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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.

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Journal Policy

Relevance of the thematic focus of the Journal
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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.

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

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Original Paper

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MSMEs Tax Compliance in Indonesia During Pandemic COVID-19: The Role of Risk Preference as Moderation

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ABSTRACT

There has been global economic fallout from the Pandemic COVID-19. Micro, Small and Medium Enterprises (MSME) is one of the industries hit worst. Many MSMEs have seen their profits decline or even disappear. Consequently, tax income dropped. In order to raise tax revenue, the government has implemented a number of reforms, one of which is a push for greater tax compliance among MSMEs. This study aims to analyze the effect of providing tax incentives and understanding taxpayers on MSME tax compliance during the COVID-19 pandemic. This study also examines risk preferences as moderation. The population in this study is the MSMEs food sector in the city of Pekanbaru, Indonesia. Samples were selected using convenience sampling. A total of 397 MSMEs in the food sector participated in this study. During the months of December 2021 and February 2022, data was gathered by distributing questionnaires to taxpayers directly and also by using Google forms. Data analysis techniques used SEM with Warp PLS. Tests show that tax incentives affect the compliance of MSME taxpayers during the COVID 19. This study demonstrates that understanding MSME tax rules can boost compliance. The high risk faced by taxpayers can reduce tax compliance even though the government provides tax incentives. However, with a high level of understanding, even though taxpayers have risks, they still carry out their tax compliance. This study aids the government's effort to give tax incentives and outreach to better comprehend the needs of MSME taxpayers.

KEYWORDS

Tax Incentives, Understanding of Tax Regulations, Taxpayer Compliance, Risk Preference

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Соблюдение налогового законодательства микро-, малым и средним бизнесом в Индонезии в период пандемии COVID-19: роль предпочтения риска в модерации

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АННОТАЦИЯ

Пандемия COVID-19 привела к глобальным экономическим последствиям. Микро-, малые и средние предприятия (ММСП) – один из наиболее пострадавших секторов экономики. Многие предприятия ММСП столкнулись со снижением прибыли и даже убытками. Соответственно, снизились налоговые посту-

пления от этого сектора. Для увеличения налоговых поступлений от ММСП правительство провело ряд реформ, одна из которых направлена на более строгое соблюдение этим сектором налогового законодательства. В данном исследовании анализируется влияние предоставления налоговых льгот микро-, малому и среднему бизнесу в Индонезии в период пандемии COVID-19 и понимания условий налогообложения на соблюдение этим сектором налогового законодательства. Также рассматривается роль предпочтения риска в выборе вариантов поведения. Всего в этом исследовании приняли участие 397 налогоплательщиков ММСП пищевой промышленности в г. Пеканбару, отобранные методом удобной невероятностной выборки. Данные собраны путем прямой рассылки анкет налогоплательщикам, а также с использованием форм Google с декабря 2021 г. по февраль 2022 г. В качестве методов анализа данных использовались SEM с Warp PLS. Исследование демонстрирует, что налоговые льготы влияют на соблюдение налогового законодательства налогоплательщиками ММСП. Также исследование показывает, что понимание малым бизнесом условий налогообложения может повысить соблюдение требований налогового законодательства. Высокий риск, с которым сталкиваются налогоплательщики, может снизить соблюдение налоговых требований, даже если правительство предоставляет налоговые льготы. Однако при высоком уровне понимания условий налогообложения, хотя налогоплательщики и несут риски, они все равно выполняют свои налоговые обязательства. Это исследование способствует усилиям правительства по предоставлению налоговых льгот для лучшего понимания потребностей малого бизнеса.

КЛЮЧЕВЫЕ СЛОВА
налоговые льготы, понимание налогового законодательства, соблюдение требований налогоплательщиками, предпочтение риска

1. Introduction

The emergence of the COVID-19 pandemic that has spread throughout the world has impacted every aspect of life. Not surprisingly, the COVID-19 Outbreak also had an impact in Indonesia. The COVID-19 pandemic has had a significant impact on the Indonesian economy. Among these impacts is weakening investment and business continuity.

Micro, Small and Medium Enterprises (MSMEs) are one of the businesses affected by the COVID-19 pandemic. According to data, as many as 30 million MSMEs in Indonesia have gone bankrupt. It not only has an impact on people's income but also has an impact on state tax revenues. Revenue from the tax sector decreased by 8.5% to 8.2% during the COVID-19 pandemic[1].

