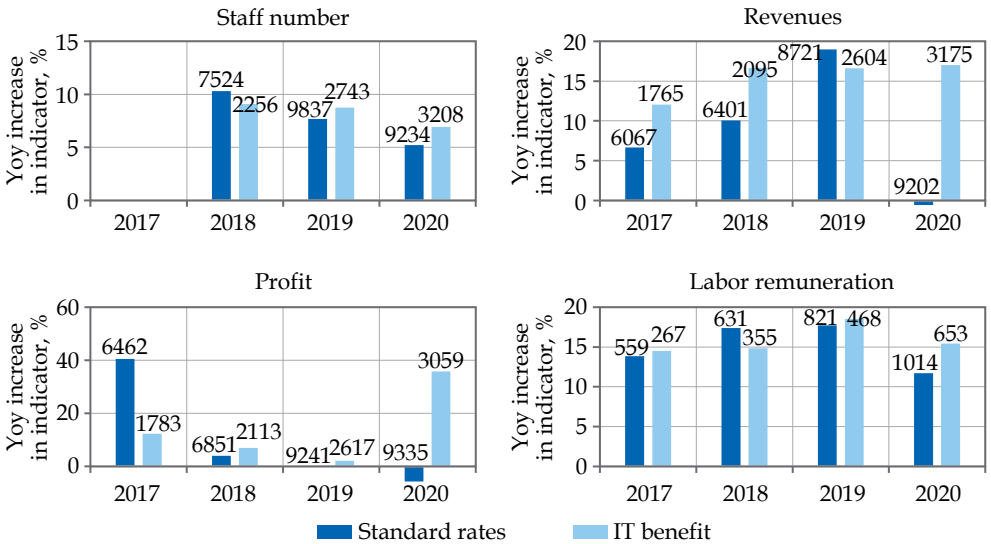

Figure 10. **Comparison of the dynamics of economic indicators (industry code 62.01) of small software companies with and without IT benefit**

Source: own calculations

So, our hypothesis on the IT benefit's positive effect on the IT industry's economic indicators is proved by a series of our calculations of the indicators' dynamics, that is, staff number, revenues, profit and labor remuneration.

From comparison of our findings with those of Kazarinov and Svechnikova [18], it turns out that companies' technical efficiency does not necessarily increase, but financial performance indicators grow. Our findings confirm those made by Yigitcanlar et al. [21] on a discernible impact of tax benefits on the IT industry's competitiveness.

6. Conclusion

Starting from 2010, the benefit in terms of reduced rates on insurance contributions (IT benefit) has been applied in respect of IT companies (with headcount of at least 7 employees) engaging in the development of software and databases. This paper looks into the IT benefit's effect on financial performance of companies with this benefit in 2017-2020.

We applied to a more complete sample of companies engaged in development of software and databases the method of identification of the payment regime of insurance contributions on the basis of ratios between contribution sums to different funds (the pension fund and the medical fund) depending on the relevant regime, that is, standard rates of contributions, IT benefit, simplified system benefit and benefit for SME.

The share of companies with the IT benefit among the sample of companies with headcount of over 7 employees increases from 27.9% in 2017 to 41.7% in 2020. Among large companies (with a staff of over 50 employees) the share of those using the IT benefit goes up to 65%.

For assessing the effect of IT benefit on the development of companies for each period from 2017 till 2020, we compare dynamics of the economic indicators (staff number, revenues, pre-tax profit and labor remuneration) of companies with IT benefit and those with standard rates of insurance contributions.

The findings allow us to conclude about a considerable positive effect of the IT benefit on insurance contributions on economic performance of software companies which took advantage of it. It is expressed in higher average annual growth in their economic indicators as compared with IT companies without the benefit: staff number 11.5% against 8.7%, revenues 20.9% against 15.1%, profit 32.8% against 15.2% and labor remuneration 22.6% against 17.9%. Considering the extent of application of this benefit, the benefit on insurance contributions for software developers is an essential factor of development of the IT industry as a whole.

The study's scientific result consists in the development and application of the method of reliable identification of the existence of the insurance contributions benefit of IT companies. The findings of application of this method have allowed to assess the effect of this benefit on IT companies' financial performance. It is shown that the benefit has a positive effect on growth in revenues, profit, average staff number and labor remuneration with benefit-recipient companies engaged in the development of software and databases.

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Analytical Review of Tax Compliance Studies in the SMEs Sector: A Bibliometric Approach

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ABSTRACT

Small and medium-sized enterprises (SMEs) play a crucial role in fostering economic growth; however, they often face challenges in meeting their tax obligations due to limited resources and understanding. This bibliometric study explores the relationship between taxes and SMEs, exploring aspects such as compliance, the impact of tax burdens, and the effectiveness of incentives. The analysis of 783 Scopus documents reveals a growing interest in research, with consistent annual publications and significant citation rates. Among the fields, Business, Management, and Accounting lead in publications, closely followed by Economics, Econometrics, and Finance, also Social Sciences. Geographically, the United States, United Kingdom, Australia, South Africa, and Malaysia stand out as major contributors, underscoring the global nature of this engagement. Thematic analysis uncovers emerging and declining themes, including the cost of tax compliance, supply chain management, and country-specific SME issues. Niche themes focus on Russia's business environment, tax avoidance, and access to finance in India. Basic themes cover SME growth, the impact of taxation, and responses to the challenges posed by the COVID-19 pandemic. Motor themes emphasize innovation in SMEs, Malaysia's capital structure, and challenges related to tax compliance, also tax evasion. The research underscores the intricate relationship between taxes and SMEs, underscoring their global significance and the necessity for targeted policies. Despite limitations such as database representation, temporal constraints, and language bias, this study advocates for ongoing research and policy strategies. These should aim to support fair and sustainable tax obligations for SMEs, ensuring their continued growth and valuable contribution to the economy.

KEYWORDS

bibliometric, publications, SME tax, tax compliance, public policy

JEL H20, M10, Z18

УДК 336.22

Аналитический обзор исследований соблюдения налогового законодательства малым и средним бизнесом: библиометрический подход

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АННОТАЦИЯ

Малые и средние предприятия (МСП) играют решающую роль в стимулировании экономического роста. Однако они часто сталкиваются с проблемами при выполнении своих налоговых обязательств из-за ограниченности ресурсов и понимания. Это библиометрическое исследование рассматривает взаимосвязь

между налогами и МСП, изучая такие аспекты, как соблюдение требований, влияние налогового бремени и эффективность налоговых стимулов. Анализ 783 документов Scopus показывает растущий интерес к исследованиям с постоянными ежегодными публикациями и значительным уровнем цитирования. Среди областей лидируют по количеству публикаций: Бизнес, Менеджмент и Бухгалтерский учет, Экономика, Эконометрика и Финансы, а также Социальные науки. США, Великобритания, Австралия, Южная Африка и Малайзия выделяются как основные поставщики публикаций, что подчеркивает глобальный характер этого взаимодействия. Тематический анализ выявляет возникающие и исчезающие темы, включая стоимость соблюдения налогового законодательства, управление цепочками поставок и проблемы МСП, специфичные для конкретной страны. Нишевые темы сосредоточены на деловой среде в России, уклонении от уплаты налогов и доступе к финансам в Индии. Основные темы охватывают рост малого и среднего бизнеса, влияние налогообложения и мер реагирования на проблемы, вызванные пандемией COVID-19. В Малайзии актуальны темы инноваций в МСП, структуры капитала и проблемы, связанные с соблюдением налогового законодательства, а также с уклонением от уплаты налогов. Исследование подчеркивает сложную взаимосвязь между налогами и МСП, подчеркивая их глобальное значение и необходимость целенаправленной налоговой политики. Несмотря на такие ограничения, как представление баз данных, временные ограничения и языковая предвзятость, данная работа актуализирует продолжение налоговых исследований. Они должны быть направлены на поддержку справедливых и устойчивых налоговых обязательств для МСП, обеспечивая постоянный рост данного сектора и повышение его вклада в экономику.

КЛЮЧЕВЫЕ СЛОВА
библиометрия, публикации, налоги для МСП, соблюдение налогового законодательства, налоговая политика

1. Introduction

Amidst global economic shocks and rapid tax policy changes, Small and Medium Enterprises (SMEs) are struggling to survive and thrive. Contributing up to 40% to GDP in some countries, including Indonesia, SMEs are not only the engine of the economy, but also the epitome of social resilience [1].

However, this force faces crucial challenges such as understanding and fulfilling tax obligations. Although SMEs open up great opportunities for poverty reduction and social equity [2], many of them are hampered by limited resources and heavy tax burdens [3].

Furthermore, in a dynamic environment with frequently changing tax policies, identifying SMEs' barriers in fulfilling their tax obligations is becoming increasingly important [4–6]. The absence of adequate knowledge about taxes and the payment process makes it difficult for SMEs to understand their tax responsibilities [7; 8].

To address this issue, our research utilizes a bibliometric approach. Bibliometric analysis allows us to systematically explore the existing literature, identify trends and patterns in previous research, and offer valuable insights and recommendations related to SME tax compliance. This method is not just about collecting data, but about understanding the evolving narrative in the academic literature. In the current unstable economic situation, filled with pandemic challenges and market fluctuations, this research becomes especially relevant.

We aim to explore the deeper relationship between taxes and SMEs, including SME tax compliance, the impact of tax burden on SMEs' survival, and the effectiveness of tax incentives provided to them [9].

The purpose of the study is to examine the relationship between taxes and SMEs by examining aspects such as compliance, the impact of tax burden and the effectiveness of tax incentives.

In addition, this research can help identify policies and actions that the government and relevant agencies can take to encourage better tax compliance among SMEs. By understanding this background, scrutinizing the literature on taxes and SMEs through bibliometric analysis can understand trends of new insights and valuable recommendations to support the growth and sustainability of SMEs, while being mindful of fair and sustainable tax obligations.

2. Method

This research conducted a bibliometric analysis with the procedure in Figure 1.

For data processing and analysis, we employed the spreadsheet application alongside Bibliometrix. Bibliometrix was instrumental in facilitating thematic mapping and trend analysis, allowing us to systematically categorize the data based on recurrent themes and track the research focus's evolution over time. This tool was pivotal in analyzing patterns and revealing the underlying narrative in academic literature regarding tax compliance in SMEs.

A search for research documents was conducted in the Scopus database for tax and SMEs with the string tax AND ("small business" OR "SMEs"), resulting in 1,254 documents. We filtered the search results by document type and English language to ensure a broad, international perspective, considering English's prevalence in academic research.

Additionally, we conducted a meticulous manual filtering process, focusing on titles, abstracts, and keywords, to exclude non-relevant papers and ensure a dataset of the highest relevance and quality for our bibliometric analysis. A total of 783 relevant documents were generated from 1940 to mid-2023. In the process of statistical and thematic analysis, we encountered challenges like incomplete datasets and the complexity of sifting through closely related yet distinct research topics.

To overcome these challenges, we employed cross-referencing techniques and consulted secondary sources to ensure a comprehensive and accurate understanding of each document's relevance to our study's focus.

Our analysis was strategically categorized into four distinct areas: Publication and citation analysis provided insights into the research's influence and reach. Subject Area analysis helped us understand the interdisciplinary nature of tax compliance in SMEs. Analysis of Countries highlighted geographical trends in research, reflecting different regulatory environments.

Finally, Keywords and Cluster Topics allowed us to identify central themes and emerging trends in this field, offering insight into the future trajectory of academic inquiry.

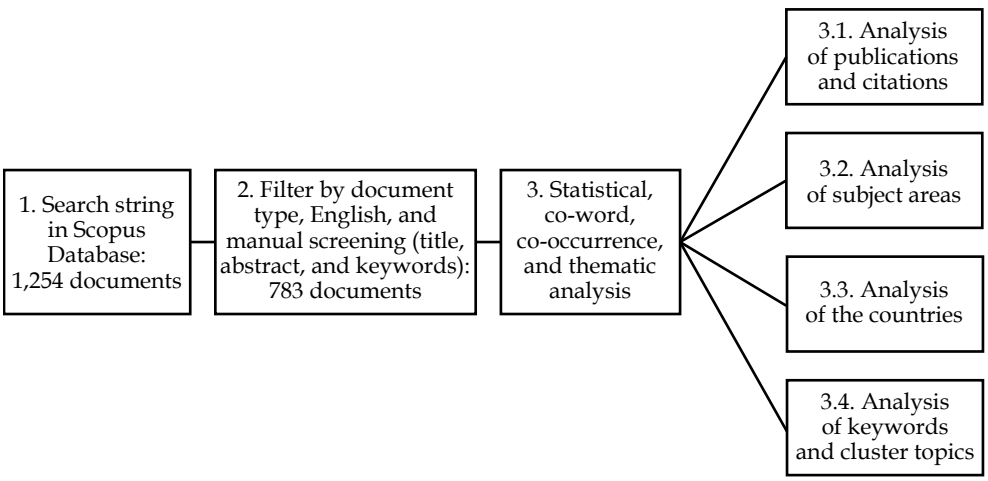

Figure 1. **The Procedure of Document Collection and Analysis**

The publications and citations analysis measures the number of publications and citations related to the tax and SME research field. This analysis provides an overview of how active research is conducted in the field and the extent to which these publications influence research and scientific development [10]. Subject area analysis identifies and analyses the most dominant subjects or research areas in a particular field [11].

This analysis helps map research topics, reveal research trends, and understand scientific developments in taxes and SMEs. Countries analysis identifies and analyses research contributions from different countries concerning taxes and SMEs. This analysis helps understand the geographical distribution of research, influence, and comparison of research contributions between different countries [1].

Subject area analysis involves the use of subject categories defined in this database. Each publication listed in the scientific database is labelled with a specific subject category, such as social sciences, life sciences, science, arts, humanities, and more. Thematic analysis is in the form of thematic map visualization generated by bibliometrix application with Latent Dirichlet Allocation (LDA) method. This method helps identify the main topics or themes in various documents, such as scientific articles or publications [12].

Thematic maps also organize documents based on topics and visualize them in graphical form, providing valuable insights in understanding the development of research topics and related topic categories in taxes and SMEs [10].

The thematic map provides a diagrammatic visualization consisting of two measures and four quadrants: development degree (density) and relevance degree (centrality) for measurements and basic themes, motor themes, niche themes, and emerging or declining themes for topic quadrants [13; 14].

Development degree measures how mature or developed a research topic is based on the number of related publications. The higher the development degree, the more publications related to the topic, signalling an established and significant research area. Relevance degree measures how relevant or central a research topic is to other topics in the literature corpus. Relevance degree can be measured using a distance or relationship metric between the topic and other topics. The higher the relevance degree, the more closely related the topic is to other topics, indicating its importance in the research network [15].

Basic themes reflect established and widely recognized research topics in a particular field. Basic themes include topics that have been researched for a long time, and many publications are related to them.

Motor themes are research topics that have a strong influence and are central to driving or initiating research developments in a field. Motor themes often influence or inspire other topics and have high centrality and density in the research network.

Niche themes reflect research topics focused on more specific or narrow research areas. However, niche themes have high density in the context of specific topics and can provide deep insights into specialized areas. Emerging themes are research topics that have recently emerged and gained increasing research interest over a period.

In contrast, declining themes are research topics that have lost research interest over time [16]. The categories and the four squares were then synthesized to gain knowledge, insights, trends and patterns from tax and SME research.

3. Results

3.1. Analysis of Publications and Citations

The number of publications and citations is an important indicator in seeing the impact and influence of research on taxes and SMEs [1]. The data collected comes from various years, starting from 1940 to mid-2023. Each year, the number of documents and research citations was analyzed to identify trends and patterns related to tax and SME research.

The trend in the number of publications in Figure 2 shows the tax and SME research pattern over the period studied.

In recent decades, this research has experienced a significant increase. The number of publications has stabilized in recent years, with relatively minor fluctuations. The number of publications peaked at 74 publications in 2021. After that, there was a slight decline in the following years, but the number of publications remained relatively high, averaging around 50 publications per year.

The citation trend of tax and SME research citations over the period saw significant fluctuations in the number of citations from year to year. In the early 2000s, citations increased dramatically, peaking in 2010 with 876 citations. After that, there was a sharp decline in the following years, but the number of citations remained relatively high, with an average of around 350 citations per year.

In 2020, there was a significant increase, with 488 citations. The articles with the most citations discuss technological approaches, SME barriers, and SME capital structure [17–19]. This data shows that tax and SME research remains relevant and receives attention from researchers and academics.

In an article [20] cited more than 153 times, explaining that small business activity and Schumpeterian entrepreneurship are distinct phenomena driven by different forces and associated with different outcomes. By knowing the differences, and understanding the character of the business in depth, the government will produce better policies. The are correlations between regulations and entrepreneurship is comparable to the impact of taxation. Individuals who are self-employed or run small businesses can evade tax more effortlessly than large businesses. Small businesses under a particular size are usually free from a lot of exhausting laws, which may discourage creative entrepreneurship.

The issue discussed in the most research on the second site [21] is the impact of tax payments on company profits. The tax payment process is preceded by the process of citizen registration with the tax office. Compliance with registering for taxpayer status is influenced by the distance between the business location and the tax office. Registration as a taxpayer is one of the three steps to formalize a company's business, the others being a permit to open a business and a government trade license. The impact of business formalization varies between companies. For large companies, it will increase the customer base and ultimately increase profits. For very small companies, it will decrease profits. The companies predict that their profits will also decrease due to formalizing their business, even though there are many benefits that will be obtained. The impact of this research is to advise the government to provide better information to encourage companies to formalize their businesses. Another suggestion is that policies need to be made that offer the benefits of formalization, especially for informal companies that have higher capabilities.

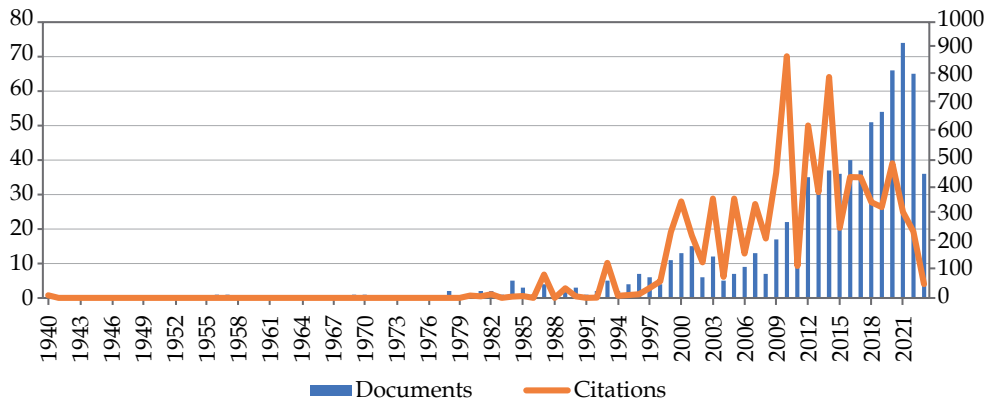

Figure 2. **Number of documents and citations per year of tax and SME research topics**

The third study [22] addresses the effectiveness of R&D instruments for small and medium-sized enterprises (SMEs), comparing the impact of direct subsidies and tax incentives. While the findings indicate that both instruments strengthen the R&D orientation of firms and innovation output, the addition of tax incentives to direct grants does not significantly enhance outcomes. The study suggests that limitations associated with tax incentives in SMEs, such as delayed benefits and vulnerability to competitive imitation, may diminish their effectiveness. The research recommends a nuanced approach, highlighting that direct subsidies are more suitable for addressing market failures in SMEs, while a combination of both instruments may be beneficial depending on the nature of the R&D projects undertaken. Despite providing valuable insights, the study acknowledges limitations, such as the lack of detailed information on funded projects and suggests future research with larger datasets to further validate and refine the results.

3.2. Analysis of Subject Area

Publications on the topic of taxation and SMEs come from various fields. Figure 3 shows that the field that contributes the most research related to taxes and SMEs is Business, Management, and Accounting, with a total of 391 publications. This area is followed by Economics, Econometrics, and Finance with 381 publications and Social Sciences with 268 publications. These results illustrate the high interest of researchers in studying the impact of taxes on SMEs.

In addition, the data also shows that disciplines directly related to SMEs, such as engineering, health, and humanities, also have significant contributions to this research. This data indicates an understanding of the importance of considering various aspects of SMEs in the tax context of researchers in studying the impact of taxes on SMEs.

3.3. Analysis of the Countries

Research on taxes and SMEs has been a focus in many countries around the world. The data in Table 1 show the top 20 countries with the most total research documents related to taxes and SMEs, namely the United States, United Kingdom, Australia, South Africa, Malaysia, Russia, China, Germany, Czech Republic, Canada, South Korea, Indonesia, Vietnam, Spain, Italy, New Zealand, Sweden, Nigeria, Ghana, and India.

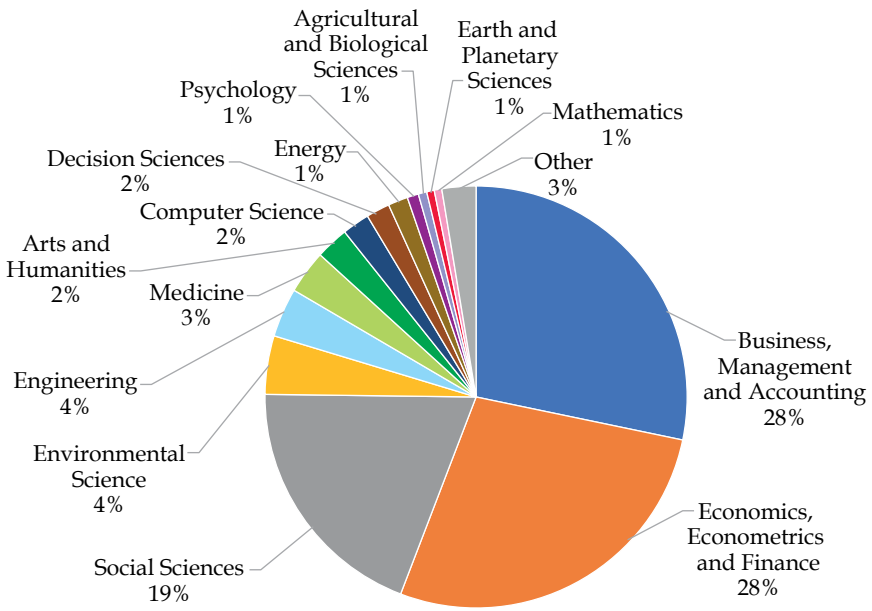

Figure 3. **Tax and SME research topic subject areas**

The United States is the most active country in research publications on taxes and SMEs, with a total of 179 publications. Other countries with significant contributions to this research are the United Kingdom with 64 publications, Australia with 49 publications, South Africa with 42 publications, and Malaysia with 38 publications. Many developing countries such as Indonesia and Vietnam also do research related to taxes and SMEs, although with fewer publications than developed countries.

The publication data shows that countries around the world have diverse interests and contributions in tax and SME research. The United States is the leader in terms of the number of publications, followed by countries such as the United Kingdom, Australia, South Africa, and Malaysia. These findings provide insight into the global distribution of research related to tax and SMEs and reinforce the importance of cooperation and knowledge exchange between these countries for advancing the tax and SME sectors globally.

3.4. Analysis of Keywords and Cluster Topics

From the results of thematic themes obtained from the bibliometrix application, four themes' categories appear in the bibliometric analysis: emerging or declining themes, niche themes, basic themes, and motor themes in Figure 4.

Table 1

Number of documents per country on tax and SME research topics

Num.	Country	Doc.	Num.	Country	Doc.
1	United States	179	11	South Korea	18
2	United Kingdom	64	12	Indonesia	17
3	Australia	49	13	Vietnam	17
4	South Africa	42	14	Spain	15
5	Malaysia	38	15	Italy	14
6	Russian Federation	35	16	New Zealand	14
7	China	32	17	Sweden	13
8	Germany	22	18	Nigeria	12
9	Czech Republic	20	19	Ghana	11
10	Canada	18	20	India	11

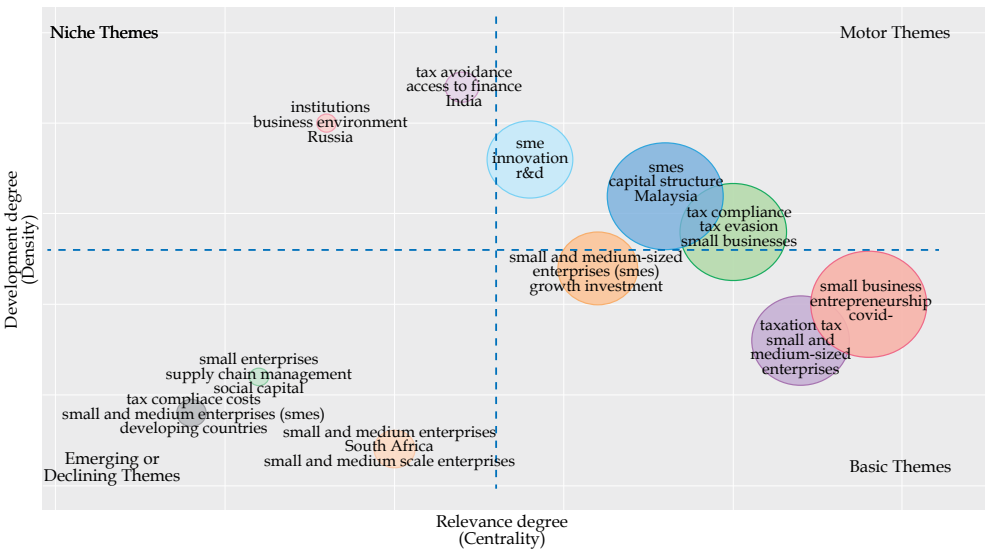

Figure 4. **Tax and SME thematic theme**

Emerging or declining themes show topics that are on the rise or decline in the field of tax and SMEs research. One of the topics in this category is tax compliance costs, small and medium enterprises, and developing countries [23].

This topic shows increased attention to the tax compliance costs incurred by SMEs in developing countries. Tax compliance costs include the time, money, and human resources required to comply with applicable tax regulations [24; 25].

This issue is important because SMEs often have limited resources, and the burden of tax costs can impact their financial performance and competitiveness [17; 26; 27]. Research on this theme might focus on analyzing the impact of tax compliance costs on SME growth, how governments can design more efficient policies to mitigate this burden, and efforts to increase SMEs' awareness and understanding of their tax obligations. Developing countries have challenges in dealing with this issue due to complex tax regulations, low levels of tax awareness, and a lack of resources to support better tax compliance [28].

The next topic was small enterprises, supply chain management, and social capital. This theme shows the increasing research interest in the role of small enterprises in supply chain management and social capital [29]. Supply chain management is important in optimizing supply chains to improve efficiency and competitiveness. In the context of SMEs, supply chain management often involves specific challenges such as scale constraints, limited access to resources, and lack of distribution networks [30].

In addition, this theme also highlights social capital as a key factor in SME success [31]. Social capital includes the relationships and networks held by SMEs that can assist them in obtaining information, resources, and support from business partners, the government, and the community.

Research on this theme may involve identifying best practices in supply chain management for SMEs, analyzing the role of social capital in enhancing SME competitiveness and growth, and strategies for developing stronger networks and collaboration between SMEs and other stakeholders in the supply chain.

The final topic in the emerging or declining themes category was small and medium enterprises, South Africa, and small and medium scale enterprises. This theme shows increasing attention to the role and issues of small and medium-sized enterprises in South Africa and countries of similar scale. SMEs play an important role in these countries' economic growth and job creation [32]. However, they also face unique challenges, such as limited access to capital, inadequate infrastructure, and a complex business environment [33; 34].

Research on this topic may focus on analyzing the business and regulatory climate in South Africa and similar countries, the role of SMEs in local and national economic development, and the efforts of governments and stakeholders to support the growth and sustainability of SMEs. This includes policy initiatives, financial support, and training programs that can help SMEs thrive and contribute more to the economies of these countries [35].

An in-depth analysis of these rising themes can provide valuable insights for policymakers, business practitioners, and researchers to understand the role and challenges of SMEs in global and local contexts. In addition, research on these themes can serve as a foundation for developing better solutions and initiatives to support the growth and sustainability of SMEs in the future.

Niche themes reflect specialized research topics with a more limited focus. The first topic in this category is institutions, business environment, and Russia. This theme indicates a specific research focus on the role of institutions and the business environment in Russia [36]. Institutions include regulations, policies and legal structures that influence how a country conducts business. In Russia, the business environment can be complex, with challenges such as cumbersome bureaucracy and varying political stability [37].

Research on this theme will likely analyze the role of institutions in hindering or encouraging investment and

business growth in Russia. This could include analyzing government policies, the role of the legal system, and the challenges companies face in operating in the country. In addition, research could also explore efforts and initiatives to improve the business environment in Russia to support the development of the business sector, including SMEs [38].

The next topic is tax avoidance, access to finance, and India. This theme highlights two important issues related to SMEs in India: tax avoidance and access to finance [39]. Tax avoidance refers to efforts to legally reduce tax liabilities, while access to finance covers the issue of SMEs' access to financial resources needed for investment and business expansion [40].

Research on this theme is likely to explore the tax avoidance strategies and practices commonly used by SMEs in India and their impact on the country's tax revenue. In addition, research could identify the barriers that SMEs face in gaining access to finance from formal financial institutions and analyze the efforts and initiatives that have been taken to improve access to finance for SMEs.

A deeper analysis of these niche themes can provide valuable insights for the Indian government and other stakeholders in addressing the issue of tax evasion and improving access to finance for SMEs. In addition, a better understanding of the role of institutions and the business environment in Russia can help formulate more effective policies to improve the business climate in the country. Thus, research on these niche themes has the potential to make a positive impact in supporting the growth and sustainability of SMEs in India and Russia or countries with similar characteristics [36; 41].

The basic themes category covers fundamental and common SME and tax research topics. The initial topic is small and medium enterprises, growth, and investment. This theme covers fundamental topics related to growth and investment in SMEs [42]. Growth is a key objective for many SMEs, and research on this theme will likely focus on the factors that influence their growth [43]. These factors can include internal aspects such as innovation, resource management, and marketing strategies, as well as external aspects such as economic conditions, market competition, and government regulations [44; 45]. Investment is also important in the development of SMEs [46]. Research on this theme could address the challenges and opportunities in obtaining capital for investment, such as access to finance, support from financial institutions, or using venture capital.

The next topic in this theme is taxation, tax, and small and medium enterprises. This theme focused on the role of taxation in SMEs. Tax regulations can affect the financial health and business performance of SMEs [21; 47–49]. Research on this theme might identify the impact of taxes on SMEs' profitability and efficiency and the strategies SMEs use to manage their tax burden. In addition, this theme may also explore the role of the tax system in promoting or hindering the growth of SMEs and how tax policy can be geared to support the sustainable development of the SME sector.

The last topic is small business, entrepreneurship, and COVID-19. This theme examines the role of entrepreneurship in meeting the challenges of COVID-19 on small businesses and how the pandemic has posed severe challenges to SMEs around the world. Research on this theme might examine the adaptation of SMEs to the changing business environment brought about by the pandemic, such as business model adjustments, the use of digital technology, or the utilization of online marketplaces [50–52]. In addition, this theme also covers the role of entrepreneurship in dealing with the economic and social crisis caused by the pandemic [53]. Research on this theme can explore how entrepreneurship and innovation can solve the challenges SMEs face during crises.

A deeper analysis of these underlying themes will provide a better understanding of the challenges and opportunities faced by SMEs and help formulate more appropriate policies and strategies to support the growth and sustainability of the SME sector. In addition, research on these themes can also provide a broader view of

the role and contribution of SMEs in the overall economy [36].

Motor themes are the main topics that drive research attention in the field of small and medium enterprises. The first topic in this category is small and medium enterprises, innovation, research, and development (R&D). This theme highlights the role of R&D in the context of SMEs. Innovation is key to improving the competitiveness and growth of SMEs [45].

Research on this theme is likely to explore the types of innovation undertaken by SMEs, such as product, process, or marketing [54; 55]. In addition, this theme also addresses the challenges and barriers SMEs face in conducting research and development activities, such as limited access to resources and lack of ability to adopt new technologies [56]. This research can provide insights into efforts and initiatives taken to improve SMEs' innovation capacity, such as partnerships with research institutions or innovation support programs from the government.

The next topic is small and medium enterprises, capital structure, Malaysia. This theme focuses on the capital structure of SMEs in Malaysia. Capital structure includes the composition of funding from various sources, including loans, equity, and internal sources of funds [57]. Research on this theme may analyze SMEs' preferences and decisions in choosing sources of funds and the factors that influence their capital structure [58]. In addition, this theme will also address the impact of capital structure on SME performance and growth. For example, whether there is a link between different capital structures and SMEs' profitability or financial risk [59]. This research can provide insights for SME owners and financial institutions in managing capital structure more efficiently and sustainably.

The third topic in this category is tax compliance, tax evasion, and small business. This theme covers tax compliance and tax evasion issues in small businesses. Tax compliance is mandatory for SMEs, but challenges such as the complexity of tax regulations and limited resources are often barriers to good compliance [24; 60]. On the other hand, some SMEs may also engage in unauthorized tax avoidance. Research on this theme might analyze the factors that influence SMEs' tax compliance, the government's efforts to improve their tax compliance, and the consequences of tax evasion on the country's tax revenue [61]. This research can help formulate more effective strategies and policies to improve SMEs' tax compliance and reduce tax evasion practices that cost the country.

An in-depth analysis of these motor themes can provide valuable insights for SME owners, governments, and other stakeholders in addressing the challenges and opportunities in supporting the growth and sustainability of the SME sector. In addition, research on these themes can contribute to developing better policies and initiatives to support a more vibrant and competitive SME ecosystem [62].

From the analysis, it can be concluded that some themes are rising in research attention related to small and medium enterprises, such as tax compliance costs, supply chain management, and business growth. On the other hand, some themes are a specific research focus, such as tax avoidance and access to finance issues in certain countries. All these themes reflect the importance of research in understanding the role and challenges of small and medium-sized enterprises in various contexts, including the business environment, taxation, and entrepreneurship.

4. Conclusion

This study shows that research on taxes and Small and Medium-Sized Enterprises has become a significant topic in various disciplines. There is an increasing research interest, especially related to the cost of tax compliance, the impact of taxes on Small and Medium-Sized Enterprises growth, and the role of tax incentives in the Small and Medium-Sized Enterprises environment.

The bibliometric analysis shows that business, management, and accounting are the most active in related publications, followed by economics, econometrics, and finance. The citation rate of research on

taxes and Small and Medium-Sized Enterprises demonstrates this topic's continued attention and relevance in the academic and practical spheres. In addition, this research has highlighted the contribution of different countries to the understanding of taxes and Small and Medium-Sized Enterprises, with the United States, United Kingdom, and Australia being the countries with the highest contribution of publications on this topic.

From the thematic theme results obtained, there are rising trends in research, such as the cost of tax compliance, the role of Small and Medium-Sized Enterprises in supply chain management and social capital, and a focus on the role and challenges of Small and Medium-Sized Enterprises in countries such as South Africa.

In addition, niche themes highlighted a particular focus on institutions and business environment in Russia, tax avoidance and access to finance issues in India, and motor themes such as innovation and research and development in Small and Medium-Sized Enterprises in Malaysia.

As such, the bibliometric analysis of research on taxes and Small and Medium-Sized Enterprises provides important insights for policy, business practitioners, and researchers to understand better tax policy's challenges, opportunities, and impact on Small and Medium-Sized Enterprises sustainability and growth. The research also highlights the importance of global cooperation and supportive policy frameworks for Small and Medium-Sized Enterprises to grow sustainably in a fair and sustainable tax environment.

While providing important insights on taxes and Small and Medium-Sized Enterprises with a bibliometric approach, this study has some limitations. These limitations include data limitations of the databases used, limitation of the time span of the study, which may omit recent dynamics, focus on English-language publications, which limits global representation, limitations of the bibliometric analysis methodology, and lack of ability to provide an in-depth understanding of the practical implications or tangible impact of tax-related policies on Small and Medium-Sized Enterprises. There are also limitations in providing specific policy recommendations and limitations in capturing recent changes in taxation and Small and Medium-Sized Enterprises dynamics, limiting data interpretation and the overall quality of the study.

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How Does the Public React to the Electric Vehicle Tax Incentive Policy? A Sentiment Analysis

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ABSTRACT
While there are arguments suggesting that tax incentives can expedite the adoption of electric vehicles (EVs), there are also counterarguments proposing that these incentives may exacerbate external costs. As a result, the government may need to incorporate public opinion as an input in formulating the most suitable approach to promote the adoption of electric vehicles within society. The purpose of this study is to investigate public sentiment on EV tax incentives in Indonesia through Twitter. This study utilizes text mining to examine public attitudes and sentiments toward EV using Twitter data. The sentiment analysis model employed is the Indonesian RoBERTa Base Sentiment Classifier. The data utilized in this study consists of Twitter posts spanning from May 2022 to May 2023. The final dataset for analysis comprises 99,856 tweets, each identified by a unique tweet ID. The results show that neutral sentiment dominating the tweet post from negative and positive sentiment. We also found that 56% are supporters and 44% are opposing groups. Tax incentive policies may not always be supported in terms of being considered unfair or inappropriate. Our finding shows three topics that are important for the public about EV: the price of electric vehicles, environmental issues, and EV infrastructure. This study demonstrates that tax incentives or price subsidies may not consistently receive positive perceptions or full support from society. Certain policies considered by specific stakeholders may diminish the effectiveness and expected outcomes of these measures. Our findings have several contributions for knowledge development and tax policy makers.

KEYWORDS
public react, electric vehicle, tax incentive, sentiment analysis, tax policy

JEL H23, M48

УДК 336.228

Как общественность реагирует на политику налоговых льгот для электромобилей: анализ настроений

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АННОТАЦИЯ
Хотя существуют аргументы, предполагающие, что налоговые льготы могут ускорить внедрение электромобилей, есть также контраргументы, предполагающие, что эти стимулы могут увеличить внешние издержки. В результате правительству, возможно, придется учитывать общественное мнение в качестве вклада в формулирование наиболее подходящего подхода для содействия внедрению электромобилей в обществе. Целью данного исследования является изучение общественных настроений в отношении налоговых льгот

на электромобили в Индонезии через Twitter. В этом исследовании используется интеллектуальный анализ текста для изучения общественного отношения и настроений к электромобилям с использованием данных Twitter. В качестве модели анализа тональности используется индонезийский базовый классификатор тональности RoBERTa. Данные, использованные в этом исследовании, состоят из сообщений в Twitter, охватывающих период с мая 2022 г. по май 2023 г. Окончательный набор данных для анализа состоит из 99 856 твитов, каждый из которых идентифицируется уникальным идентификатором твита. Результаты показывают, что нейтральные настроения доминируют в твит-посте в диапазоне от негативных и до позитивных тональностей. Мы обнаружили, что 56% являются сторонниками, а 44% – оппозиционными группами. Политика налоговых льгот не всегда может быть поддержана с точки зрения того, что она считается несправедливой или неуместной. Наш вывод показывает три темы, которые важны для общественности в отношении электромобилей: цена электромобилей, экологические проблемы и инфраструктура для электромобилей. Это исследование демонстрирует, что налоговые льготы или ценовые субсидии могут не всегда получать позитивное восприятие или полную поддержку со стороны общества. Определенные меры политики, рассматриваемые конкретными заинтересованными сторонами, могут снизить эффективность и ожидаемые результаты этих мер. Наши выводы могут быть полезны для развития знаний и разработки налоговой политики.

КЛЮЧЕВЫЕ СЛОВА
общественная реакция, электромобиль, налоговое стимулирование, анализ настроений, налоговая политика

1. Introduction

The transportation sector is responsible for 24% of direct carbon dioxide (CO2) emissions from burning fuels worldwide [1]. These emissions cause various crises such as environmental pollution and greenhouse effects. This crisis has triggered a massive global movement in world countries to switch from fossil energy vehicles to electric energy.

Littlejohn & Proost [2] asserted that carbon emission standards achieve much lower emission reductions in EV. Therefore, governments in several countries have issued many policies, such as conducting research and development, improving infrastructure, and providing subsidies and tax incentives [3; 4]. Government policies play an important role in the adaptation of EV [5].

Wangsa et al. [6] stated that tax incentives and subsidies will increase the use of EV. However, the evaluation of this policy is still a limited topic discussed in the academic environment [7].

Indonesia has set up regulations with the issue of "Presidential Decree No. 55 of 2019" to encourage the switch to EV to promote the reduction of carbon dioxide emissions [6]. Among the programs within the regulation, the Indonesian government formulated tax incentives to stimulate people towards EV, such as 0% VAT and income tax, as well as 0% import duties on fully built EV imports.

Moreover, "battery electric vehicles" (BEVs) and "plug-in hybrid electric vehicles" (PHEVs) sales taxes are now fully excluded from the obligation of luxury tax (*Pajak Penjualan Barang Mewah – PPnBM*). Those tax incentives have just effectively applied for the April 2023 tax period until December 2023.

Although there is argument that the tax incentives might truly accelerate the rise of EV adoption [8], others may see that incentives for EV might raise the cost of other externalities like accidents, traffic, and increased government spending on infrastructure as well as the budget deficit will increase due to the subsidies and the decrease in tax collection [9].

But, Yuniza et al. [10] suggest that this policy has not yet become a trigger mechanism for the public to switch to electric vehicles because the incentive policy provided through Government

Regulation is still questionable. Therefore, the government may need to consider public opinion as input in formulating the most appropriate approach to push society towards the adoption of EV. Based on the provided background, the research question guiding this study is: What is the public sentiment on EV in Indonesia as expressed on Twitter.

Our study is important for several reasons.

First, Christidis & Focas [11] suggested the role of public sentiment and feelings in the adoption of EV. However, further research on these findings is still very limited, especially for the sentiment regarding EV tax incentive policy. Previous research has only investigated sentiments and emotions related to purchasing electric cars [12], pro-environmental behavior [13], consumer behavior towards innovation adoption [14], and consumer adoption of EV [15]. Jena [16] stated that the antecedents and critical factors of sentiment have not been thoroughly investigated, therefore, more studies are needed in the future. Our study extends this call for research by investigating public sentiments and emotions regarding EV tax incentive policies.

Second, previous studies related to public attitudes towards tax incentive policies and EV adoption only focused on one or a few cities [17; 18] and only a few articulated public attitudes and sentiments on a national scale [19]. Our study overcomes the limitations of previous research by investigating sentiments regarding EV tax incentives on a national scale. In contrast to previous research, we conducted an analysis in a developing country, namely Indonesia. We argue that the policy of EV tax incentives differs between developing and developed countries. Developing countries have many differences from developed countries, such as their limited infrastructure and low public trust. Therefore, this study comprehensively captures public sentiment on the electric vehicle tax incentive policy.

Third, most studies on attitudes towards public policies, such as tax incentives, collect data through questionnaire surveys or interviews [20]. These studies tend to be subjective and have certain drawbacks [21].

Our study is more objective and large-scale, extending previous research to investigate public attitudes and sentiments through social media. Social media data can cover the entire country and provide effective and real-time content analysis [22]. Analysis technologies such as semantic text mining can extract insights from large amounts of data on social media and overcome some of the limitations of traditional methods such as time, space, and sample size [23].

We use text mining approaches to identify public perceptions and opinions about electric vehicle tax incentives on social media. We found that neutral sentiment dominating the tweet post (59.1%), followed by negative tweets account for 22.9% and finally the positive sentiment with 18%. We also found that 56% of group emotions is supporters (‘happy’, ‘love’) and 46% is opponents (‘anger’, ’fear’, ’sadness’). Further, we determined the top three popular topic about tax incentive for EV by modeling LDA themes on Twitter posts, they are the price of electric vehicle, environmental issue and EV infrastructure.

The purpose of this study is to investigate public sentiment through Twitter regarding electric vehicle (EV) tax incentives in Indonesia.

The research hypothesis is the assumption that the tax incentives or price subsidies may not consistently receive positive perceptions or full support from society.

This study makes several contributions to the academic literature and the practical environment. First, we provide a comprehensive understanding of public sentiment regarding EV tax incentive policies. Knowledge of public attitude is very important for policymakers. Second, this study provides practical implications for policymakers regarding how public perceptions and attitudes respond to EV tax incentive policies.

2. Literature Review

2.1. Electric Vehicle Tax Incentive in Indonesia

Policy incentives have a favorable impact on electric car adoption [24]. Several countries such as Germany, Spain, Japan, Taiwan, Austria, Norway, France, United Kingdom, Italy, Hungary, Portugal, the Philippines suggest a tax incentive model to increase the acceleration of EV adoption [6].

Financial incentives will affect EV purchase and payment intentions [1; 6]. Futher, EV consumers derive the most benefits from tax subsidies compared to producers or dealers [25]. This incentive model also adopted by Indonesia Goverment.

Indonesia issued Presidential Decree No. 55 of 2019 to encourage and speed the implementation of various EV programs. This regulation has five main guidelines for accelerating EV, one of them is incentive provision [6; 10]. The electric vehicle tax incentive in Indonesia is a policy aimed at fostering the development and widespread adoption of electric vehicles (EVs), specifically electric cars and buses [10].