It is impossible to avoid the drop in tax revenue collection, but an effort is needed to keep the decline from becoming too sharp. In addition, it is necessary to ensure the sustainability of sources of tax revenue, namely business/economic actors, by maintaining supply and demand. Under normal conditions, taxes play more of a budget function, namely as the primary source of state revenue. Meanwhile, during a pandemic, the tax function can switch to a regulatory role, a stability function, and an equity function [1]. The decline in tax revenues requires the government to use various strategies.

Alm et al. [2] stated that during the COVID-19 Pandemic, the government needed to issue policies to help MSMEs. One way to encourage tax compliance is by offering tax incentives [3; 4]. According to a study [5; 6] on the effect of tax incentives on tax compliance, tax incentives encourage tax compliance. Although tax incentives are suspected of increasing tax compliance, research [7] shows that taxpayers do not voluntarily pay taxes, so tax revenue from MSMEs still needs to be satisfactory.

Further encouraging tax compliance is the COVID-19 outbreak's emphasis on the importance of following the law. Increasing knowledge and correct understanding can improve tax compliance.

[1] https://www.pajakku.com/read/60504f8ac069d02167e9587b/Diversifikasi-Penerimaan-Pajak-di-Tengah-Krisis-Pandemi

Research [8–11] demonstrates that tax compliance is impacted by tax knowledge.

However, Ayuba et al. [12] shows that tax knowledge cannot increase tax compliance. The inconsistency of the results of this study indicates that there is a possibility that other variables influence it. In this study, we propose risk preference as a moderating variable. Risk preference is an opportunity for taxpayers to consider and prioritize the various options available [13].

Alm & Torgler [14] conveyed that his behavior toward the risks faced can influence a taxpayer's decision. Therefore, when taxpayers identify their attitude towards risk, they will try to avoid problems by complying with regulations that impact tax compliance.

Wulandari [15] finds taxpayers with a high-risk level will affect tax compliance. Kartika [16] states that tax compliance and preferences have a strong relationship. If the taxpayer has low compliance, he will feel he has a high risk. Mei & Firmansyah [17] found that risk preference can strengthen the effect of tax understanding on tax compliance. So is research of Alabede et al. [18] proving risk preference can moderate tax understanding with tax compliance

This paper aims to analyze the effect of tax incentives and tax knowledge on MSME taxpayer compliance in Indonesia during the COVID-19 pandemic. This study also examines risk preference as moderation.

Research hypotheses:

H1: Tax incentives have a significant effect on MSME taxpayer compliance.

H2: Understanding of Tax Regulations Affects MSME Taxpayer Compliance.

H3: Risk preference moderates the Effect of tax incentives on taxpayer compliance.

H4: Risk Preference Moderates the Effect of Understanding of Tax Regulations on MSME Taxpayer Compliance.

In the next section, we will present a literature review that explains the theory used and the hypotheses we built. Next is the research method describing the population, sample, data collection techniques, variables, and data analysis techniques. The following section is the results and discussion, then closes with conclusions on the research results.

2. Literature review

2.1. Attribution Theory

Attribution is an assumption about why someone behaves in a certain way. According to [19], attribution bias is a person's tendency to explain everything, including the intentions of other people's behavior. This theory refers to how a person describes the causes of other people's behavior or himself, which will be determined whether internal or external will influence individual behavior [20]. Internal attributions are internal forces or dispositions (psychological elements that precede behavior) that change a person's behavior [21].

The attribution theory employed in this study is significant as a supporting theory because it clarifies how taxpayer behavior is influenced by internal and external attributions that alter one's attitude, specifically the attitude toward paying taxes. Internal attribution is indicated by the understanding and risk preference felt by the taxpayer. Meanwhile, external attribution is the regulation of tax incentives issued by the government. Internal and external attributions can affect the behavior of MSME taxpayers in paying their taxes.

2.2. Effect of Tax Incentives on Taxpayer Compliance

Brauner & Stewart [22] investigate the effectiveness of state tax incentives through reducing the tax burden for various projects. During the pandemic, several new tax incentives have been introduced to increase government revenue and improve tax compliance. Tax incentives for taxpayers who would be impacted by COVID-19 are the first measure (Ministry of Finance Decree No. 23/PMK.03/2020).