This policy operates by reducing the value-added tax (VAT) applied to purchasing EVs [6]. The extent of VAT incentives is contingent on the domestic component level (TKDN) of the EVs. EVs featuring a TKDN exceeding 40 percent are eligible for a 10 percent VAT incentive, resulting in a mere one percent VAT payment. In contrast, EVs with a TKDN ranging from 20 to 40 percent qualified for a 5 percent VAT incentive. The determination of eligible EV models and types of incentives will be overseen by the Industry Ministry.

These incentives will remain in effect until the EV sector secures investments amounting to five trillion rupiah ($347 million) or commences commercial production with a similar investment sum. The core objectives driving the implementation of VAT incentives include hastening national economic transformation, augmenting the appeal of investments in the domestic battery-based EV industry, facilitating the transition from fossil fuels to electric energy, and cultivating public interest in the utilization of EVs.

Tax breaks and subsidies for the development of EV and charging stations are among the measures that the government of the Republic of Indonesia might provide the industry. This approach necessitates the government allocating additional funds in order to make pricing more reasonable. Other incentives include a 0% import duty on fully completed EV [6].

2.2. Attitudes and Sentiment towards tax incentive policies

Public attitudes and sentiments are important factors that drive EV development [11; 19].

Bai et al. [26] suggest that understanding cross-society experiences of tax policy can be investigated through sentiment analysis because the reasons behind different demands and requests for a tax policy can be described through sentiment.

Graham-Rowe et al. [27] states that positive feelings toward EVs have a positive correlation with public attitudes and intentions to switch to EVs. The various emotions expressed by the public are related to attitudes [15].

Higueras-Castillo et al. [12] also confirmed this, that positive public sentiment will lead to positive attitudes and vice versa, negative sentiment can trigger resistance. EV tax incentive policies can generate positive or negative public sentiment depending on the conditions under which the policy was issued. Thus, the public can react differently to the positive intention of the government or policymakers by providing tax incentives.

Several previous studies have improved public sentiment regarding EV policy.

Jena [16] finds that in the case of EV adoption policies in India, price and maintenance have a negative sentiment in the majority. Although the government has provided incentives for this type of EV, public interest in these vehicles remains low.

This is in contrast to the results of a study by Mpoi et al. [1] in Greece, which

found that incentives have positive sentiments. Mpoi et al. [1] finds that financial incentives help boost the EV market in Greece.

Another study by Wu et al. [19] found the interesting results that incentives do not matter to the Chinese public. Although the public has positive sentiments regarding EVs because of their impact on reducing carbon emissions, EV tax incentive policies are not very popular. In fact, the Chinese public is more interested in preferential policies, namely, driving without limits and brands in EV attributes. The inconsistency in some of these previous studies has triggered further investigation.

To that end, we argue that the country's environment plays a role in shaping public sentiment toward EV tax incentive policies, and we investigate this by comparing two economically and politically disparate countries.

2.3. Twitter as a data source of public opinion research

Public sentiment can be observed through social media, such as Twitter.

Krishna [28] suggests that in the era of the rise of the Internet, public evaluation of a product or policy is highly dependent on social media platforms, and public opinion greatly influences decision-making behavior. Every individual can easily obtain information and public responses to certain issues through this platform in real-time. Moreover, social media can easily be used to guide public opinion in certain directions.

Wojtowicz & Wallace [29] suggested that social media can be a promising data source for researching public opinion. Especially Twitter, which is a social media platform that presents billions of public opinions or sentiments every day. The broad spatial, temporal, and social characteristics of the information on the Twitter platform allow for diverse environmental research [30]. In recent years, there has been a significant increase in the use of Twitter social media big data as a data source in public opinion literature studies [31].

Previous studies of the impact of tax incentive policies have generally used surveys or experimental methods. This method is good at detecting causality but still has some drawbacks. Therefore, our study attempts to compensate for this deficiency by analyzing public sentiment on social media. Social media offers an effective and real-time analysis of issues related to public sentiment [22].

This study complements the objectivity of the results of previous studies that began exploring sentiment on tax policy through surveys and experiments.

3. Methods

3.1. Sentiment Analysis Approaches

This study uses text mining approaches to identify public perceptions and opinions about electric vehicle tax incentives on social media. Public's social media data that will be analyzed in this study is obtained from Twitter within Australian and Indonesian twitter users. Text mining can be used to extract meaningful information from unstructured textual data by identifying, extracting, managing, integrating, and exploiting knowledge from texts efficiently and systematically [32].

Furthermore, text mining can maintain a high degree of consistency, therefore, this technique provides support for reliable qualitative research [33].

Text mining techniques can be used to conduct sentiment analysis in identifying public perceptions and opinions about electric vehicle tax incentives on Twitter within Australian and Indonesian twitter users. Sentiment analysis can provide insight about opinions, attitudes, and emotions of people about individuals, phenomenon, or topics [34].

As a classification technique, sentiment analysis can be conducted via machine learning approach and lexicon-based approach as Illustrated on the following Figure 1.

The use of multiple-layer networks with neural networks or deep learning in the sentiment analysis process has emerged in recent years as it provides advantage of far more of neural networks'

learning (representation) power than was previously possible with only a small amount of input [35].

Deep learning approach, therefore, facilitates broader aspects of textual analysis other than positive or negative sentiment polarity. One of the important features is that it can detect humans' subjective thoughts and sensations or emotions, such as "love", "joy", "surprise", "anger", "sadness", and "fear".

3.2. Data Collection and Pre-processing

Python programming language is used for scraping Twitter data as well as data cleansing, pre-processing and further analyses. The data retrieved include details of each tweet post such as: tweet details ('id', 'date', 'rawContent', 'lang', 'hashtags', 'url'), user details ('user', 'mentionedUsers'), and engagement: ('replyCount', 'retweetCount', 'likeCount', 'quoteCount', 'viewCount'). The keywords for the search are 'mobil listrik' (electric car), 'motor listrik' (electric motorcycle), and 'kendaraan listrik' (electric vehicle).

The pre-processing stage includes the standardization of lowercase and removal of meaningless words or sentences that do not affect the meaning of a tweet, for example: links to an external website, html references, mentions tags, hashtags, special characters, and numbers.

Data used in this study is twitter post from the past year from May 2022 until May 2023. Total twitter post retrieved is 100,024 posts about EV, and after cleaning for missing value and duplicate post retrieved, the final data for analysis is 99,856 tweets as identified by unique tweet id.

4. Results

4.1. Sentiment Analysis

This study employs deep-learning approach in assigning the sentiment classification of every tweet. The model used for sentiment analysis is Indonesian RoBERTa Base Sentiment Classifier built with transformers library by Nabiilah et al. [36] that achieve 94.36% of accuracy.

The model is deep-learning models based on the "Bidirectional Encoder Representations from Transformers" (BERT)[1] model by Devlin et al. [37] which is modified and re-trained with Indonesian dataset. Using this model, every tweet is given label whether it is "positive", "negative", and "neutral".

[1] https://ai-research.id/nlp-resources/indonesian/text-classification/

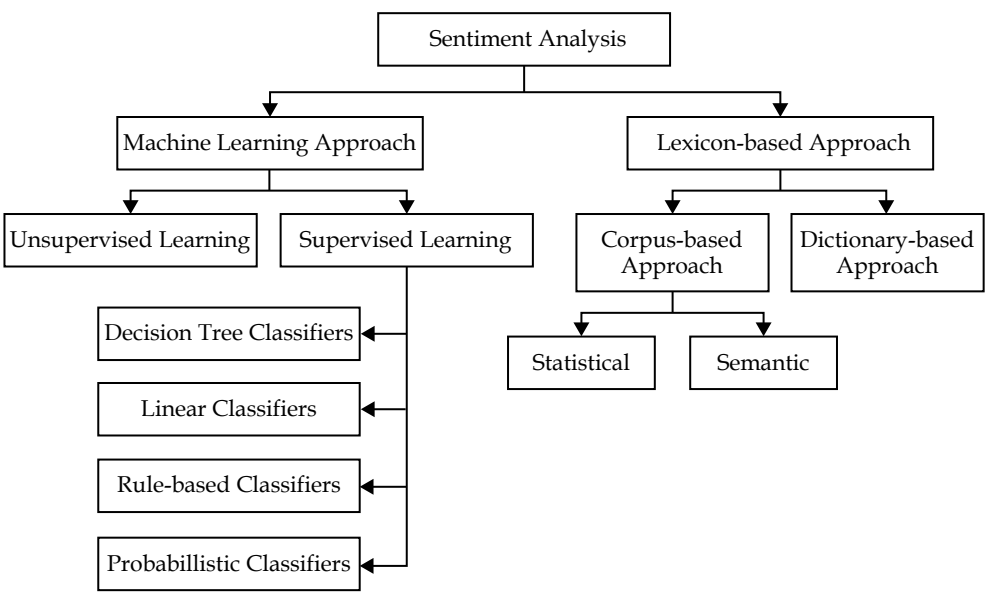

Figure 1. **Sentiment Analysis Approaches [34]**

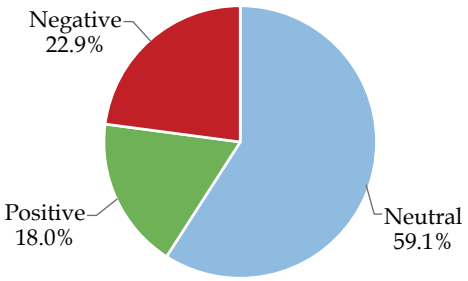

Figure 2. **Sentiment Analysis**

The overall data in Figure 2 shows that neutral sentiment dominates the tweet post with 59.1% (59,003), followed by negative tweets accounting for 22.9% (22,867) and finally positive sentiment with 18% (17,986).

However, when considering the rate of likes and retweets from a post, the proportion of the overall data changes with neutral sentiment get less engagement of likes and retweets compared to negative and positive twitter post. The result is shown in Figure 3.

Positive Sentiment. Figure 4 shows that the top ten words in tweets with positive sentiment about electric vehicles in Indonesia are: 'hemat' (economical) mentioned 1,838 times, 'lingkungan' (environment) mentioned 1,702 times, 'ramah' (friendly) mentioned 1,562 times, 'dunia' (world) mentioned 1,529 times, 'keren' (impressive) mentioned 1,468 times, 'pln' (State Electricity Company) mentioned 1,400 times, 'baterai' (battery) mentioned 1,071 times, 'beli' (buy) mentioned 1,059 times, 'polusi' (pollution) mentioned 1,000 times, and 'beralih' (move to) mentioned 991 times.

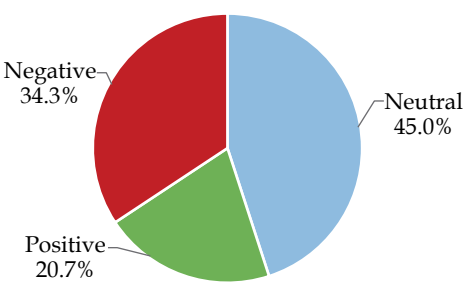

Figure 3. **Sentiment Analysis from Rate of Likes and Retweets from A Post**

These words suggest that the public recognizes the value of electric vehicles and their impact on the environment and world. The word 'hemat' (economical) being the most frequently tweeted word also indicates that people may consider the economic value that electric vehicles can bring when deciding to switch to them. Price and economic reasoning may be the top priorities for people when buying an electric vehicle.

In addition to the economic value, the presence of words such as 'lingkungan' (environment), 'ramah' (friendly), and 'polusi' (pollution) in the top ten words in tweets with positive sentiment about electric vehicles in Indonesia suggests that people are also concerned about the environmental impact of their transportation choices.

The fact that these words appear frequently in tweets with positive sentiments indicates that people see electric vehicles as a more environmentally friendly option compared to traditional fossil fuel-powered vehicles. This could be another factor that influences people's decision to switch to electric vehicles, in addition to economic benefits.

Neutral Sentiment. Figure 5 shows that the top ten words in tweets with neutral sentiment about electric vehicles in Indonesia are: 'pln' (State Electricity Company – SOC) mentioned 5,435 times, 'subsidi' (subsidy) mentioned 4883 times, 'baterai' (battery) mentioned 4,824 times, 'pemerintah' (government) mentioned 3,903 times, 'ekosistem' (ecosystem) mentioned 3,252 times, 'G20' mentioned 3,240 times, 'KTT' (G20 conference) mentioned 2,933 times, 'juta'

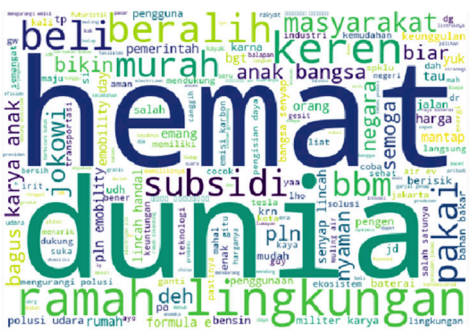

Figure 4. **Positive Sentiment**

(million) mentioned 2,510 times, 'ev' mentioned 2,350 times, and 'harga'(price) mentioned 2,316 times. These keywords highlight the role of the government in providing an ecosystem and subsidies to support the adoption of electric vehicles. People also recognize the vital role of the State Electricity Company in supporting the infrastructure needed for electric vehicles, such as battery charging stations.

The presence of words such as 'subsidi' (subsidy), 'pemerintah' (government), and 'ekosistem' (ecosystem) in the top ten words in tweets with neutral sentiment about electric vehicles in Indonesia suggests that people are aware of the government's efforts to support the adoption of electric vehicles. The fact that these words appear frequently in tweets with neutral sentiments indicates that people may have mixed feelings about the effectiveness of these efforts. Further analysis of the specific issues and concerns raised by the public could provide valuable insights into improving government policies and initiatives to increase public support for electric vehicles.

Negative Sentiment. Figure 6 shows that the top ten keywords dominating the tweets with negative sentiment are: 'subsidi' (subsidy) mentioned 4,895 times, 'beli' (buy) mentioned 2,853 times, 'orang' (people) mentioned 2,105 times, 'bbm' (fossil fuel energy) mentioned 1,506 times, 'kaya' (rich) mentioned 1,279 times. It is interesting that subsidy has become the most frequently mentioned word for negative sentiment. The word 'rich' also appears in the top five most frequently mentioned words. These findings raise concerns that the public may not support the government's subsidy regulations.

The presence of words such as 'subsidi' (subsidy), 'kaya' (rich), and 'pemerintah' (government) in the top ten keywords dominating the tweets with negative sentiment suggests that people may have concerns about the fairness and effectiveness of the government's subsidy regulations. The fact that the word 'rich' appears in the top five most frequently mentioned words could indicate that people perceive subsidies as disproportionately benefiting the wealthy. Further analysis of the specific issues and concerns raised by the public could provide valuable insights into how to improve government policies and initiatives to increase public support for electric vehicles.

4.2. Emotion Analysis

The results of the emotion analysis can be seen in Figure 7. The emotions shown in the tweets posted by users may indicate public preferences. People expressing their emotions can also be captured using natural language processing, similar to sentiment analysis. The model used in this study for emotion analysis is the Indo RoBERTa Emotion Classifier[2], which achieves an accuracy of 71.81%. The emotion labels output from the model's processing of the data are: 'anger' (27%), 'fear' (5%), 'sadness' (14%), 'happy' (54%), and 'love'. Further, we have grouped these emotions into a supporters group ('happy', 'love') and an opponents group ('anger', 'fear', 'sadness').

[2] https://huggingface.co/StevenLimcorn/indonesian-roberta-base-emotion-classifier

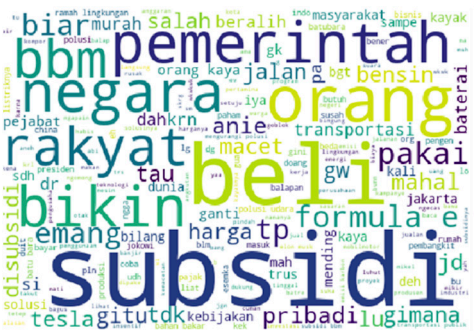

Figure 5. **Neutral Sentiment**

Figure 6. **Negative Sentiment**

Based on the results of the emotion analysis, it can be seen that the majority of the emotions expressed in the tweets were positive, with 54% of the tweets expressing happiness and an additional percentage expressing love. This indicates that the public may generally have a positive view of the topic being discussed. However, it is important to note that a significant percentage of tweets also expressed negative emotions such as anger and sadness. These emotions were grouped into an opposing group, indicating that there may be a portion of the public that opposes the topic being discussed. Further analysis could be conducted to explore the reasons behind these emotions and better understand public opinion on this topic.

Among the most mentioned words (translated) in the supporting group are SOC (6,020 mentions), battery (4,577 mentions), ecosystem (3,609 mentions), environment (2,862), and world (2828 mentions) as shown in Figure 8. Most people supporting the effort of SOC in establishing the infrastructure and ecosystem of EV. The majority also perceived that moving toward EV will bring benefits to environment and the world.

Moving to the opposing group, the top mentioned words are subsidy (8,843 mentions), buy (4,025 mentions), government (2,772 mentions), people (2,475 mentions), and fossil-fuel (2,371 mentions) that shown in Figure 9.

In line with the statistics of negative sentiment in the previous analysis, the

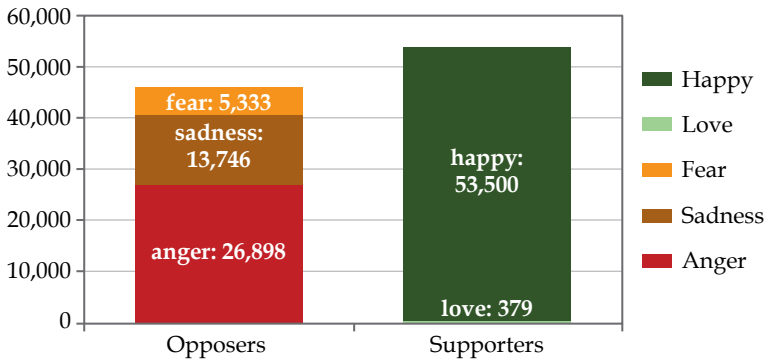

Figure 7. **Emotion Analysis Result**

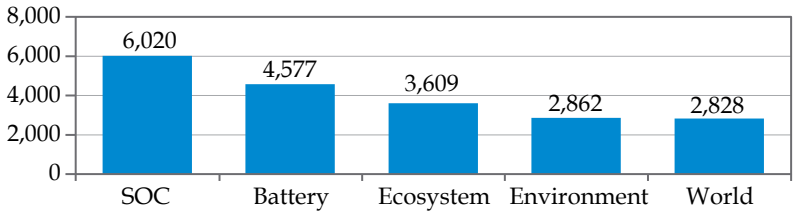

Figure 8. **Top Words in Supporting Group**

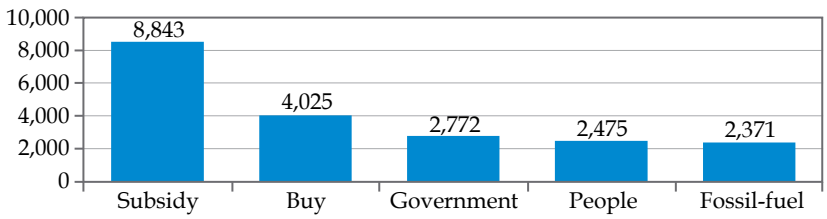

Figure 9. **Top Words in Opposing Group**

word 'subsidy', become the most mentioned, indicating that the voice against EV mostly related to the subsidy policy by the government. Other concern also raise issue that people disagree with the government that seems focusing on 'buy' side in the strategy of moving toward EV from fossil-fuelled vehicles.

4.3. Public Attention Topics

The topic of public attention in the tweet data can be generated from the process of natural language processing analyzing the attributes of textual data. Before process to the further analysis, it is possible that there are words that may distort the analysis of the topics, therefore, we conduct initial review of the textual data by overviewing the word occurrence in the data as shown in the following Figure 10.

The top five keywords (translated) from the overall data are: electric with 115,466 mentions, cars with 54,001 mentions, vehicle with 40,313 mentions, motorcycle with 31,161 mentions, and subsidy with 10,575 mentions. Tweet posts about cars significantly outnumber those about motorcycles, this indicates that concern about electric vehicle is more pronounce in higher economic ability people as in the context of Indonesia, people who own cars are considered more economically capable than people who own motorcycles. Subsidy also become one of the highlights of public opinion concern as the rising issue of government of Indonesia plan for tax subsidy for the purchase of EV in the timeframe.

As for the deeper understanding about how people perceived electric vehicles and its tax subsidy, we conduct topic analysis by modeling LDA themes on textual data of Twitter posts. In ranking and filtering terms, we use saliency measures that allows for quicker assessment and comparison of topics.

Based on the output of the approach, we determined three concerns about tax incentive for EV which are economical concern, environmental concern, and infrastructure of EV in Indonesia.

4.3.1. Economical Concern

Topic 1 focused on the economical concern of EV. This can be shown by LDA Topic 1 results in Figure 11. The most discussed themes in this topic are "subsidi" (subsidies) , "beli" (purchases) and "harga" (prices). The price paid to switch to EV is an important factor in this regard. The public will compare the costs that must be spent on EV with those of fossil fuel vehicles. Therefore, the themes of bonuses, prices, and incentives became the main public discussion. This topic also discusses how the government pays attention to prices.

Our study confirms previous findings by Ma & Mayburov [38], Rietmann & Lieven [39], Hardman et al. [40], Bienias et al. [41] that the public gave a higher response to tax incentives in topic 1.

Figure 12 shows that combining the analysis with emotion and public preference to support or oppose about this topic, the proportion show that opposers group dominating for most of the timeline analysed.

4.3.2. Environmental Concern

Topic 2 is about environment concern as shown in Figure 13. The themes that are of significant concern in this topic include "baterai" (batteries), "pemerintah" government) and dan "lingkungan" (environment).

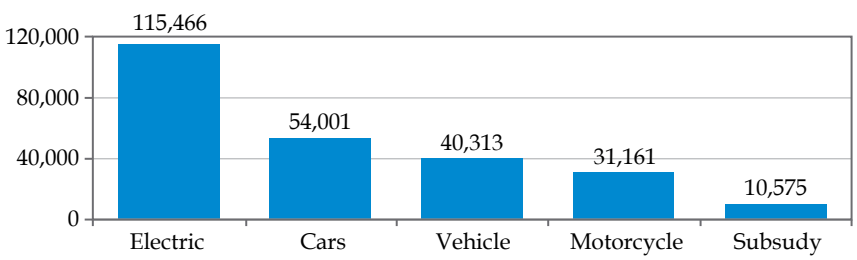

Figure 10. **Overviewing The Word Occurence**

The themes discussed the environmental effects of using EV, both positive and negative. The role of the government is also the focus of public discussion on this topic.

The public wants vehicles that are environmentally friendly but must be supported by green government policies. This is not surprising because the main motivation for the EV idea is to reduce pollution from the use of fossil-fuel vehicles that pollute the environment. However, it is also necessary to pay attention to whether migration to EV has reduced environmental pollution. or only for diverting pollution from cities to certain areas (power plant areas that still use fossil fuels).

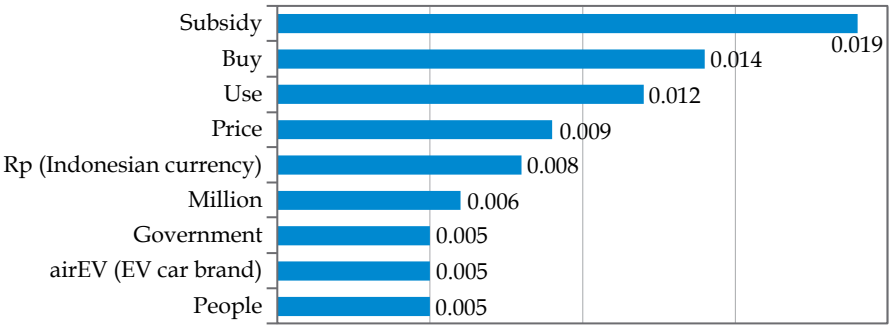

Figure 11. **LDA Topic Model – Top Salient Words of Topic 1**

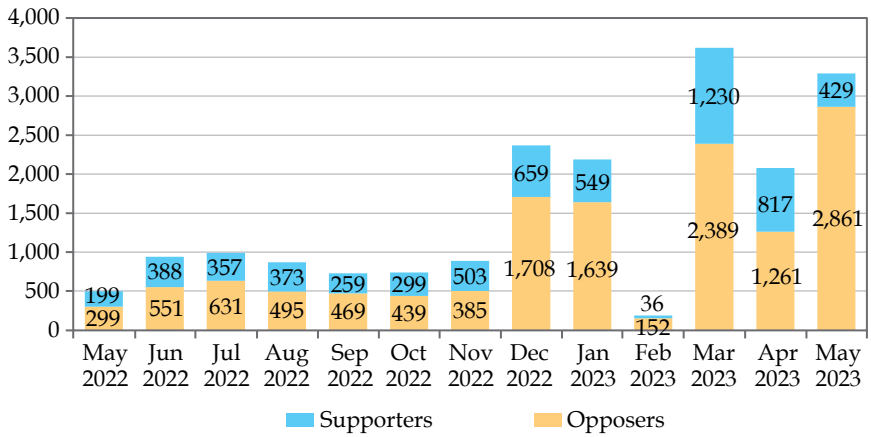

Figure 12. **Number of Post – Topic 1**

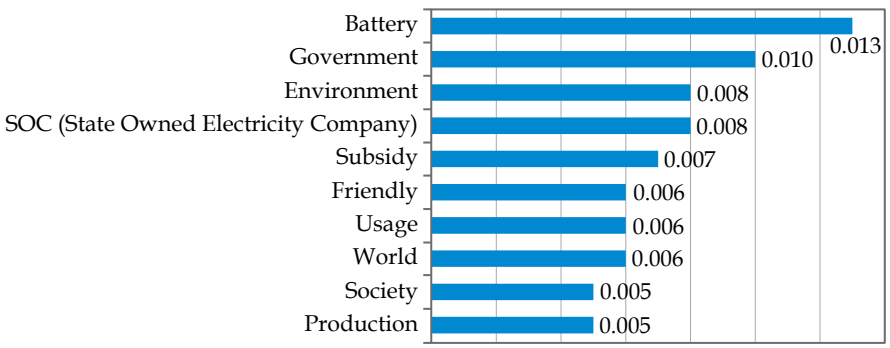

Figure 13. **LDA Topic Model – Top Salient Words of Topic 2**

According to Figure 14, in contrast with topic 1, the supporters group for topic 2 outnumber the opposers with significant margins.

4.3.3. Infrastructure of EV

Topic 3 reflects the public attetion about electric vehicle infrastructure as shown in Figure 15. "PLN" (State Electricity Company), "KTT" (G20 Summit), BBM (fuel oil) is the most theme discused in this topic. The public is worried about infrastructure, such as charging stations, the ability of the State Electricity Company, and the G20 countries' attention (investment) to electric vehicle policies. Tax incentives may attract public interest to switch to EV, but there are concerns about the readiness of the existing infrastructure. The government paid close attention to EV prices by providing subsidies and tax incentives. However, the availability of appropriate infrastructure is an important concern. Support for this argument is shown with the large number of supporters group twitter posts through out the year.

Fugure 16 shows that the gap with opposers also considerably large, showing that this issue may play important aspect in electric vehicle adoption. It is interesting that in July 2022 the overall volume of posting increased significantly. This may due to the response of the use of electric vehicles in G20 summit in Indonesia. There are also spikes in march and april 2023 that might the increasing concern about the infrastructure readiness following the issuance of tax incentive regulation.

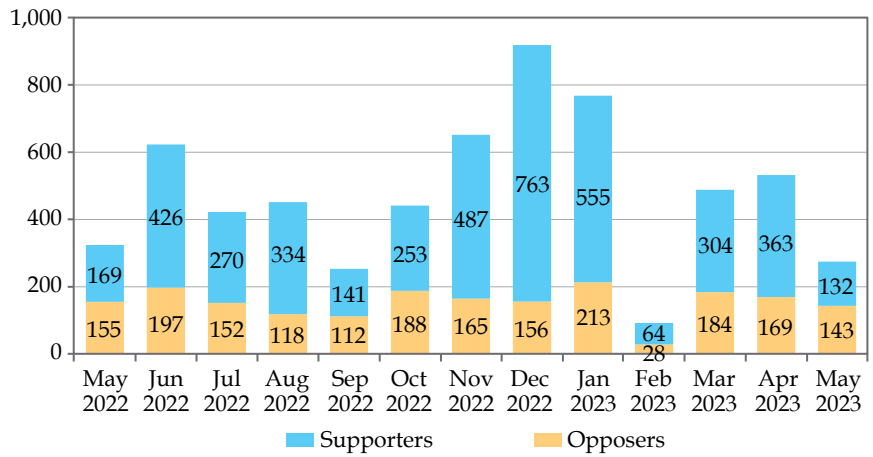

Figure 14. **Number of Post – Topic 2**

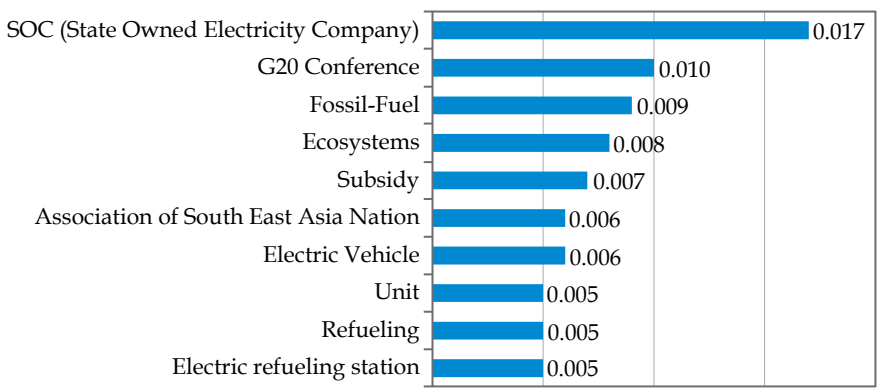

Figure 15. **Lda Topic Model – Top Salient Words of Topic 3**

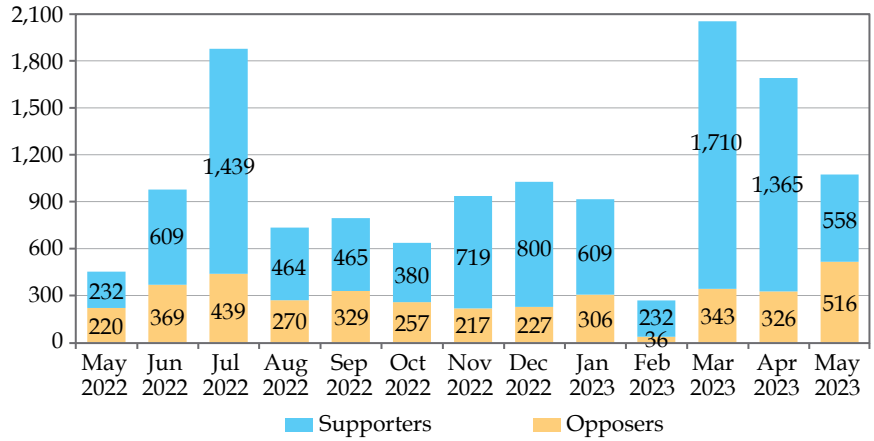

Figure 16. **Number of Post – Topic 3**

5. Discussion

Based on the three analyses that we have conducted the public voices are still mixed regarding the move towards EVs in Indonesia for the moment. For those who fully support the government step as reflected in the positive sentiment posts, they might recognize the benefits from the movement toward EV such as the environmental impacts, lowering transport cost, and opportunity for encouraging local products. Meanwhile, for the opposers of the government program, there are significant negative sentiments about the tax subsidy as they see that only rich people will get the most benefits of the program.

The public also show a variety of emotions as a respond of the EV movement program by the government. Although supportive emotions (love, happy) still dominate the overall number, the opposer emotions (anger, sadness, fear) is still high in value and cannot be easily ignored. The success of the program implementation itself might be difficult to achieve without the full support of the citizens as the main actors of the movement towards EV.

Previous literature suggest that a positive correlation between favorable emotions towards electric vehicles (EVs) and public attitudes and intentions to transition to Evs [27]. The emotional expressions of the public play a significant role in shaping these attitudes, as noted in [15]. A positive public sentiment can foster positive attitudes, while conversely, negative sentiments may lead to resistance [12].

We can consider that the hypothesis of our study is fully confirmed. Our findings indicate that opposer emotions remains a significant concern that needs attention. It is evident that the public still does not favor the tax incentive policy. We contend that this lack of support may be attributed to the fact that the majority of Indonesian citizens continue to live below the average standard of living. Consequently, matters like this are highly sensitive and tend to evoke opposer emotions.

We also want to emphasize three key aspects of public opinion concerning electric vehicles (EVs) in Indonesia.

Firstly, the awareness of the economic benefits of EVs in Indonesia remains limited. Many Indonesians perceive these benefits as inaccessible because they believe only affluent individuals can afford the high upfront costs and take advantage of EV tax subsidies. The issue of purchase costs and monetary incentives holds significant importance as they have a positive impact on the market share of electric vehicles. Rather than solely relying on tax incentives, providing purchase incentives can potentially yield stronger results. This approach has demonstrated its effectiveness in increasing the market share of EVs, as highlighted by Hardman et al. [40]. It's essential to note that the public's willingness to adopt electric

vehicles is contingent upon price competitiveness with conventional vehicles, as emphasized by Bienias et al. [41].

Secondly, environmental issues become the most supported issue by the public. People recognized that the use of fossil-fuel is becoming more and more dangerous for the environment and switching to electric vehicles is the right solution. Although there are some people who still doubt the environmental benefits of the use of EV, the magnitude of this voices relatively minimal.

Previous literature has consistently affirmed the impact of environmental awareness and public concern on electric vehicle (EV) adoption, as stated in Mpoi et al. [1]. Both Axsen et al. [42] and Manutworakit & Choocharukul [43] highlight a significant and positive correlation between purchase intention and environmental concern. The ethos endorsed by electric vehicles, aimed at reducing pollution and environmental degradation, aligns with the global trend of "green earth" issues becoming an integral part of people's lifestyles over recent decades.

Lastly, about the infrastructure readiness of EV in Indonesia, most people are still in doubt for the capability of the government and State Electricity Company as the main provider of EV infrastructure. This indicates that the government might need to focus first on the EV infrastructure before establishing such move toward EV programs. This study confirms the significance of infrastructure in the electric vehicle (EV) campaign, consistent with previous findings.

The establishment of a robust network of charging stations is a crucial factor in promoting EV adoption, as noted in Mpoi et al. [1] and Giansoldati et al. [44]. Furthermore, Santos & Davies [45] emphasizes that a well-developed charging infrastructure will exert a substantial, if not partial, positive impact on adoption.

6. Conclusions

The purpose of this study is to investigate public voice and reaction through Twitter regarding EV policy in Indonesia. The use of social media as a tool to measure public response to government policies may not be common practices, especially in Indonesia.

However, with this study, it is shown that public voice through social media may have valuable value in seeing how people perceive and the usefulness of a policy for the public.

To be able to formulate more appropriate policies in encouraging the adoption of electric vehicles and provide policies that are pro-community, the government may need to review more interactions with the community or their representatives such as associations in the transportation sector.

We contribute to the literature that public voice provides valuable input for improving government policy formulation. As for practical implications, government can employ active monitoring of social media in capturing public voice and intensive communication when formulating new policies.

Our results limited to the Twitter data, so future study could extend this study using broader social media data.

The techniques used in this research can also be applied to other topics besides EVs, thus providing support for the importance of the public voice in interacting with government policy formulation.

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Real Earnings Management Sine Qua Non Book-Tax Differences in Tax Avoidance of Mining Sector Companies in Indonesia

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ABSTRACT

This study aims to prove the effect of book income that can be manipulated through real earnings management activities on book-tax differences that appear to be interrelated but have not been widely studied. Researchers want to prove the coupling relationship (sine qua non) between real earnings management and book-tax differences based on rational choice theory as the main theory. Tests were conducted on 43 sample companies in the mining sector listed on the Indonesia Stock Exchange in 2018–2021. The analytical method used is panel data regression with the help of EViews (Econometric Views) version 12. The results prove that there is an effect of abnormal cash flow and abnormal discretionary expenses on book-tax differences, while abnormal production costs have no effect. Furthermore, the same result is also obtained when the reverse test is conducted, namely book-tax differences in real earnings management. The reciprocal test gives the result that book-tax differences affect abnormal operating cash flows and abnormal discretionary expenses but do not affect abnormal production cots. Meanwhile, the alignment of the reciprocal relationship between abnormal cash flow operations and abnormal discretionary expenses to book-tax differences shows the relationship (sine qua non) between real earnings management and book-tax differences. The contribution of this research proves that book-tax differences are the output of real earnings management, so the amount can be used as an indicator if a company manipulates earnings. Therefore, it is important for the government, especially the Directorate General of Taxes as a policymaker to start considering the amount of book-tax differences in a certain range that is permitted for companies. In addition, it can be followed up by issuing additional tax regulations if needed to minimize tax avoidance.

KEYWORDS

sine qua non, real earnings management, book-tax differences, mining companies, coupling

JEL G32; H26

УДК 336.62

Взаимосвязь манипулирования реальными доходами и налоговыми разницами как индикатор уклонения от уплаты налогов компаниями горнодобывающего сектора в Индонезии

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АННОТАЦИЯ

Данное исследование направлено на то, чтобы доказать влияние бухгалтерского дохода, которым можно манипулировать с помощью деятельности по управлению реальными доходами, на налоговые разницы. Исследователи хо-

тят доказать взаимосвязь (непременное условие) между управлением реальными доходами и различиями в налоговых разницах, основываясь на теории рационального выбора в качестве основной теории. Тестирование было проведено на 43 выборочных компаниях горнодобывающего сектора, зарегистрированных на Индонезийской фондовой бирже в 2018–2021 гг. В качестве аналитического метода используется панельная регрессия данных с помощью EViews (Econometric Views) 12-й версии. Результаты доказывают, что существует влияние аномального денежного потока и аномальных дискреционных расходов на бухгалтерские налоговые разницы, тогда как аномальные производственные затраты не оказывают никакого влияния. Более того, тот же результат получается и при проведении обратного теста, а именно налоговые разницы возникают при управлении реальными доходами. Взаимный тест дает результат, что налоговые разницы влияют на аномальные операционные денежные потоки и аномальные дискреционные расходы, но не влияют на аномальные производственные затраты. Между тем, соответствие взаимной связи между аномальными операциями с денежными потоками и аномальными дискреционными расходами с бухгалтерскими налоговыми разницами показывает взаимосвязь (непременное условие) между управлением реальными доходами и балансовыми налоговыми разницами. Результаты этого исследования доказывают, что налоговая разница является результатом управления реальной прибылью, поэтому эту сумму можно использовать в качестве индикатора того, что компания манипулирует прибылью. Таким образом важно, чтобы правительство, особенно Главное налоговое управление как орган, определяющий налоговую политику, начали регламентировать сумму различий налоговых разниц в определенном диапазоне, который разрешен для компаний. Кроме того, за этим может последовать принятие дополнительных налоговых правил, если это необходимо для минимизации уклонения от уплаты налогов.

КЛЮЧЕВЫЕ СЛОВА
обязательное условие, управление реальной прибылью, бухгалтерские налоговые разницы, горнодобывающие компании, взаимосвязь

1. Introduction

In Indonesia, tax revenue is the largest contributor to state revenue. More than 70% of state revenue in the Indonesian State Budget (APBN) each year is from taxes [1].

In addition, the mining sector is one of the sectors that is expected to support tax revenue because the mining sector has great potential for tax revenue considering that Indonesia has a natural wealth of mining materials. However, when viewed from the Gross Domestic Product (GDP) and tax revenue, the contribution of the sector only reached 6.6% and 4.3% in 2020. This small contribution resulted in a tax coefficient from the mining sector of only 0.66% [2].

The small contribution to tax revenue can be caused by problems in the mining sector itself, such as the company's motivation to avoid taxes [3].

For example, PT Adaro Energy Tbk is one of the mining companies that was hit by the issue of tax avoidance in 2019. The company is alleged to have transferred profits from its coal business to a subsidiary in Singapore called Coltrade Service International. Indications of tax avoidance were contained in a report by international NGO Global Witness published on July 4, 2019. The strategy of the parent company (PT Adaro) in Indonesia to sell coal from mining in Indonesia at a lower price to its subsidiary, Coltrade Services International (Singapore), allows the transfer of profits to the subsidiary, thus reducing the parent company's tax bill by USD125,000,000 in the period 2009–2017, or USD14,000,000 per year[1].

In addition, indications of profit shifting through transfer pricing (TP) activities are carried out due to the motivation

[1] Thomas V.F. Dugaan Adaro Menghindari Pajak Mengingatkan pada Kasus Asian Agri. Available: https://tirto.id/dugaan-adaro-menghindari-pajak-mengingatkan-pada-kasus-asian-agri-edHZ (accessed: 17.10.2023).

to attract many investors and also the desire to report low taxes in order to reduce the company's burden. Another way, as one of the characteristics that attracts investors, is the tendency of company management to try to report high accounting profit (book income) in the capital market.

However, in addition, the company wants to minimize the amount of tax that must be paid by adjusting the amount of profit before tax (taxable income) in accordance with the company's financial condition.

The difference between book income and taxable income gives rise to the book-tax difference [4]. Book income arises from business transactions that refer to the Statement of Financial Accounting Standards (PSAK), while taxable income arises after fiscal reconciliation that refers to the Tax Law.

Therefore, taxable income that is lower than book income is an important point desired by management for tax planning purposes. This is because the company's net income will run opposite the taxable income rate. If net income increases, then taxable income is expected to be reported lower than the net income generated, so that the tax will be paid lower. The net income reported by management can be manipulated through earnings management, as has been proven by [5], which reveal that earnings management carried out by the company can result in an increase in the company's net profit and a decrease in taxable income.

In practice, earnings management can be done with two methods: accrual-based earnings management and real earnings management [6]. Real earnings management is an earnings management method that is often chosen by companies because it is more difficult to detect by auditors and tax authorities [7].

In the practice of real earnings management, companies manipulate earnings during the accounting period by arranging real activities, such as (1) sales manipulation, (2) manipulation by reducing discretionary spending, and (3) manipulation through the production process with excess production [8]. Thus, real earnings management activities have a direct impact on current and future cash flows and are also more complicated to recognize for average investors as well as auditors or regulators [9].

If real earnings management manipulation succeeds in reducing taxable income, book-tax differences will automatically be manipulated. If book-tax differences are manipulated, it can be used as a tool for tax avoidance. However, there are not many studies that reveal the movement of real earnings management that will always affect the movement of book-tax differences, or vice versa. In general, previous studies directly linked real earnings management or book-tax differences with tax avoidance.

In order to prove the coupling between real earnings management and book-tax differences in this study, it is still necessary to test the reciprocity between book-tax differences and real earnings management. Testing book-tax differences against real earnings management is expected to provide mutually influencing results, so it will also prove that book-tax differences are actually the result of real earnings management, and book-tax differences cannot change if real earnings management does not change.

This test has not been conducted by previous researchers, so the purpose of proving the relationship between the two is to explain the nature of the coupling relationship (sine qua non), or maybe just the opposite, decoupling. The results of this study also provide support and evidence that Rational Choice Theory is relevant as a basis for choosing real earnings management decisions and book-tax differences. Real earnings management is proxied by three forms of real activities, namely operating cash flow, production costs, and discretionary expenses.

Furthermore, tax avoidance in this study is proxied by tax-effect book-tax differences, referring to [10]. The use of tax-effect book-tax differences is more appropriate when referring to tax conditions in Indonesia than income-effect book-tax differences because it can accommodate the corporate income tax rate imposed on mining sector companies.

This study aims to prove the effect of book income that can be manipulated through real earnings management activities on book-tax differences that appear to be interrelated but have not been widely studied.

Research hypotheses:

H1: Real earnings management proxied by abnormal operating cash flow has a positive effect on book-tax differences as a form of tax avoidance.

H2: Real earnings management proxied by abnormal production costs has a positive effect on book-tax differences as a form of tax avoidance.

H3: Real earnings management proxied by abnormal discretionary expenses has a positive effect on book-tax differences as a form of tax avoidance.

H4: Tax avoidance with book-tax differences has a positive effect on abnormal operating cash flow which is a proxy for real earnings management.

H5: Tax avoidance with book-tax differences has a positive effect on abnormal production costs as a proxy for real earnings management.

H6: Tax avoidance with book-tax differences has a positive effect on abnormal discretionary expenses as a proxy for real earnings management.

The results of this study can be used as a reference for the Directorate General of Taxes of Indonesia to develop regulations, make policies, and even as a basis for conducting tax audits of companies that are indicated to avoid taxes using real earnings management activities. This can be done by setting limits on the level of volatility of allowable book-tax differences in order to provide supervisory action against tax avoidance activities, especially through real earnings management in Indonesia.

2. Literature Review

2.1. The gap between book income and taxable income

Research conducted by [10] have proven that the gap between book income and taxable income reported (book-tax differences) is an indication of accounting and tax manipulation in financial statements. Similarly, [11] proves that companies with strong incentives and prospects for earnings management and tax management have a high level of abnormal book-tax differences. The magnitude of abnormal book-tax differences indicates the level of management manipulation, which suggests that book-tax differences are a useful proxy for earnings management and tax management after controlling for accounting-tax misalignment.

The research of [12] shows that both corporate tax avoidance and free cash flow increase management's real earnings manipulation activities. Research by Geraldina's [13] found that the use of accrual earnings management and real earnings management can be mutually substitutable. Meanwhile, research [7] implies that to achieve the objectives of aggressive tax reporting and aggressive financial reporting in the same reporting period, managers use accrual-based earnings management tools and real transactions as a complement or substitute for each other.

Similarly, [14] prove that the mismatch between financial accounting standards and tax law results in discretion for the company's management to manipulate book income and taxable income in the same reporting period. Machdar [15] proves that abnormal operating cash flows and abnormal discretionary expenses in real earnings management affect tax avoidance. Kaldonski [16] also proves that real earnings management is basically a form of inflating profits that are already tax compliant.

This research is conducted to prove again the relationship between real earnings management and book-tax differences, so the researcher named the movement between real earnings management and book-tax differences as a coupling relationship. This is because book-tax differences and real earnings management will always affect each other and will not be able to stand alone, so if real earnings management changes, then book-tax differences will also change in the same direction, and vice versa.

The coupling relationship between real earnings management and book-tax

differences used for tax avoidance in this study can be reviewed using Rational Choice Theory. Real earnings management and book-tax differences can be a choice that is considered rational by the management of the company both to achieve personal and organizational goals. One of the goals that management wants to achieve is to get an award for being able to advance the company by scoring high profits and a small tax burden.

This phenomenon can also be considered rational by shareholders. If it is related to the return or value of benefits, then shareholders prefer tax avoidance because there is a transfer of the value of benefits from other countries to them [17]. Thus, management's decision to manipulate real earnings management, which will also manipulate book-tax differences, will always be done, which leads to corporate tax avoidance.

2.2. Rational Choice and Division of Labor

Rational Choice Theory, hereafter referred to as RCT, is the main theory used in this study. RCT was first contained in [18] work entitled The Wealth of Nations.

Smith [18] and Emile [19] believed that work specialization is one of the most important concepts in social science, not only for economics but for the study of society and institutions in general. Smith's explanation of economic growth lies in the emphasis on work specialization or professionalism as a source of society's ability to increase its productivity. Furthermore, Smith argued that the background interest in economic usefulness is the most important motivator in economic activity as a consequence of free competition in the context of universal "natural law". The "invisible hand" occurs when work specialization develops, shapes, and intervenes in market institutions, expanding the relationship of endless resource exchange even across borders and encouraging effective cooperation. Thus, individuals, as actors of change, have the opportunity to determine preferences for decision-making in defense of economic gains [20].

Smith's theory finally provides implications for organizational policy makers by emphasizing two important features of an interdependent decision cycle, namely: first, policies that benefit the organization and achieve organizational sustainability [21]. Second, organizational characteristics are about how policies are developed and implemented and whether they are beneficial to the organization itself. Individuals (agents) as members of the organization have preferences that rationally refer to the ultimate goals of the organization, so that individual behavior patterns are actions based on rational choices that are influenced by the organizational environment in which they are located or external environmental pressures on the organization.

2.3. Rational Choice, Institutions and Managers (Human Agency)

In the last decade, the widespread economic phenomena and issues that must be resolved by both economists and researchers have required them to broadly not only look from the side of economic and accounting numbers but also using social (human) methods and approaches, which are considered the most appropriate to address economic problems that have clearly involved social issues.

Boettke [22] argues that various issues due to economic imperialism are actually not sterile from social issues, so they cannot handle the fact that problems that occur in society or institutions are manifestations of social interaction. Consequently, individual actors naturally and rationally try to maintain their existence as a response to the social environment, which ultimately forms perceptions and choices in order to obtain individual or group benefits [23]. It is further argued that individuals are the source of institutions, meaning that individuals will naturally form both formal and informal structures based on their interests and benefits as members of the organization. This view implies that the institution or organization is a product of social interaction within it and, at the same time, an instrument for shaping individual preferences to act both

for individual interests and the interests of the institution or organization. For example, in the context of tax aggressiveness, managers deliberately make decisions to control behavioral costs to ensure the company's (financial) performance targets are achieved.

Theoretically, managers' opportunistic behavior is documented through earnings management as instrumental rationality, which is a strategy, technique, or tool (instrument) to prepare reporting on financial performance that precisely hides the company's actual performance for certain purposes [24]. Earnings management can be broadly categorized into three dimensions, namely accrual earnings management, real earnings management, and fraudulent accounting. On the one hand, managers manipulate the real activities of normal operations for tax savings or even avoidance. Minimizing the tax burden and accounting profit that remain high is the focus of the company's management. Accounting profit will increase when the company's tax burden is smaller. The management will do various things to achieve this goal by minimizing the risk of being detected by the tax authorities (Directorate General of Taxes) and auditors. Real earnings management is the most rational choice, according to management, to avoid taxes and maintain high profits. The rational choice of management in the form of real earnings management or tax avoidance in the form of book-tax differences is both used to achieve the goal of increasing profits, which indirectly leads to minimizing the tax burden. When the practice of real earnings management increases, the book-tax differences will increase, and vice versa. The harmony of the relationship between real earnings management and book-tax differences means that these two things will run together or side by side (sine qua non).

However, manipulation of real activities actually provides information to stakeholders that the objectives of financial reporting have been met, whereas in fact, financial information is not of high quality [7]. Company management is a key actor in the application of real earnings management, meaning that management will continue to practice earnings management even though they know the potential to harm other parties (shareholders).

Reflecting on RCT, Scott [25] argues that subjective (individual) actions are generally based on the basic nature of humans as organic humans who always prioritize personal interests, and all actions will be considered rational when they believe they can realize the interests of other parties, including achieving the goals of group or organizational existence (Figure 1).

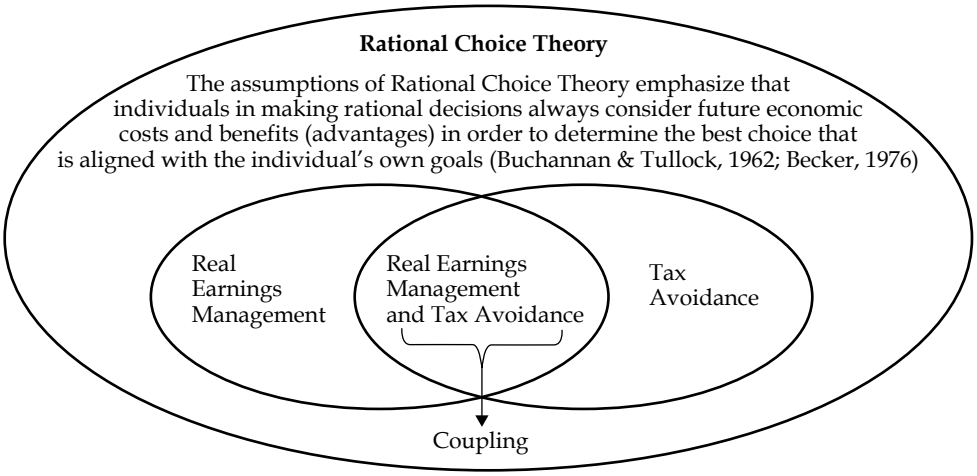

Figure 1. **Coupling Real Earnings Management and Book-Tax Differences According Rational Choice Theory**

Hypotheses 1, 2, and 3 are formulated to prove the effect of real earnings management with proxies of abnormal operating cash flow, abnormal production costs, and abnormal discretionary expenses on book-tax differences.

2.4. Real Earnings Management in abnormal operating cash flow and Book-Tax Differences

The important point of RCT is an individual choice that focuses on maximizing economic benefits based on rational preferences by including methods that are considered the most efficient to achieve organizational and individual economic goals [26].

RCT is subject to the incremental method or economic progressiveness method (EPM). Real earnings management is a form of earnings management that emphasizes the economic progressiveness method through real activities to engineer corporate profits. One part of the real activity that is a component of real earnings management is operating cash flow [5]. Sales are one of the main keys to cash inflows in the company's operating activities. If the sales amount is small, then the flow from operating activities can potentially be smaller because the amount of cash inflow is reduced. Treatment of sales in real earnings management can make cash inflows in operating activities increase or decrease.

Furthermore, the increasing and decreasing operating cash flows will also have an impact on the reported taxable profit, so that the tax burden borne can be greater or smaller. The hypothesis that can be formulated based on this description is as follows:

H1: Real earnings management proxied by abnormal operating cash flow has a positive effect on book-tax differences as a form of tax avoidance.

2.5. Real Earnings Management in Production Cost and Book-Tax Differences

Production costs are part of the real activities contained in real earnings management [5]. Higher production costs reflect that the company increases production activities to produce more products than usual. More production will cause the cost per unit to be smaller, and vice versa.

Furthermore, the size of the cost per unit that can be charged in tax calculations will have an impact on the reported taxable profit. The hypothesis that can be formulated based on this description is as follows:

H2: Real earnings management proxied by abnormal production costs has a positive effect on book-tax differences as a form of tax avoidance.

2.6. Real Earnings Management in Discretionary Expenses and Book-Tax Differences

Real earnings management is a form of earnings management that focuses on real activities to engineer corporate profits. One form of real activity that is part of real earnings management is discretionary expense manipulation [5]. Discretionary expenses are expenses that do not really affect the company's real activities, so they can be written off when the company's financial condition is not healthy. An increase or decrease in discretionary expenses will affect the taxable profit reported by the company. The tax borne by the company will be smaller when the discretionary expenses that can be charged in the calculation of taxable profit are greater.

The hypothesis that can be formulated based on this description is as follows:

H3: Real earnings management proxied by abnormal discretionary expenses has a positive effect on book-tax differences as a form of tax avoidance.

Furthermore, in order to prove that book-tax differences are actually the result of real earnings management manipulation, it is necessary to test in the reverse direction, i.e., to test the effect of book-tax differences on the three components of real earnings management. The proof can be formulated into three further hypotheses, namely H4, H5, and H6.

2.7. Book-Tax Differences and Real Earnings Management (Abnormal Operating Cash Flow)

Tax avoidance can be done in various ways, one of which is through book-tax differences. The difference between accoun-

ting and tax profits is the key to book-tax differences. The differences that occur can be negative or positive. When the resulting book-tax differences are positive, it can be concluded that profit according to accounting is greater than profit according to tax, and vice versa [27]. One way that companies can print book-tax differences with a positive value is through the treatment of sales as a component of real earnings management. Book-tax differences that are positive will have an impact on the company's operating cash flow from sales that can be included in the process of calculating profit according to tax. This will lead to a tendency for the tax burden borne by the company to be lower. The hypothesis that can be formulated based on this description is as follows:

H4: Tax avoidance with book-tax differences has a positive effect on abnormal operating cash flow which is a proxy for real earnings management.

2.8. Book-Tax Differences and Real Earnings Management (Abnormal Production Costs)

When the resulting book-tax differences are negative, it can be indicated that the profit according to accounting will be smaller than the profit according to tax [27]. Treatment of production costs is one way that companies can print book-tax differences with positive values. The company's desire to print book-tax differences with a positive value requires that the production cost per unit that can be charged in the calculation of profit according to tax be large.

This will result in the tax burden borne by the company becoming lower. The hypothesis that can be formulated based on this description is as follows:

H5: Tax avoidance with book-tax differences has a positive effect on abnormal production costs as a proxy for real earnings management.

2.9. Book-Tax Differences and Real Earnings Management (Abnormal Discretionary Expenses)

When the resulting book-tax differences are positive, than the treatment of discretionary expenses is one form of real earnings management that can be used by companies to print book-tax differences with positive values. The company's desire to print book-tax differences with a positive value requires discretionary expenses that can be charged in the calculation of profit according to tax to be large.

This will result in the tax burden borne by the company becoming lower and lower. The hypothesis that can be formulated based on this description is as follows:

H6: Tax avoidance with book-tax differences has a positive effect on abnormal discretionary expenses as a proxy for real earnings management.

3. Method

3.1. Data Collection and Sample

All mining sector companies listed on the IDX for the period 2018–2021 became the population in the study. The research period from 2018 to 2021 was taken because the researcher used the PT Adaro Energy Tbk profit transfer case from 2009 to 2017 as a benchmark to see whether the activity was still carried out up to four years later or not.

The samples used are taken from the population and must meet several criteria, namely:

1) mining sector companies that are listed on the IDX consistently in the 2018–2021 period;

2) companies that publish audited financial reports consistently in the 2018–2021 period with a reporting period ending in December;

3) companies that did not experience suspension and delisting during the 2018–2021 period.

Researchers finally obtained 43 companies that fit the sample criteria to be used as data in this study. Details of the sample selection results that match the criteria can be presented as follows (Table 1).

3.2. Research Design

The research design is an outline of the problem-solving plan developed by analyzing the data. The research design is prepared to determine or test the effect of the independent variable (X) on the dependent variable (Y) in order to answer all research hypotheses.

In addition, the ability of control variables to influence the dependent variable (Y) also needs to be tested to determine the level of strength of these variables. This study uses real earnings management (X) (Y) as the independent and dependent variables, while tax avoidance (Y) (X) becomes the dependent and independent variable.

The control variables used refer to [12], namely company age and company size. The research design in this study can be organized as follows (Figure 2).

3.3. Dependent Variable

The dependent variable used in this study is tax avoidance. The tax avoidance variable is represented by book-tax differences. The choice of proxy is based on the relationship between real earnings management and book-tax differences, which essentially focuses on earnings.

Furthermore, book-tax differences in this research are measured using the tax-effect book-tax differences ratio, which is then poured into the regression equation to determine normal book-tax differences. Normal book-tax differences arise because there are differences between Financial Accounting Standards (SAK-IFRS) and Tax Regulations.

Tax-effect book-tax differences were chosen because they can accommodate the tax rate factor in accordance with conditions in Indonesia, which then require separate tax reporting. Research by [10] states the ratio of tax-effect book-tax differences as follows:

$$\begin{aligned} &Tax\text{-}effect book\text{-}tax\ differences = \\ &= (Book\ Income \times Statutory\ Tax\ Rate) - \\ &- (Taxable\ Income \times Statutory\ Tax\ Rate) \end{aligned} \quad (1)$$

Tax-effect book-tax differences are the difference between commercial and fiscal income: tax effect, book income means gross profit, taxable income is profit before tax, and statutory tax rate (STR) means the tax rate according to the Tax Law. The regression equation to find normal book-tax

Table 1

Sample Selection Results

No.	Description	Number
1	Mining sector companies listed on the IDX in 2021	57
2	Mining sector companies that experienced suspension in the 2018–2021 period	(5)
3	Mining sector companies that are not consistently listed on the IDX during the 2018–2021 period	(9)
4	Mining sector companies that did not publish complete financial reports during the 2018–2021 period	0
	Total Company Sample	**43**

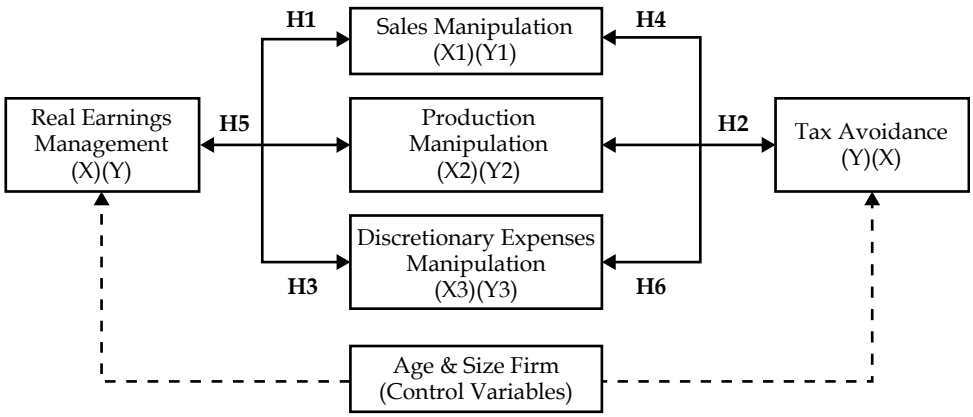

Figure 2. **Research Design**

differences used in this study is a combination of research [28; 10]. The equation can be written as follows:

$$\frac{BTD_{it}}{Assets_{it}} = \alpha_0 + \beta_1\left(\frac{\Delta INV_{it}}{Assets_{it}}\right) + \\ + \beta_2\left(\frac{\Delta REV_{it}}{Assets_{it-1}}\right) + \beta_3\left(\frac{NOL_{it}}{Assets_{it}}\right) + \\ + \beta_4\left(\frac{TLU_{it}}{Assets_{it}}\right) + \beta_5\left(\frac{LagBTD_{it}}{Assets_{it}}\right) + \varepsilon_{it}. \quad (2)$$

BTD_{it} means *tax-effect BTD*, INV_{it} indicates the change in fixed asset investment of company *i* in year *t*; REV_{it} means the change in total revenue of company *i* in year *t*; NOL_{it} means the net operating loss of company *i* in year *t*; TLU_{it} indicates the fiscal loss compensated by company *i* in year *t*; and $LagBTD_{it}$ means the *tax-effect BTD* of company *i* in year *t* – 1.

3.4. Independent Variable

Real earnings management is an independent variable used in this study. Real earnings management is measured using the abnormal level of three activities as follows:

1. Abnormal Operating Cash Flow.

Timing sales to be faster and / or making additional unsustainable sales through discounts or less stringent credit terms is key to sales manipulation [29]. Sales seem to increase due to the impact of sales manipulation, but there is actually a decrease in the company's current-year cash flow [30]. The decrease in cash flow indirectly leads to a smaller profit for the year, so taxable profit will decrease.

The amount of treatment results on sales is reflected in abnormal operating cash flow, which is the result of reducing actual operating cash flow to normal operating cash flow. The calculation of abnormal operating cash flow uses a regression equation taken from research [12]. The regression equation for abnormal operating cash flow can be written as follows:

$$\frac{CFO_{it}}{Assets_{it-1}} = \alpha_0 + \beta_1\left(\frac{1}{Assets_{it-1}}\right) + \\ + \beta_2\left(\frac{Sales_{it}}{Assets_{it-1}}\right) + \beta_3\left(\frac{\Delta Sales_{it}}{Assets_{it-1}}\right) + \varepsilon_{it}. \quad (3)$$

CFO_{it} is the operating cash flow of company *i* in year *t*, *assetsit – 1* means total assets of company i in year *t* – 1, *salesit* is the total sales company *i* in year *t*, and *Salesit* means the change in total sales of company *i* in year *t*.

2. Abnormal Production Cost.

Abnormal production costs arise when there is an excessive amount of production to lower fixed costs per unit without offsetting increases in marginal costs and decreases in total costs per unit [29]. This indicates that Cost of Good Sold (COGS) will be reported lower and operating margins higher. Cost of production is derived from the sum of Cost of Good Sold with inventory changes. Companies can increase production costs that can be expensed in tax calculations so that taxable income becomes small.

Abnormal production costs will reflect the company's production manipulation. [12] revealed that reducing actual production costs and normal production costs will result in abnormal production costs. Research [12] states that abnormal production costs are formulated in the regression equation as follows.

$$\frac{PROD_{it}}{Assets_{it-1}} = \alpha_0 + \beta_1\left(\frac{1}{Assets_{it-1}}\right) + \\ + \beta_2\left(\frac{Sales_{it}}{Assets_{it-1}}\right) + \beta_3\left(\frac{\Delta Sales_{it}}{Assets_{it-1}}\right) + \\ + \beta_4\left(\frac{\Delta Sales_{it-1}}{Assets_{it-1}}\right) + \varepsilon_{it}. \quad (4)$$

3. Abnormal Discretionary Expenses.

The key to discretionary expense manipulation is to minimize expenses, such as research and development (R&D), advertising, and maintenance in order to increase corporate profits [29].

However, management can increase discretionary expenses so that the reported taxable profit can be smaller. [12] revealed that discretionary expense manipulation is reflected by abnormal discretionary expense which is the result of reducing actual discretionary expense with normal discretionary expense.

The calculation of abnormal discretionary expenses in this study uses

a regression equation adopted from research [12] and can be written as follows.

$$\frac{DISEXP_{it}}{Assets_{it-1}} = \alpha_0 + \beta_1\left(\frac{1}{Assets_{it-1}}\right) + \\ + \beta_2\left(\frac{Sales_{it-1}}{Assets_{it-1}}\right) + \varepsilon_{it}. \quad (5)$$

3.5. Control Variables

Firm's age and firm's size are the control variables used in this study. The method of measuring company age is adopted from research [31], which is measured by the number of years since the company was listed or listed on the Indonesia Stock Exchange [32]. Company size is measured from the division between total long-term debt and total assets owned by the company [33]. Researchers consider that the results of this ratio can describe the size of the company. The smaller the value of the ratio, the company tends to have a large size because total assets are able to cover the company's long-term debt.

3.6. Data Analysis Method

Panel data regression analysis is the method chosen in this study. In this study, panel data regression was conducted six times, namely:

1) testing Equation I;
2) testing Equation II;
3) testing Equation III;
4) testing Equation IV;
5) testing Equation V;
6) testing Equation VI.

Regression conducted on each equation aims to test all hypotheses in this study. The equations can be presented as follows.

Book-tax differences as dependent variable:

Equation I is used to test hypothesis 1 (abnormal operating cash flow on BTD) which can be formulated as follows.

$$BTD_{it} = \alpha + \beta_1 AbCFO_{it} + \\ + \beta_2 FIRM\ SIZE_{it} + \beta_2 FIRM\ AGE_{it} + \varepsilon_{it}. \quad (6)$$

Equation II is used to test hypothesis 2 (abnormal production cost to BTD) which can be formulated as follows.

$$BTD_{it} = \alpha + \beta_1 AbPROD_{it} + \\ + \beta_2 FIRM\ SIZE_{it} + \beta_2 FIRM\ AGE_{it} + \varepsilon_{it}. \quad (7)$$

Equation III is used to test hypothesis 3 (abnormal discretionary expense to BTD) which can be formulated as follows.

$$BTD_{it} = \alpha + \beta_1 AbDISEXP_{it} + \\ + \beta_2 FIRM\ SIZE_{it} + \beta_2 FIRM\ AGE_{it} + \varepsilon_{it}. \quad (8)$$

Real earnings management as dependent variable:

Equation IV is used to test hypothesis 4 (BTD on abnormal operating cash flow) which can be formulated as follows.

$$AbCFO_{it} = \alpha + \beta_1 BTD_{it} + \\ + \beta_2 FIRM\ SIZE_{it} + \beta_2 FIRM\ AGE_{it} + \varepsilon_{it}. \quad (9)$$

Equation V is used to test hypothesis 5 (BTD on abnormal production costs) which can be formulated as follows.

$$AbPROD_{it} = \alpha + \beta_1 BTD_{it} + \\ + \beta_2 FIRM\ SIZE_{it} + \beta_2 FIRM\ AGE_{it} + \varepsilon_{it}. \quad (10)$$

Equation VI is used to test hypothesis 6 (BTD on abnormal discretionary expenses) which can be formulated as follows.

$$AbDISEXP_{it} = \alpha + \beta_1 BTD_{it} + \\ + \beta_2 FIRM\ SIZE_{it} + \beta_2 FIRM\ AGE_{it} + \varepsilon_{it}. \quad (11)$$

Equations I, II, and III are used to prove the relationship of real earnings management proxied by abnormal operating cash flow, abnormal production costs, and abnormal discretionary expenses to book-tax defferences as a form of tax avoidance. It is not enough to prove it in one direction, but it must be done in two directions to find out the more specific relationship between real earnings management and book-tax defferences and vice versa. This needs to be done to determine the coupling or decoupling between the two activities.

Equations IV, V, and VI in this study are formulated to prove the opposite relationship, namely book-tax defferences to real earnings management. When real earnings management affects book-tax defferences and book-tax defferences affects real earnings management, it can be concluded that real earnings management and book-tax defferences have a coupling relationship (sine qua non).

4. Result

4.1. Descriptive Statistical Analysis

Table 2 explains the descriptive statistics of each variable used in this study. The descriptive statistics for the research sample show that the mining sector companies used totaled 172.

The average value (mean) for BTD is –3.810565; abnormal CFO is –2.328884; abnormal PROD is –0.763576, abnormal DISEXP is –2.629598, company size is –1.736610; and company age is 14.68605. The minimum value for BTD is –6.846480; abnormal CFO is –6.296140; abnormal PROD is –3.882660; abnormal DISEXP is –3.637980; company size is –3.994140; and company age is 0.000000. Furthermore, the highest value (maximum) for BTD is –1.776710; abnormal CFO is 0.000000; abnormal DISEXP is –1.416070; company size is –0.418360; and company age is 31.00000. The median value of BTD is –3.810565; abnormal CFO is –2.227985; abnormal PROD is –0.732540; abnormal DISEXP is –2.605795; company size is –1.681720; and company age is –13.50000. The standard deviation for BTD is 0.562571; abnormal CFO is 0.894990; abnormal PROD is 0.767292; abnormal DISEXP is 0.505047; company size is 0.868149; and company age is 7.909224.

4.2. Hipotesis Test Result

The focus of this research is to prove the reciprocal relationship between real earnings management proxied by sales manipulation, production manipulation, and discretionary expense manipulation to book-tax differences as a form of tax avoidance. Furthermore, the results will also be used as a basis to explain the coupling or decoupling relationship between real earnings management and book-tax differences. The test results and hypothesis interpretation can be presented in Table 3.

Table 2

Descriptive Statistical Analysis Results

Variable	Obs.	Mean	Minimum	Maximum	Median	Std. Dev.
BTD	172	–3.810565	–6.846480	–1.776710	–3.810565	0.562571
Abnormal CFO	172	–2.328884	–6.296140	0.000000	–2.227985	0.894990
Abnormal PROD	172	–0.763576	–3.882660	0.817990	–0.732540	0.767292
Abnormal DISEXP	172	–2.629598	–3.637980	–1.416070	–2.605795	0.505047
Firm Size	172	–1.736610	–3.994140	–0.418360	–1.681720	0.868149
Firm Age	172	14.68605	0.000000	31.00000	–13.50000	7.909224

Table 3

Panel Least Square Results of Equation I and II

Variable	Equation I			Equation II		
	Coefficient	t-statistic	Prob.	Coefficient	t-statistic	Prob.
C	–4.015311***	–9.824778	0.0000	–3.799914***	–20.72029	0.0000
AbCFO	0.12227*	2.925820	0.0041			
AbPROD				0.018462	0.261705	0.7939
FIRM SIZE	–0.225324***	–2.740324	0.0070	–0.140471**	–2.290338	0.0232
FIRM AGE	0.012227	0.459476	0.6467	–0.016376**	–2.028247	0.0441
F-statistic		5.336800			3.434067	
Prob. (F-statistic)		0.000000			0.018328	
R^2		0.655884			0.057779	
Adjusted R^2		0.532986			0.040954	
Observation		172			172	

***, **, * indicates significant at level 1%, 5%, 10%

The regression model in Equation I is feasible to use because the Prob. (F-statistic) gives a result of 0.00 so that it is less than 0.05. In addition, the Adjusted R^2 gives the result that the independent variables are able to explain 53.29% of the dependent variable so that 46.71% is explained by other variables outside the study. The test results show that abnormal operating cash flow positively affects BTD by 0.15 at 1% significance level. The control variable in this study, firm size, does not affect tax avoidance, while firm age negatively affects BTD by 0.22 at the 1% significance level. Thus, testing Equation I supports the acceptance of hypothesis 1, namely "real earnings management proxied by abnormal operating cash flow affects book-tax differences as a form of tax avoidance".

Abnormal operating cash flows can arise when companies provide discounts or credit relaxation so that the level of sales increases. Mining sector companies tend to provide discounts or credit concessions to attract customers because the products sold are quite expensive and are only used by certain consumers. However, the increase in sales volume is not followed by an appropriate cash inflow because providing discounts or credit concessions will result in cash inflows from sales being smaller than they should be. This will result in the company's operating cash flow in the current year being smaller so that the profit recorded or reported by the company will also be lower. The low booked profit will also be followed by a low taxable profit.

However, book profit can be higher than taxable profit because the accrual basis method of recognizing transactions is allowed in accounting, while the tax authorities only allow the cash basis method. Receipts from future sales on credit can be included in the calculation of the current year's book profit, but must be excluded in the calculation of taxable profit. This in turn makes the taxable profit lower than the book profit, resulting in the tax expense tending to be lower.

The Prob. (F-statistic) value of 0.01 is less than 0.05 so that the Equation II regression model is declared feasible to use. In addition, the ability of the independent variables to explain the dependent variable based on Adjusterd R^2 is 4.09% so that there are 95.91% explained by other variables outside the study.

The test results show that BTD is not influenced by abnormal production costs. In addition, company size and age, which are control variables, negatively affect BTD by 0.14 and 0.01 at 5% significance level. Thus, testing Equation II rejects hypothesis 2, stating that "abnormal production cost as a proxy for real earnings management does not affect book-tax differences as a form of tax avoidance".

Abnormal production costs focus on the treatment of production costs incurred by the company. In the context of the mining sector, companies tend to produce according to demand or market conditions because the cost of production is not cheap. In addition, quality is important because mining products are quite high value so that companies will prioritize quality over quantity. This is done to maintain the sustainability of the company in the midst of market competition and coupled with the Covid-19 pandemic in 2020–2022 which makes the economy slump.

Efforts to minimize the tax burden must be in the minds of company management, but they do not do this through production manipulation because it is feared that it will disrupt the company's financial stability. When companies force themselves to increase production costs that can be charged in tax calculations so that there is a buildup of inventory when market demand is down, it will backfire on the company's own finances (Table 4).

The regression model in Equation III (Table 4) is feasible to use because Prob. (F-statistic) gives a result of 0.00 so it is less than 0.05. In addition, Adjusted R^2 gives the result that the independent variable is able to explain 6.15% of the dependent variable so that 93.85% is explained by other variables outside the study. The test results show that abnormal discretionary expenses positively affect tax avoidance by 0.23 at the 10% significance level.

Table 4

Panel Least Square Results of Equations III and IV

Variabel	Equation III			Equation IV		
	Coefficient	t-statistic	Prob.	Coefficient	t-stat	Prob.
C	–3.175826	–8.623141	0.0000	0.314920	0.361591	0.7183
AbDISEXP	0.230643*	1.969853	0.0505			
FIRM SIZE	–0.100033	–1.590000	0.1137	0.002677	0.019714	0.9843
FIRM AGE	–0.013752*	–1.699713	0.910	–0.074707*	–1.769913	0.0792
BTD				0.404665***	2.925820	0.0041
F-statistic	0.741229			5.200580		
Prob. (F-statistic)	0.003353			0.000000		
R^2	0.078056			0.650025		
Adjusted R^2	0.061593			0.520534		
Observation	172			172		

***, **, * indicates significant at level 1%, 5%, 10%

The control variable in this study, firm size, does not affect tax avoidance, while firm age is found to negatively affect BTD by 0.01 at the 10% significance level. Thus, testing Equation III supports the acceptance of hypothesis 3, namely "real earnings management proxied by abnormal discretionary expenses affects book-tax differences as a form of tax avoidance".

Mining sector companies tend to have high discretionary expenses to support operational activities, such as expert services expenses, freelance labor salary expenses, and research and development expenses. Discretionary expenses in the mining sector are not solely used for tax avoidance purposes, but are mostly used to support the sustainability and progress of the company.

In addition, companies that have high discretionary expenses may not use BTD to reduce tax expenses because the expenses calculated according to accounting are not much different according to tax. In addition, the decisions or views of company leaders in the mining sector can also be one of the reasons discretionary expenses are not used to minimize the tax burden.

Likewise, the Prob. (F-statistic) value of 0.00 is less than 0.05 so that the Equation IV regression model is declared feasible to use. In addition, the ability of the independent variables in explaining the dependent variable based on Adjusterd R2 is 52.05% so that there are 47.95% explained by other variables outside the study. The test results show that BTD affects abnormal operating cash flow positively by 0.40 at 1% significance level. Abnormal operating cash flow is not affected by company size, but is negatively affected by company age by 0.07 at the 10% significance level. Company size and age are control variables in this study. Thus, testing Equation IV supports the acceptance of hypothesis 4, namely "tax avoidance with book-tax differences affects abnormal operating cash flow as a proxy for real earnings management"

Companies that wish to print high BTD will focus on the company's cash flow. Cash flow from operating activities is a concern for the company because it will indirectly affect the reported book profit and taxable profit. Companies that want to obtain high BTD will make taxable profit low and book profit remain high. This will unconsciously bring the company into the practice of real earnings management through abnormal operating cash flow with a focus on sales. High BTD can be achieved when cash inflows mainly from operating activities in the current year are small because the reported taxable profit is also small.

However, book profit can be made larger than taxable profit through the credit sales mechanism as a treatment of sales. Credit sales receipts from the future can be accounted for in book profit because it is allowed to adopt the accrual basis, while in tax they must be excluded because only the cash basis is allowed.

The regression model in Equation V (Table 5) is declared feasible to use because the Prob. (F-statistic) value is 0.04, making it less than 0.05.

In addition, the Adjusted R2 gives the result that the independent variables are only able to explain 3.08% of the dependent variable so that 96.92% is explained by other variables outside the study. The test results show that abnormal production costs are not affected by BTD. Furthermore, firm size negatively affects abnormal production costs by 0.15 and is significant at the 5% level, while firm age does not affect it. Therefore, hypothesis 5 is rejected, stating that "tax avoidance with book-tax differences does not affect abnormal production costs as a proxy for real earnings management".

The way to achieve high book-tax differences is not done through abnormal production costs. This happens because abnormal production costs will force companies to increase production costs so that the products produced increase from before in order to minimize production costs per unit. For mining companies, this action can backfire on the company's finances because abundant production and not followed by increased market demand will result in losses for the company when the product is not sold. Mining products that are stored for too long due to unsaleability will lead to a decrease in quality so that they must be disposed of and harm the company.

The Prob. (F-statistic) value of 0.00 is less than 0.05 so that the regression model Equation VI is declared feasible to use. In addition, the ability of the independent variables to explain the dependent variable based on Adjusterd R2 is 85.4% so that there are 14.6% explained by other variables outside the study. The test results show that BTD positively affects abnormal discretionary expenses by 0.10 at the 5% significance level. The control variable in this study, company size, negatively affects abnormal discretionary expenses by 0.07 at the 10% significance level, while company age has no effect. Therefore, testing Equation VI supports the acceptance of hypothesis 6, namely "tax avoidance with book-tax differences affects abnormal discretionary expenses as a proxy for real earnings management".

Discretionary expenses are one of the real earnings management components that are affected by the company's desire to print high book-tax differences. Treatment of discretionary expenses is indirectly carried out when the company wants book profit to be greater than taxable profit. This can happen because discretionary expenses have a great opportunity to be

Table 5

Panel Least Square Results for Equations V and VI

Variabel	Equation V			Equation VI		
	Coefficient	Std. Error	Prob.	Coefficient	Std. Error	Prob.
C	–0.621406*	–1.667581	0.0973	–2.491678***	–9.145630	0.0000
BTD	0.051789	0.688920	0.4918	0.108883**	2.516620	0.0131
FIRM SIZE	–0.154427**	–2.314096	0.0219	0.071732*	–1.688634	0.0938
FIRM AGE	–0.014504	–1.257669	0.2103	0.010378	0.785997	0.4333
F-statistic		2.815228			23.23509	
Prob. (F-statistic)		0.040848			0.000000	
R^2		0.047866			0.892453	
Adjusted R^2		0.030863			0.854043	
Observation		172			172	

***, **, * indicates significant at level 1%, 5%, 10%

used as a deduction in the calculation of taxable profit because they are deductible expenses. Discretionary expenses such as depreciation can be worth more when charged in the calculation of taxable profit due to differences in rules between Financial Accounting Standards (SAK) and tax regulations.

4.3. Coupling Analysis Results

The results of hypothesis testing that have been carried out prove that between discretionary expenses and book-tax differences, the nature of the relationship is aligned (hand in hand) or coupled, and it can be said that if there is manipulation of discretionary expenses, it will automatically appear in nominal changes in book-tax differences, or "sine qua non".

However, table 6 also shows that there is no influence between abnormal production costs and book-tax differences. This is because mining companies have policies that adjust their production costs based on needs, for example, meeting customer demand (increased sales), without being able to manipulate book-tax differences with the aim of tax avoidance.

Meanwhile, the coupling nature between abnormal operating cash flows and book-tax differences means that the two variables will go hand in hand. When abnormal operating cash flows increase, the resulting book-tax differences also increase, and vice versa. This indicates that sales that emphasize operating cash flow will always have a direct impact on the movement of the book value of book income and taxable income, which in turn results in book-tax differences.

Furthermore, factors that cause abnormal operating cash flows, such as discounting and credit relaxation, will also have an impact on book-tax differences. This also provides information that mining sector companies tend to conduct tax avoidance in the form of book-tax differences through real earnings management by treating sales, resulting in abnormal operating cash flows.

The same result occurs in the relationship between abnormal discretionary expenses and book-tax differences. Coupling properties are also formed in the relationship between discretionary expenses and book-tax differences. When abnormal discretionary expenses increase or decrease, it will be followed by an increase or decrease in book-tax differences.

This can happen because most types of expenses that can be categorized as discretionary expenses can be charged in the calculation of taxable income or are deductible expenses. Depreciation expense, contained in general and administrative expenses, is one form of discretionary expense that can allow a higher amount than when included in the tax calculation. The difference between the provisions of Financial Accounting Standards (FAS) and Tax Regulations is the basis for this.

5. Discussion

Previous research has only proven one-way testing, either from real earnings management to tax avoidance or only proving book-tax differences as an indicator of earnings management to tax avoidance. As in the case of [13] and [12], who prove that real earnings management activities are used for tax avoidance.

Table 6

Coupling and Decoupling Analysis Results

Variable	Dependen			
	AbCFO	AbPROD	AbDISEXP	BTD
AbCFO				+ Coupling
AbPROD				× No Effect
AbDISEXP				+ Coupling
BTD	+ Coupling	× No Effect	+ Coupling	

Meanwhile, [10] prove that book-tax differences can indicate manipulation in accounting. Or [11], which shows that the greater the book-tax differences, the greater the level of earnings management carried out in order to obtain tax savings through tax avoidance. The study cannot prove the relationship between real earnings management and book-tax differences, as the researcher wants to prove.

Therefore, the researcher wants to prove that not only does real earnings management affect book-tax differences, but from the researcher's observation, it needs to be proven that book-tax differences are also the result of real earnings management, so in addition to testing real earnings management on book-tax differences, the researcher also reciprocally tests book-tax differences on real earnings management.

Thus, the hypothesis testing of this study provides the following results: Hypotheses 1, 2, and 3 that test the effect of the three real earnings management proxies in influencing book-tax differences provide significant results, except for the abnormal production cost variable.

Meanwhile, hypotheses 4, 5, and 6 that test the effect of book-tax differences on the three real earnings management proxies also give significant results, except for the abnormal production cost variable, as explained earlier in the coupling test results section.

These results prove that there is a coupling relationship (sine qua non) from real earnings management activities to book-tax differences and vice versa. That is, book-tax differences are indeed the result of real earnings management manipulation from operating cash flow costs and discretionary expenses. This effect also shows that companies, especially in the mining sector, will always carry out earnings management by manipulating operational cash flow costs and discretionary expenses with the aim of conducting tax avoidance by adjusting the amount of the company's book-tax differences, where the amount of book-tax differences will automatically adjust based on real earnings management manipulation.

Real earnings management is an activity that refers to the PSAK, while book-tax differences are an activity that refers to the Tax Law. The result of real earnings management is book income, while book-tax differences are the difference between book income and taxable income. Taxable income itself can be obtained from the fiscal reconciliation process (the process of adjusting commercial financial statements in accordance with PSAK with the Tax Law, which produces fiscal financial statements).

Thus, the existence of fiscal reconciliation can be a dilemma for the government because the two rules (PSAK and Tax Law) become interrelated. If the calculations in the PSAK still have to be adjusted again with the tax regulations, there will always be weaknesses that can be utilized by company management to avoid taxes, such as book-tax differences.

This research is expected to contribute to the government, especially the Directorate General of Taxes, as a policymaker, to start paying attention to the volatility of book-tax differences for each company. Because it has been proven that book-tax differences are the result of earnings management manipulation.

However, this study still has limitations, namely not considering the existence of tax facilities in each type of mine, which may also affect the determination of the amount of book income recognized and the amount of taxable income of the company.

Wittek et al. [34] revealed that rational choice theory has two assumptions, namely, maximizing self-interest at a small cost and individualism methodology. The notion of coupling departs from the notion of decoupling, which is two variables that initially run in harmony or side by side but, for some reason, become misaligned or contradictory [35].

6. Conclusion

In general, decisions made by organizations and managers (individuals) involve complex and broad conditions. Rational choice theory tries to build a framework for framing the complex

situation so that a rational framework will be obtained underlying the decisions made by individuals on all available options, for example, in tax avoidance to choose to use accrual-based earnings management or real earnings management.

In contrast to the accrual-based earnings management method, real earnings management is more often used as an option for tax avoidance because it tends not to be easily detected by external auditors and because many of the accounts contained in it can be determined by management policies to manage the company's operational activities, which of course are tailored to the specific needs of the company that are not the same as those of other companies.

Thus, of course, the decision that will be made by the company's management is one that is considered rational in accordance with the conditions of the company and also based on experience in previous years. However, when viewed in general, choices that are considered rational are based on individual experience; if there are choices that are considered rational but in an unstable environment, it can lead to high individual risk, and if faced with the company's need to audit financial statements, it will automatically have implications for the behavior of auditors or tax authorities, which are also irrational. Because, in principle, companies cannot control the behavior of external auditors and even tax authorities.

Therefore, rational choice theory cannot be separated from maximizing behavior, namely individuals as subjects in the context that they are in institutions or organizations, meaning that institutions or organizations are products and sources in making decisions to obtain maximum economic benefits for the organization, in this case the selection of tax avoidance methods. Rational choice theory is based on the assumption of preference consistency for low-risk faced by individuals (human or non-human) as decision-makers, meaning that rationally, if the risk cannot be predicted precisely due to a lack of external information (an environment outside the organization) and cannot even be controlled effectively, then individuals will prefer risks that have high risk consistency (stable), which of course can be controlled properly by individuals.

The selection of the best strategy by management to maintain high profits and a low tax burden can be explained by rational choice theory. The theory emphasizes that the best choice is the one that can provide benefits for oneself to achieve certain goals on the basis of rational thinking. Real earnings management and book-tax differences can be a choice that is considered rational by management to achieve the goal of printing high profits and minimizing the tax burden. When these two things can be achieved, the management will get an award for being able to increase the value of the company, and this is also one of the goals of the management. Real earnings management and book-tax differences, which are rational choices of management, will certainly run in harmony or side by side to achieve the goal of maintaining high profits and minimizing the tax burden. When real earnings management increases, it will be followed by book-tax differences that also increase, and vice versa. The alignment of the relationship is known as coupling.

From the findings of the research, the government, especially the Directorate General of Taxes, can be more thorough in examining tax avoidance, especially with regard to real activities and book-tax differences. Furthermore, the Directorate General of Taxes can also calculate the book-tax differences that arise against companies suspected of tax avoidance. In addition, tax auditors owned by the Directorate General of Taxes can be given training related to the examination of real earnings management and book-tax differences. Knowledge and understanding of real earnings management and book-tax differences will be very useful when there are indications of mining companies doing tax avoidance through book-tax differences.

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CEO Skills in Preventing Tax Avoidance Activities and Reducing the Risk of Stock Price Crashes in Indonesia

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ABSTRACT
The market bubble phenomenon has hit the capital markets, including in Indonesia. This occurs when a company's cash flow is lower than investors' expectations. Even the literature on stock price crash risk, which considers managers' motives to disguise negative information, identifies that tax avoidance has been used as a mask by managers to cover up poor performance. This study aims to determine the effect of high CEO capability on the relationship between tax avoidance and stock price crash risk in Indonesia. This research method uses a quantitative approach with 436 observations of companies on the Indonesia Stock Exchange during the period 2015–2019. Data was obtained through the official website of the Indonesia Stock Exchange indexed by Kompas 100. The data was tested using ordinary least squares regression model. The results of this study found that, first, tax evasion has a positive effect on the risk of decreasing the share price of companies incorporated in the Kompas 100 index on the Indonesia Stock Exchange. Second, that a highly skilled CEO can weaken the relationship between tax evasion and the risk of falling stock prices. This finding supports the agency theory perspective, where tax evasion is used by opportunistic managers to disguise financial information, thereby increasing the risk of future stock price crash. This study enriches the literature by demonstrating the role of highly skilled CEOs in influencing the intensity of the relationship between tax avoidance and stock price crash risk. Second, this study demonstrates the uniqueness of incorporating the human aspect, in the form of CEO characteristics, into the model linking tax avoidance with stock price crash risk.

KEYWORDS
capital market, stock market, quantitative finance, corporate financial management, tax avoidance

JEL D53; H12; M41; M42

УДК 336.228, 336.63

Роль компетенций генерального директора в предотвращении уклонения от уплаты налогов и снижении риска обвала цен на акции в Индонезии

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АННОТАЦИЯ
Феномен пузыря ударил по рынкам капитала, в том числе в Индонезии. Это происходит, когда денежный поток компании ниже ожиданий инвесторов. Литература о риске обвала цен на акции, в которой рассматриваются мотивы менеджеров для сокрытия негативной информации, указывает, что уклонение от уплаты налогов использовалось менеджерами в качестве маскировки по сокрытию плохой работы. Данное исследование направлено на определение влияния роли компетенций генерального директора на взаимосвязь процессов предотвращения уклонения от уплаты налогов и снижения риска обвала цен на акции в Индонезии. Метод исследования предусматривал количественный подход

с наблюдением 436 компаний на Индонезийской фондовой бирже в период 2015–2019 гг. Данные были получены через официальный сайт Индонезийской фондовой биржи, индексируемой Kompas 100. Данные были протестированы с использованием обычной регрессионной модели наименьших квадратов. Результаты исследования показали следующее. Во-первых, уклонение от уплаты налогов положительно влияет на риск снижения цены акций компаний, входящих в индекс Kompas 100 на Индонезийской фондовой бирже. Во-вторых, высококвалифицированный генеральный директор может ослабить взаимосвязь между уклонением от уплаты налогов и риском падения цен на акции. Этот вывод подтверждает точку зрения агентской теории, согласно которой уклонение от уплаты налогов используется оппортунистическими менеджерами для сокрытия финансовой информации, тем самым увеличивая риск будущего обвала цен на акции. Данное исследование обогащает литературу, демонстрируя роль высококвалифицированных руководителей во влиянии на интенсивность взаимосвязи между уклонением от уплаты налогов и риском обвала цен на акции. Также исследование демонстрирует уникальность включения человеческого аспекта в виде характеристик генерального директора в модель, связывающую уклонение от уплаты налогов с риском обвала цен на акции.

КЛЮЧЕВЫЕ СЛОВА

рынок капитала, фондовый рынок, количественные финансы, управление корпоративными финансами, уклонение от уплаты налогов

1. Introduction

The market bubble phenomenon hit the capital market, including in Indonesia. This happens when the company's cash flow is lower than investors' expectations, Manrejo [1] said that manager will withhold negative information to protect his personal interests.

Habib [2] said that on the risk of stock price crashes that pays attention to managers' motives for disguising negative information has identified that tax evasion has been used as a mask by managers to cover up poor performance.

Various managerial policies that are deliberately designed to minimize the tax burden, Blaufus & Neifar [3–4] are proven to accurately increase profits, company value, and shareholder wealth, even by putting costs aside, aggressive tax strategies make company shares more attractive.

Garg [5] said especially when tax evasion is used by an opportunistic manager to disguise poor performance. Kim [6] also showed thus, shareholders are forced to consume misleading information asymmetry. Basri [7] substantiated if this is continuously done, then at a certain critical point there will be an accumulation of negative information which can drive down the company's stock price (crash risk).

Mazur [8] has shown that tax-evading firms have a higher probability of experiencing future stock price crashes. However, other studies have shown different results. Neifar [4] showed that in Germany, tax avoidance has no effect on stock price crash risk, but increases shareholder wealth significantly. The difference in the results of this study can occur because the positive effect of tax avoidance on the risk of a stock price crash depends on whether there is opportunistic behavior of managers in this relationship [9]. If tax evasion is not intended to hide negative information.

Al Mamun [10] showed that the tendency of managers to behave opportunistically is more driven by the need to maintain a career or because managers have low skills. Custódio [11] substantiated that managers with superior skills are not interested in hiding negative information because with high skills, they can overcome any consequential pressure. Managers with higher skills will enjoy higher levels of compensation and have diverse career experiences in a variety of industries. Therefore, Custódio [11] showed that managers with high skills are not as motivated to hide bad news as managers with low skills or abilities.

This study extends the literature on tax avoidance as a determinant of stock

price crash risk by taking into account the skills of a firm's key manager, the chief executive officer (CEO). Previous research has not revealed much about the role of highly skilled CEOs in firms that pursue aggressive tax policies.

To fill the gap in the literature, this study aims to answer the question of how the role of highly skilled CEOs in influencing the relationship between tax avoidance and stock price crash risk. Using a sample of Kompas 100 indexed companies listed on the Indonesia Stock Exchange for the period 2015 to 2019.

We are motivated to research the Indonesian capital market given that the phenomenon of tax avoidance has become a very serious taxpayer compliance problem and threatens the tax systems of countries in the world, including Indonesia. With Indonesia's tax ratio ranging from 10–12%, it shows that the contribution of tax revenue to national income is relatively low compared to the enormous potential of tax revenue. Sutrisno et al. [12] approve that this condition reflects the high level of tax evasion in Indonesia.

This research contributes to knowledge development in several ways.

First, this study enriches the literature by demonstrating the role of high skill CEOs in influencing the intensity of the relationship between tax avoidance and stock price crash risk. Through this study, it is evident that high-skill CEOs are not sensitive to career concerns, so they are not motivated to hide the negative information behind tax avoidance and can reduce the likelihood of the firm experiencing stock price crash risk.

Second, this study displays the uniqueness of incorporating human aspects in the form of CEO characteristics in a model that links tax avoidance with the risk of stock price crashes.

Third, this study makes a practical contribution by providing companies with an overview of the role of CEOs with high capabilities to mitigate the risk of stock price crashes.

Finally, this study also contributes theoretically Healy & Ball [13; 14] by providing evidence from an agency theory perspective that managers' opportunistic behaviour is triggered by career concerns and low skills.

The purpose of this study was conducted with the aim of knowing the effect of a CEO's high skill on the relationship between tax avoidance and the risk of stock price crashes in Indonesia.

This study formulates the following hypothesis:

H1: Tax avoidance has a positive effect on the stock price crash risk

H2: CEOs with high skills weaken the positive relationship between tax avoidance and the risk of falling stock prices

In the next section, we will present literature review that explains the theory used in this study and explains the hypothesis we built.

2. Literature Review

2.1. Agency Theory

From the perspective of agency theory Meckling [15], the idea that tax avoidance facilitates agents (managers) to present information asymmetry to principals (shareholders) to hide their inability to perform well.

Jaya [16] showed that agency theory is closely related to tax avoidance practices, because agency theory or agency theory explains the relationship between stakeholders and company management, where both parties work together to achieve company goals, namely profit. Stakeholders or shareholders are referred to as principals, while company management is referred to as agents in agency theory.

Fama [17] substantiated that the relationship between the principal and the agent is contained in the Cooperation contract and is referred to as the agency relationship. The relationship between principal and agent Jaya [18] called an agency relationship that occurs when the owner of the company delegates authority to the manager as to perform a service or job in the company.

Svabova [19] said in agency theory, which is reflected in the agency relationship, there is often information asymmetry or differences in information received

between the principal and the agent. Where the principal or company owner has less information related to the company than the agent or company manager. This encourages managers to act alone and benefit themselves. In agency theory, financial reports made by company management are caused by opportunistic motivation and signaling motivation. Opportunistic motivation is where management reports financial reports with higher profits to get incentives, while signal motivation is where management reports quality financial reports to give positive signals to investors.

As a result of managers' activities to hide this negative information, Daniel [20] substantiated that the company's share price is valued above its fundamental value for some time depending on how far the share price is as long as the actual average return is greater than the interest rate. At the point where managers are no longer able to increase the actual average rate of return and hidden negative information is released to the public, then the market response is shown by a sudden drop in the share price known as the risk of a share price crash.

Based on this, agency theory has a relationship with tax avoidance by companies. Where this situation is caused by differences in interests caused by information asymmetry between the principal and the agent.

2.2. Tax avoidance and the stock price crash risk

Delgado et al. [21] showed that tax avoidance is a form of effort to streamline and reduce the tax burden by avoiding the imposition of taxes and placing profits on transactions that are not tax objects. In carrying out tax avoidance practices, the technical strategy carried out must be legal and safe for taxpayers and does not conflict with the provisions of tax regulations. In carrying out tax avoidance practices can be done in several ways.

According to researchers Jati & Bhattacharjee [22; 23], there are several ways that companies generally use to avoid taxes while still complying with the laws and regulations: utilizing tax treaty, maximizing fixed assets by expecting depreciation expense (capital intensity), choosing capital from debt that is higher than the company's capital, and transfer pricing. All these methods aim to increase investor valuation and obtain more profit. Tax avoidance is done to increase the value of the company, so that management performance can look good in the eyes of investors.

Ritsatos [24] stated that because tax evasion includes the act of eliminating the tax burden in an illegal way, leading to escape in tax payments. The method that can be done is certainly by supporting various rules so that it is against the law.

Blaylock [25] showed that tax evasion is the means or efforts used with the aim of reducing the tax burden by using unlawful means, while tax avoidance is the steps to avoid taxes in a legal way. However, both acts against tax, namely tax avoidance and tax evasion, are unjustified acts, because they hinder the government in realizing the purpose of tax regulations made (the spirit of law). Both are actions that can harm morals or morals, so that it can cause harm to many parties.

Bird & Bird [26; 27] substantiated that companies do tax avoidance to enjoy benefits in the form of cost savings, increased profits, and increased shareholder wealth. However, it is undeniable that tax avoidance activities also carry potential costs that are not cheap, namely Ligon [28] in the form of litigation risk and reputation risk.

Lee [29] stated that the complexity of the design of tax avoidance transactions is deliberately designed to prevent detection by the tax authorities. Abubakar et al. [30] stated that Companies' involvement in tax avoidance activities with different levels of aggressiveness indicates their different tastes in potential cost risks. In a country with a society that views tax obligations as a form of social responsibility.

Alvionita [31] stated that considering the high tax avoidance in Indonesia which is reflected in the low tax ratio below 15 percent and research results which show that when tax planning is carried out effectively there is no effect on the risk of a stock price crash.

Hotho [32] stated that whereas if a company implements an aggressive tax strategy, the company is faced with the risk of future crashes. This research is intended to confirm the relationship between tax evasion and stock price crash risk in Indonesia.

Chen [33] stated that increased tax avoidance activities have an impact on increasing the risk of stock price crashes. Based on the theoretical explanation and some previous similar literature, the following hypothesis is prepared.

H1: *Tax avoidance has a positive effect on the stock price crash risk.*

2.3. Tax avoidance has a positive effect on the stock price crash risk

Tax avoidance can be caused by internal factors of corporate governance, namely the CEO. Harymawan [34] stated that because a CEO is the highest leader in a company's management and is fully responsible for the company's operations. CEOs in making decisions are influenced by several factors such as personality and power.

Saona [35] stated that a manager's decision to engage in opportunistic behavior is more driven by reasons to maintain a career related to poor performance in managing the company. Gul [36] stated that a highly skilled manager is not concerned about the risk of being fired given his long and varied career experience, as well as his ability to move jobs across industries to pursue a career. In addition, Qiao [37] stated that a manager with higher ability is usually compensated more highly. Given their superior capabilities are highly sought after in the labor market to guide companies during a constantly changing business environment, Healy [38] stated that such as changes in industry deregulation, changes in market dynamics, increasing global competition, rapid changes in technology, and changes in managerial practices. Because of their lack of concern about compensation issues, highly skilled CEOs are not motivated to hide bad news to prevent the risk of falling stock prices. Previous studies have proven that the significant positive effect of CEO power and stock price crash risk mainly occurs in companies with low-skilled CEOs. Zhang [39] stated that highly skilled managers deliver better quality earnings thereby reducing the likelihood of crashes.

By looking at the results of previous research Ali & Bryan [40; 41] on the influence of manager abilities or skills on manager behavior and the implications for companies, this study predicts that managers with high skills tend to behave in harmony with the interests of shareholders and are not motivated to hide bad news. This study hypothesizes that the presence of highly skilled managers can prevent the use of tax evasion to cover up negative information in order to reduce the risk of stock price crashes. This study formulates the following hypothesis.

H2: CEOs with high skills weaken the positive relationship between tax avoidance and the risk of falling stock prices.

Next, we will explain the research methods consisting of population, sample, data collection techniques, variables, and data analysis techniques used in this study.

3. Research Method

This study uses the ordinary least square regression model with stock price crash risk as the dependent variable and tax avoidance as the variable of interest. Meanwhile, CEO skill is a moderating variable. Data obtained from the website of the Indonesia Stock Exchange in the form of annual reports and financial statements of companies listed on the Kompas-100 Index.

Kim [42] measured of stock price crash risk in this study uses two measures, namely down to up volatility (*DUVOL*) and Negative Conditional Skewness (*NCSKEW*). As in equation (1) below:

$$r_{it} = \alpha_j + \beta_{1jrm,\tau-2} + \beta_{2jrm,\tau-1} + \\ + \beta_{3jrm,\tau} + \beta_{4jrm,\tau+1} + \beta_{5jrm,\tau+2} + \varepsilon_{jt}, \quad (1)$$

where r_{jt} is the stock return j in week r while rm is the stock return based on the market value index for that week. While, α is the constant and β is beta.

DUVOL is measured by Kim [43] by calculating the natural logarithm of the ra-

tio of the standard deviation on the week down to the standard deviation on the week up, equation (2) below:

$$DUVIL_t = \log\left\{\frac{(n-1)\sum down\ w_2}{(n-1)\sum up\ w_2}\right\}; \quad (2)$$

$$NCSKEW_{j\tau} = -\frac{n(n-1)^{3/2}\sum w_{3j\tau}}{(n-1)(n-2)(\sum w_{2j\tau})^{3/2}}, (3)$$

where $W_j\ t$ is the company-specific weekly return as described above; n is the number of weekly returns in a year; and the negative sign in front of the equation indicates that a higher *NCSKEW* value indicates a higher accident risk.

This study uses predictions about the likelihood of involvement in tax evasion as the main measure Wilson [44] that focuses on a strong tendency to commit extreme forms of tax evasion by using two measurements, namely the tendency of companies to carry out aggressive tax evasion: *SHELTER* and long-term effective tax rate *LETR*:

$$\begin{aligned} SHELTER = &-4.86 + 5.20^{\times} BTD + \\ &+ 4.08^{\times} |DAP| - 1.41^{\times} LEV + \\ &+ 0.76^{\times} AT + 3.51^{\times} ROA + \\ &+ 1.72^{\times} FOREIGN\ INCOME + \\ &+ 2.43^{\times} R\&D, \end{aligned} \quad (4)$$

where *BTD* (book-tax difference) is book income minus taxable income divided by assets. Book Income is income before tax in year *t*. Taxable income is calculated by adding up the current domestic tax expense and the current foreign tax expense divided by the tax rate, then deducting the net operating loss. $|DAP|$ is the absolute value of discretionary accrual performance which is the residual value of the following cross-sectional modification of the Jones [45]:

$$\begin{aligned} TA_{it} = &\delta_0 ASSET_{it-1} + \delta_1 \Delta SALES_{it} + \\ &+ \delta_2 PPE_{it} + \delta_3 ROA_{it-1} + v_{it}, \end{aligned} \quad (5)$$

where *TA* is the total accrual which is defined as the change in non-cash current assets minus current liabilities excluding the long-term debt portion due to deducting depreciation and amortization; $ASSET_{it-1}$ is an asset in the previous period; *SALE* is a sales change; *PPE* is property, plant and equipment; ROA_{it-1} is the return on assets at $t-1$.

LEV is long-term debt divided by total assets, *AT* is the log value of total assets, *ROA* is profit before tax divided by total assets, *FOREIGN INCOME* is a dummy variable that is assigned a value of 1 if the company reports its overseas income and is assigned a value of 0 otherwise, *R&D* is research and development costs divided by total assets.

The second method for measuring tax evasion is measuring the long-term cash effective tax rate (*LETR*):

$$LETR_{it} = \frac{\sum_{k=t-4}^{t} cash\ tax\ paid}{\sum_{k=t-4}^{t} pretax\ income - special\ item}, (6)$$

where *cash tax paid* is cash tax paid by the company. Income before tax is income before tax. Special items are extraordinary income items that are usually hidden by management for tax avoidance purposes such as extraordinary expenses, restructuring costs, profits from debt relief, and so on.

Measuring CEO skills, namely using the General Ability Index (*GAI*) developed by Al Mamun [10]. *GAI* shows the ability and work experience of the CEO in the company prior to occupying the current position as measured by the following equation:

$$\begin{aligned} GAI_{it} = &0.268X1_{it} + 0.312X2_{it} + \\ &+ 0.309X3_{it} + 0.218X4_{it} + 0.153X5_{it}, \end{aligned} \quad (7)$$

where (*X*1) is the number of different positions held by a CEO during his career, (*X*2) is the number of companies where the CEO previously worked, (*X*3) is the number of industrial fields where the CEO has worked, and (*X*4) is a dummy variable that is given a value of 1 if the CEO has served as CEO in another company and 0 otherwise, (*X*5) is a dummy variable that is given a value of 1 if the CEO works for a multi-division company and 0 otherwise.

To test hypothesis 1, this study uses a regression equation that relates each measurement of stock price crash risk

in year t with each measurement of tax avoidance in year $t-1$ and a set of control variables in year $t-1$.

$$SPCR_t = \alpha_0 + \alpha_1 TAXVAR_{t-1} + \\ + \sum_{q=2}^{m} \alpha_3 Control\ variable_{t-1} + \varepsilon_{t-1}, \quad (8)$$

where $SPCR_t$ is one of the two stock price crash risk measurements in year t; $TAXVAR_{t-1}$ is one of two measures of tax avoidance in year $t-1$.

The control variables used in this study consisted of $DTURN_{t-1}$, $SIGMa_{t-1}$, RET_{t-1}, $SIZE_{t-1}$, $MBt\text{-}1$, LEV_{t-1}, ROA_{t-1}, $ACCM_{t-1}$. The variable $DTURN_{t-1}$ is the average outstanding shares in year t minus the average outstanding shares in year $t-1$. The variable $SIGM_{at-1}$ is the standard deviation of company-specific weekly returns throughout the fiscal year by Chen [33].

The variable RET_{t-1} is the company's specific weekly average return in year $t-1$. The variable $SIZE_{t-1}$ is the logarithm of the market value of equity in year $t-1$. The MB_{t-1} variable is the market value of equity divided by the book value of equity in year $t-1$. The variable ROA_{t-1} is the return on investment in the form of company assets in year $t-1$. The LEV_{t-1} variable is the company's leverage ratio in year $t-1$. The variable $ACCM_{t-1}$ is the number of previous 3 year moves of $|DAP|$. the value described above.

To test hypothesis 2, this study adds equation (8) with the CEO skill variable as measured using the general ability index (*GAI*) and the interaction of this variable with the tax avoidance variable which is formulated in the following equation:

$$SPCR_t = \alpha_0 + \\ + \alpha_1 TAXVAR_{t-1} + \alpha_2 SKILL_{t-1} + \\ + \alpha_3 SKILL_{t-1} SKILL_{t-1} \cdot TAXVAR_{t-1} + \\ + \sum_{q=2}^{m} \alpha_3 Control\ variable_{t-1} + \varepsilon_{t-1}, \quad (9)$$

$SKILL_{t-1}$ is the general ability index of a CEO in year $t-1$; $SKILL_{t-1} \cdot TAXVAR_{t-1}$ is the interaction of skill variables and tax avoidance in year $t-1$.

The next section is an explanation of the data test results and discussion which is analyzed for compatibility with the results of similar studies. In the discussion section, there will also be a summary of arguments to confirm the hypothesis that has been built before.

4. Results

Table 1 presents descriptive statistics for all variables used in the regression analysis. The average value of *NCSKEW* is 0.632 and *DUVOL* is –0.0613 as shown

Table 1

Descriptive statistics for stock price crash risk, tax evasion, CEO skills, and control variables

	Minimum	Maximum	Means	std. Deviation	N
NCSKW	–3.16	10.93	0.6322	1,481	436
DUVOL	–9.90	9.59	–0.0613	1668	436
ETR	–7.68	1.95	0.1527	0697	436
SHELTER	–689.6	435.5	–503.3	97.51	436
GAI	–4.43	14.05	2,631	1,431	436
GAI_ETR	–5.60	34	0.802	2,472	436
GAI_SHELTER	99.71	7703	1343	747.1	436
ACCM	–843.9	879	0.181	78.61	436
LEV	–642.9	794	68.9	135.3	436
ROA	–55.10	60.54	5.94	12,882	436
SIZE	2.83	22.92	12.59	1,788	436
DTURN	–19.48	10	0.0006	2,637	436
SIGMA	–19.44	10	0.0536	2,638	436
RET	–884	896	–0.619	78.58	436

in Table 1, which is higher than the average value of previous studies [43], this can mean that the sample in this study has a greater risk of accidents compared to the sample used in previous studies.

Likewise, the average *ETR* value of 0.1527 is lower than the average *ETR* in the previous study and the *SHELTER* average is –503.3 higher than the previous study, which means that tax avoidance activities in the sample companies in this study are more aggressive.

Table 2 shows that *NCSKEW* and *DUVOL* have a strong correlation coefficient of 0.558. *ETR* has a negative correlation coefficient for *NCSKEW* and *DUVOL*, and *SHELTER* has a positive correlation coefficient for *NCSKEW* and *DUVOL*. These results show that the lower the company's *ETR* value and the higher the *SHELTER*, the higher the *NCKEW* and *DUVOL*. Meanwhile, *GAI*, which is a measure of CEO skills, has a negative correlation with *NCSKEW* and *DUVOL*, which means that the higher the skills of the CEO, the lower the *NCSKEW* and *DUVOL*.

In Table 3 Panel A, there are two columns, each column showing the results of the *NCSKEW* regression with the two tax avoidance proxies used in this study, namely ETR and *SHELTER*. In Panel A Column 1, it shows that the tax avoidance variable measured using ETR_{t-1} has a negative effect with a significance level of 5% on stock price crash risk as measured using $NCSKEW_t$, this can be seen from the coefficient of –0.193 and t-value –2.274. Meanwhile, Panel A Column 2 shows that the tax avoidance variable measured using $SHELTER_{t-1}$ has a positive effect with a significance level of 1% on stock price crash risk as measured using $NCSKEW_t$, this can be seen from the coefficient of 0.002 and t-value of 2.577.

While in Table 3 Panel B shows *OLS* regression with $DUVOL_t$ as the dependent variable and tax avoidance proxy as the independent variable. In Panel B Column 1, it shows that the tax avoidance variable measured using ETR_{t-1} has a negative effect at the 5% significance level on stock price crash risk as measured using $DUVOL_t$, this can be seen from the coefficient of –0.115 and t-value of –2.550. And in Panel B Column 2, it shows that the tax avoidance variable measured using $SHELTER_{t-1}$ has a positive effect with a significance level of 1% on stock price crash risk as measured using $DUVOL_t$, this can be seen from the coefficient of 0.002 and t-value of 2.851.

The results as shown in Table 3 prove that the more aggressively the company engages in tax avoidance activities, which is reflected in the higher *SHELTER* value or lower *ETR* value, the more vulnerable the company is to experiencing stock price crashes as measured by both *NCSKEW* and *DUVOL*.

The existence of a significant influence between tax avoidance activities on stock price crash risk supports Hypothesis 1, which states that tax avoidance has a positive effect on stock price crash risk. This finding is also consistent with Mazur & Rudiawarni [7; 8] research which states that tax avoidance increases the possibility of companies experiencing stock price crashes in the future.

While the coefficients of the control variables are generally consistent with the results of previous studies. First, according to Chen [33], this study shows that *DTURN* shows a positive and significant coefficient. Meanwhile, *LEV* and *ROA* show a significant negative coefficient. Meanwhile, the *ACCM* variable is consistent with the Hutton [46]. This research shows that *ACCM* has a significant positive coefficient.

Table 4 reports the results of the OLS regression of tax avoidance, CEO skills, and the interaction of tax avoidance with CEO skills, on stock price crash risk. In Table 4 there are 2 panels, namely Panel A and Panel B, and in each Panel, there are 3 Columns. Panel A displays the results of the tax avoidance regression variable proxied by ETR against the stock price crash risk variable proxied by NCSKEW.

Meanwhile, Panel B displays the regression results of the tax avoidance variable proxied by SHELTER against the stock price crash risk variable proxied by NCSKEW. Column 1 in Panels A and B shows the results of the regression of the tax avoidance variable on the stock price

Table 2

Correlation matrix of stock price crash risk, tax evasion, CEO skills, and control variables

	1	2	3	4	5	6	7	8	9	10	11	12	13	14
NCSKEW	1													
DUVOL	0.558**	1												
ETR	–0.186**	–0.195**	1											
SHELTER	0.123*	0.136**	–0.30	1										
GAI	–0.138**	–0.187**	0.402**	0.003	1									
ETR-GAI	–0.251**	–0.211**	0.078	–0.049	0.235**	1								
SHL-GAI	–0.199**	–0.229**	0.226**	–0.261**	0.901**	0.452**	1							
ACCM	0.239**	0.424**	–0.155**	0.403**	–0.078	–0.137**	–0.143**	1						
LEV	–0.053	–0.025	0.013	–0.036	0.004	0.053	–0.001	–0.124	1					
ROA	–0.060	0.007	0.075	0.029	–0.008	0.002	–0.016	0.017	–0.068	1				
SIZE	0.480**	0.874**	–0.141**	0.158**	–0.173**	–0.199**	–0.227**	0.370**	–0.037	0.224**	1			
DTURN	0.191**	0.790**	–0.090	0.047	–0.158**	–0.123*	–0.172**	0.327**	0.017	0.029	0.709**	1		
SIGMA	0.189**	0.789**	0.088	0.046	–0.157**	–0.122*	–0.171**	0.326**	0.019	0.027	0.708**	1,000**	1	
RET	0.236**	0.423**	–0.156**	0.405**	–0.083**	–0.137**	–0.147**	1,000**	–0.123**	0.017**	0.369**	0.326**	0.325**	1

Note. ** significant correlation at the 0.01 level (2-tailed); * significant correlation at the 0.05 level (2-tailed)

crash risk variable without involving CEO skills. Column 2 shows the regression results when the CEO skill variable is included in the OLS regression equation model. And Column 3 shows the regression results when the CEO skill variable and the interaction variable of tax avoidance and CEO skill are included in the regression equation model.

As a result, in Table 4 Panel A, the first row changes the coefficient value and t-value of each equation model shown in columns one (1) to column three (3). By looking at the coefficients and t-values in the first row, when the GAI variable is included in the model as shown in columns two (2) and three (3), the coefficients and t-values are lower than when the model does not involve the GAI variable as shown in column one (1). And when the GAI variable and the interaction variables measuring tax avoidance and GAI are entered into the model as shown in columns two (2) and three (3), the coefficient and *t* value are negative, which means the higher the GAI index and the more intensive the role of the CEO with skills, it reduces the company's chances of experiencing stock price crash risk. In line with the regression results shown in Table 4 Panel A,

Table 3

Effect of Tax Avoidance on Stock Price Crash Risk (*H*1)

Panel A: OLS regression of tax avoidance on *NCSKEW* $NCSKEW_t = \alpha_0 + \alpha_1 TAXVAR_{t-1} + \sum\alpha_2\ Control\ variables_{t-1} + \varepsilon_t$		
TAXVAR:		
ETR_{t-1}	–0.193** (–2.274) 0.023	
$SHELTER_{t-1}$		0.002*** (2.577) 0.010
Control Variables:		
$ACCM_{t-1}$	0.127*** (3.568) 0.000	0.123*** (3.445) 0.001
LEV_{t-1}	0.000 (–0.223) 0.824	–8.998*** (–0.205) 0.838
ROA_{t-1}	–0.024*** (–5.173) 0.000	–0.026*** (–5.435) 0.000
$SIZE_{t-1}$	0.601*** (12.171) 0.000	0.614*** (12.368) 0.000
$DTURN_{t-1}$	1.377 (1.222) 0.222	1.558*** (12.368) 0.000
$SIGMA_{t-1}$	–1.575 (–1.400) 0.162	–1.759 (–1.558) 0.120
RET_{t-1}	–0.125*** (–3,532) 0.000	–0.006*** (–4,790) 0.000
Intercepts	–6.778*** (–10.874) .000	–0.122*** (–3.403) 0.001
N	436	436
Adj. R^2	0.344	0.336
Intercepts	–6.778*** (–10.874) 0.000	–6.937*** (–9.423) 0.000

End Table 3

Panel B: OLS regression of tax avoidance on *DUVOL* $DUVOL_t = \alpha_0 + \alpha_1 TAXVAR_{t-1} + \sum\alpha_2 \, Control\ variables_{t-1} + \varepsilon_t$		
TAXVAR:		
ETR_{t-1}	–0.115** (–2.550) 0.011	
$SHELTER_{t-1}$		0.002* (2.851) 0.005
Control variables:		
$ACCM_{t-1}$	0.002** (–0.086) 0.932	0.005** (–0.250) 0.803
LEV_{t-1}	–0.235 (–0.001) 1.000	9.435 (0.040) 0.968
ROA_{t-1}	–0.019*** (–7.755) 0.000	–0.020*** (–8.050) 0.000
$SIZE_{t-1}$	0.615*** (23.397) 0.000	0.626*** (23.650) 0.000
$DTURN_{t-1}$	1.572*** (2.620) 0.009	1.690*** (2.803) 0.005
$SIGMA_{t-1}$	–1.383** (–2.309) 0.021	–1.505** (–2.501) 0.013
RET_{t-1}	0.003 (0.171) 0.864	0.007 (0.349) 0.727
Intercepts	–7.606*** (–4.138) 0.000	–7.892*** (–20.120) 0.000
N	436	436
Adj. R^2	0.853	0.851

Note: the first row for each variable represents the coefficient, the parentheses contain the t-values, and the third row contains the p-values; *, **, *** represent the level of significance at 0.1, 0.05 and 0.01 respectively

the results shown in Panel B also show results that are not much different. When the model includes the GAI variable and the interaction variables of tax avoidance and GAI as shown in column three (3) panel B, the effect of tax avoidance on SPCR is not significant.

Interpretation of the results as shown in Tables 4 supports the second research hypothesis that CEOs who have high general ability index scores weaken the positive relationship between tax avoidance and SPCR. These results prove Al Mamun & Custódio [10; 11] that high-skilled CEOs are not concerned about career and compensation issues, therefore they are not motivated to hide bad news, thus reducing the possible risk of falling stock prices.

The positive effect of tax avoidance on the stock price crash risk depends on whether or not there is activity withholding negative information. Attempts to disguise this negative information can be done either by Habibie [47] who designed special-purpose transactions or by using discretionary accruals to manipulate earnings. For this reason, this study also analyzes the effect of other variables that have similar characteristics on tax avoidance, namely earnings management.

Table 4

Effect of CEO Skills on the Relationship between Tax Avoidance and Stock Price Crash Risk (*H*2)

	(1)	(2)	(3)
Panel A: OLS regression of tax avoidance, CEO skill, and interaction of tax avoidance with CEO skill on SPCR $DUVOL_t = \alpha_0 + \alpha_1 ETR_{t-1} + \alpha_2 GAI_{t-1} + \alpha_3 ETR \cdot GAI_{t-1} + \sum\alpha_4 \, Control\ variables_{t-1} + \varepsilon_t$			
Independent variables:			
ETR_{t-1}	–0.115** (–2.550) 0.011	–0.116** (2.368) 0.018	–0.120** (–2.447) 0.015
GAI_{t-1}		0.001 (0.054) 0.957	0.009 (0.373) 0.709
$ETR_{rt-1} \cdot GAI_{t-1}$			–0.121*** (–3.786) 0.000
Control variables:			
$ACCM_{t-1}$	–0.002 (–0.086) 0.932	–0.002 (–0.095) 0.924	–0.002 (–0.115) 0.909
LEV_{t-1}	–1.235 (–0.001) 1.000	–3.755 (–0.002) 0.999	–1.206 (0.052) 0.959
ROA_{t-1}	–0.019*** (–7.755) 0.000	–0.019*** (–7.744) 0.000	–0.019*** (–7.658) 0.000
$SIZE_{t-1}$	0.615*** (23.397) 0.000	0.616*** (23.322) 0.000	0.610*** (22.938) 0.000
$DTURN_{t-1}$	1.572*** (2.620) 0.009	1.571** (2.612) 0.022	1.544** (2.571) 0.010
$SIGMA_{t-1}$	–1.383** (–2.309) 0.021	–1.382** (–2.301) 0.022	–1.354** –2.258 0.024
RET_{t-1}	0.003 (0.171) 0.864	0.003 (0.179) 0.858	0.004 (0.196) 0.845
Intercepts	–7.606*** (–4.138) 0.000	–7.611*** (–22.249) 0.000	–7.549*** (–21.591) 0.000
N	436	436	436
Adj. R^2	0.853	0.853	0.853
Panel B: OLS regression of tax avoidance, CEO skill, and interaction of tax avoidance with CEO skill on SPCR $DUVOL_t = \alpha_0 + \alpha_1 SHELTER_{t-1} + \alpha_2 GAI_{t-1} + \alpha_3 SHELTER \cdot GAI_{t-1} + \sum\alpha_4 \, Control\ variables_{t-1} + \varepsilon_t$			
Independent variables:			
$SHELTER_{t-1}$	0.002*** (2.851) 0.005	0.002*** (2.912) 0.004	0.001 (1.353) 0.177
GAI_{t-1}		–0.218*** (–4.000) 0.000	0.007 (0.046) 0.963

End Table 4

	(1)	(2)	(3)
$SHELTER_{t-1} \cdot GAI_{t-1}$			0.000 (–1.572) 0.117
Control variables:			
$ACCM_{t-1}$	–0.005 (–0.250) 0.803	–0.001 (–0.048) 0962	–0.001 (–0.041) 0967
LEV_{t-1}	9.435 (0.040) 0968	1.242 (0.053) 0.958	8.357 (0.036) 0.972
ROA_{t-1}	–0.020*** (–8.050) 0.000	–0.020*** (–8.020) 0.000	–0.020*** (–7.994) 0.000
$SIZE_{t-1}$	0.626*** (23.650) 0.000	0.623*** (23.402) 0.000	0.621*** (23.211) 0.000
$DTURN_{t-1}$	1.690*** (2.803) 0.005	1.696*** (2.813) 0.005	1.689*** (2.799) 0.005
$SIGMA_{t-1}$	–1.505** (–2.501) 0.013	–1.511** (–2.511) 0.012	–1.505** (–2.498) 0.013
RET_{t-1}	0.007 (0.349) 0.727	0.003 (0.144) 0.885	0.003 (0.139) 0.889
Intercepts	–7.892*** (–20.120) 0.000	–7.802*** (–19.250) 0.000	–7.853*** (–18.944) 0.000
N	436	436	436
Adj. R^2	0.851	851	0.851

Note: the first row for each variable represents the coefficient, the parentheses contain the t-values, and the third row contains the p-values. *, **, *** represent the level of significance at 0.1, 0.05 and 0.01 respectively

Al-Natsheh [48] stated that Earnings management is an intervention carried out in the process of presenting financial statements for personal gain, considering that managers control personal information disproportionately compared to shareholders or investors.

Hutton [46] studies have proven that there is a relationship between earnings management and the risk of stock price crashes, that companies with more opaque financial reports are more vulnerable to falling stock prices. Thus, real earnings management (REM) in a company is vulnerable to a stock collapse.

Based on these arguments, this study uses accrual manipulation as a measurement of earnings management (*ACCM*) which was developed by Campa [49], accrual quality (*AQ*) developed by Dechow [50], and *F-SCORE* to control for the effect of tax avoidance on stock price crash risk.

Table 5 shows the results of the regression of the tax avoidance variable on the stock price crash risk controlled by the earning management variable. In Table 5 Panel A Column one (1) to column four (4) shows the significant negative effect of *ETR* on NCSKEW by controlling for various variations of earning management measurements. And in Panel A Column five (5) the results of the *ETR* regression on *NCSKEW* without being controlled by the earning management variable also show a significant negative effect.

Meanwhile, in Panel B Column one (1) to column five (5) presents the results of the *ETR* regression to *DUVOL* either with or without involving the earning management variable, which is consistent with the results in panel A. This result is consistent with previous research that low *ETR* values further increase stock price crash risk. The information in Table 5 shows the robustness of the model that explains the effect of tax avoidance on stock price crash risk, either directly or indirectly.

Furthermore, this study also seeks to conduct a subgroup analysis as an alternative method to examine the moderating effect of CEO skills on the relationship between tax avoidance and stock price crash risk. Using a modified method developed by Testa et al (2018), this study grouped the sample into 2 groups, namely the sample group with high GAI scores and low GAI scores. For the high GAI score group, samples are taken that are included in the top 75th percentile of the companies with

Table 5

Tax avoidance, earnings management, and stock price crash risk

Model	(1)	(2)	(3)	(4)	(5)
Panel A: OLS regression from NCSKEW					
TAXVAR ETR_{t-1}	–0.325*** (–3.281) 0.001	–0.402*** (–4.008) 0.000	–0.393*** (–4.090) 0.000	–0.334*** (–3.506) 0.001	–0.396*** (–3.955) 0.000
Earnings management $ACCM_{t-1}$	0.004*** (4.626) 0.000			0.004*** (4,343) 0.000	
AQ_{t-1}		–0.010 (–1.236) 0.217		–0.008 (–1.032) 0.303	
F_SCORE_{t-1}			0.272** (1.858) 0.064	0.253 (1.760) 0.303	
Intercept	0.681*** (9.748) 000	1.269*** (2.691) 0.007		–0.680 (–0.617) 0.537	0.693*** (9.695) 0.000
N	436	421		421	421
Adj. R^2	0.076	0.034		0.081	0.033
Panel B: OLS Panel Regression from DUVOL					
TAXVAR ETR_{t-1}	–0.317*** (–3.037) 0.003	–0.472*** (–4.183) 0.000	–0.466*** (–4.078) 0.000		–0.466*** (–4.138) 0.000
Earnings management $ACCM_{t-1}$	0.009*** (9.249) 0.000				
AQ_{t-1}		–0.010 (–1.080) 0.281			
F_SCORE_{t-1}			0.105 (0.600) 0.549		
Intercept	–0.014 (–0.197) 0.844	0.576 (1.087) 0.278			0.010 (0.123) 0.902
N	436	436			421
Adj. R^2	0.197	0.041			0.054

Note: the first row for each variable represents the coefficient, the parentheses contain the t-values, and the third row contains the p-values; *, **, *** represent the level of significance at 0.1, 0.05 and 0.01 respectively

the highest GAI scores. While the sample group with low GAI scores includes the lowest 25th percentile of companies with the lowest GAI scores.

These results are consistent with Hutton [46] research that low ETR values further increasing the risk of a stock price crash.

5. Discussion

In Indonesia, the practice of tax avoidance is considered valid if it is an effort to minimize the tax burden of the company or individual without violating tax rules. In Indonesia there is still no comprehensive system for preventing and detecting tax avoidance practices, so there are still opportunities for companies to carry out transaction schemes and take advantage of weaknesses in the tax system.

In fact, the use of tax avoidance practices also causes state losses because state tax revenues are always reduced, thus causing an obstacle to state spending.

5.1. Tax avoidance has a positive effect on the stock price crash risk

The test results found that tax evasion has a positive effect on the stock price crash risk of companies included in the Kompas 100 index on the Indonesia Stock Exchange. This test result means that the first hypothesis is accepted. Thus, when there is an increase in the level of tax avoidance by the company's management, there is also a high possibility of the risk of falling stock prices of the company.

This finding is also in accordance with the findings of Kim [43] and has proven to be strong with the use of alternative tax avoidance measures and alternative stock price crash risk measurements. The findings of this study are also in the perspective of agency theory in looking at tax avoidance, where tax avoidance is considered to provide a tool for opportunistic managers to disguise negative information, thereby increasing the risk of falling stock prices in the market future.

Vallascas [51] stated that the characteristics of taxpayers who carry out tax avoidance can be distinguished according to the taxpayer group, ranging from large taxpayers to mediocre taxpayers Large taxpayers tend to take advantage of their large financial capabilities to hire reliable people who know the loopholes in tax laws while ordinary taxpayers usually refrain from buying, using, working on something to avoid taxation.

Tax avoidance practices are still carried out because of the old saying that "no one likes to pay taxes". Many ways are done by taxpayers in avoiding taxes.

First, a loan to a bank with a large nominal value, the taxpayer borrows from the bank with a large nominal value so that the loan interest is even greater, this loan interest is charged in the taxpayer's fiscal financial statements, but Kulapo [52] stated that the loan is not to increase the taxpayer's capital so that sales do not grow and make profits do not increase.

Second, the provision of natura and enjoyment, the provision of natura (except for the provision of food and beverages for all employees and reimbursement or compensation in the form of natura and enjoyment in certain areas may not be charged as a deductible expense. This practice is for example employees are given rice allowances (natura) in areas that are not certain areas in the form of whole rice.

This practice actually should not be expensed in the company's fiscal financial statements because the rice is not income for the employee. The company is looking for a way to make the in-kind provision allowable by giving the rice allowance in the form of money. For employees, the allowance is an income that is taxable, while for the company the allowance is an expense that can be expensed in the fiscal financial statements.

This expense can still be expensed because the company gives money to the rice distribution foundation (this can be a cost that can be deducted from the company's gross income. Third, grants, that donated assets received by blood relatives in a straight line of descent of one degree are exempted from the tax object. Grant assets such as land and buildings given by a grandfather to his grandson are tax objects because the grant assets received are not in a straight line of descent of one degree.

5.2. CEOs with high skills weaken the positive relationship between tax avoidance and the risk of falling stock prices

Second, this study finds evidence that highly skilled CEOs weaken the relationship between tax evasion and the risk of a stock price crash. This result means that the second hypothesis is accepted, and it can be stated that when a CEO in the company has better expertise and skills, then they will tend not to perform tax avoidance actions to avoid an increase in the possibility of the risk of falling company stock prices in the futures.

This finding is consistent with [10] that CEO general skills have a negative effect on stock price crash risk, both measured using *NCSKEW* and *DUVOL*. This result is also in line with Custódio [11] who argue that highly skilled CEOs do not care about career continuity and compensation issues because the labor market values their high skills with higher compensation than they do, and CEOs with above-average skills are more flexible in moving from one industry to another in which they work.

A CEO in the company has a different character, there are CEOs who can accept risks, and some are not. A CEO with a strong character, able to accept active and courageous risks in terms of tax avoidance, because he has a dominant position in the company. This makes the characteristics of a reliable CEO who is able to decide all matters of decision in company policy and plays an important role for the company in terms of tax avoidance because of the highest executive position.

According to Huang [53] as a CEO who has financial expertise experience in the company or a financial background at work is an active manager who has less cash, more debt, and is involved in more buybacks. Kim [54] stated that to the extent that tax avoidance can be viewed as an alternative investment opportunity.

The CEO holds the highest position in the company, so the CEO is included in the top-level manager category. Thus, the CEO has a very important role for the journey of a company and can determine whether the company is successful or otherwise.

Therefore, the position should not be managed carelessly, it must be run by someone who is professional in that position. Directly or indirectly, being a leader will have an influence on all decision-making in solving every company problem, including making decisions in tax policy. A CEO who has financial expertise will be more likely to do tax avoidance well, such as tax calculations.

Then the final part of this study is closed with conclusions and limitations on this study which are expected to be refined by subsequent researchers in the future.

6. Conclusion

This study found 2 things.

First, tax evasion has a positive effect on the stock price crash risk of companies included in the Kompas 100 index on the Indonesia Stock Exchange. The findings of this study are also in the perspective of agency theory in looking at tax avoidance, where tax avoidance is considered to provide a tool for opportunistic managers to disguise negative information, thereby increasing the risk of falling stock prices in the market future.

Second, this study finds evidence that highly skilled CEOs weaken the relationship between tax evasion and the risk of a stock price crash.

This study enriches the literature by demonstrating the role of highly skilled CEOs in influencing the intensity of the relationship between tax avoidance and stock price crash risk. Second, this study demonstrates the uniqueness of incorporating the human aspect, in the form of CEO characteristics, into the model linking tax avoidance with stock price crash risk.

Because of that, the findings of this study have implications for all stakeholders regarding the understanding of managerial behavior, where the presence of a highly skilled CEO can increase the effectiveness of corporate tax policies without being overshadowed by concerns over the risk of falling stock prices. The charac-

teristics of a reliable CEO are CEOs who are able to make all decisions in company policy and become an important role for the company in terms of tax avoidance because of the highest executive position.

The limitation of this study lies in the lack of disclosure regarding the competency characteristics of a CEO that should be owned, to have reliable expertise in managing tax reporting, so that company owners remain orderly in paying taxes every period. Next, the fundamental analysis presented in this study seems to make it difficult for readers who do not understand the basics of the capital market, so future research should provide a complete description to make it easier for readers in general.

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