The existence of tax incentives is an external attribution that encourages someone to behave. The MSME tax reduction during the COVID-19 period,

implemented by the government, is expected to increase MSME tax compliance. According to Smith & Stalans [23] also explained that a reduction in tax rates can improve tax compliance.

H1: Tax incentives have a significant effect on MSME taxpayer compliance.

2.3. Effect of understanding tax regulations on taxpayer compliance

Robbins & Judge [24] explained that the understanding of tax regulations can affect tax compliance. Following attribution theory, understanding regulations is an internal and external attribution. Understanding tax regulations and their external factors is an empirical perception of taxpayer behavior that influences compliance [25].

Taxpayers who know tax regulations and have extensive experience in the field of taxation will follow the taxpayer in a way that can appreciate what is happening in the taxation system and the results of tax returns [26; 27]. Understanding the government's restrictions published during the COVID-19 outbreak can help taxpayers behave in accordance with the rules. Supriyati & Hapsari [9] on individual entrepreneur taxpayers shows that ax understanding increases tax compliance. Based on this description, it is hypothesized:

H2: Understanding of Tax Regulations Affects MSME Taxpayer Compliance.

2.4. The role of risk preference in moderating the Effect of tax incentives on taxpayer compliance

Tax incentives, according to Ridwan & Nawir [11] are measures used by the government to entice people and businesses to spend money or save money by lowering the taxes they are required to pay. The government offers tax incentives to support national economic recovery and respond to reduced business productivity during the COVID-19 pandemic.

One of a person's traits that affects how they act is their affinity for taking risks. Aswar et al. [28] expresses the concept of risk preference. There are three scopes: avoiding risk, neutral in facing risk, and looking for threats. Research reveals that the behavior of taxpayers in facing risk cannot be underestimated in tax compliance. Based on [28] when the government has offered ease by lowering the tax rate, taxpayers can suffer tax penalties for failing to comply with their duties. The amount of threat faced by taxpayers can affect the decision of MSME taxpayers to implement their tax compliance. Based on the description above, the hypothesis proposed is:

H3: Risk preference moderates the Effect of tax incentives on taxpayer compliance.

2.5. The role of risk preference in moderating the influence of tax understanding on taxpayer compliance

A taxpayer's behavior toward the dangers he faces can affect his decision. Several theories on decision-makers, including tax compliance theories like rationality theory and prospect theory, include risk preference as a component. The perspective theory is the basis used to prioritize tax compliance affected by risk.

Alabede et al. [29] uses perspective theory to evaluate the impact of risk preference on individual taxpayer compliance and finds that it has a beneficial effect. Alm & Torgler [14] revealed that the behavior of taxpayers in the face of risk does not mean that the taxpayer will not fulfill their tax obligations. The risk preferences faced by MSME taxpayers, such as health risks and bankruptcy risks, cause taxpayers to increase their taxpayer understanding. The existence of risks faced by taxpayers allows taxpayers to understand better tax regulations that enable taxpayers to be more obedient in paying taxes. If the risk preference level of the taxpayer is high, it can be said that it influences the taxpayer's understanding of regulations. Taxpayers who tend to be brave in facing existing risks are taxpayers with a high-risk preference. The higher the level of risk preference, The greater it is, the more impact it will have on taxpayer compliance and understanding of tax laws [30]:

H4: Risk Preference Moderates the Effect of Understanding of Tax Regulations on MSME Taxpayer Compliance.

3. Research Methodology

The population used in this study is MSME taxpayers in Indonesia. This research is devoted to the MSME food sector in Pekanbaru City. According to data, the number of MSMEs in Pekanbaru City is 4,645 (source: Office of cooperatives and MSMEs). The sampling technique used is convenience sampling. To calculate sample adequacy, 397 SMEs were selected for the sample size using the Slovin formula.

Data collection was carried out by sending questionnaires directly to MSMEs. Respondents in this study were MSME owners or managers.

3.1. Variable Measurement

Operational definitions and variable measurements can be seen in Table 1.

3.2. Characteristics of Respondents

A total of 400 questionnaires were distributed to food SMEs in Pekanbaru City. A total of 397 questionnaires can be processed (Table 2).

The characteristics of the participating respondents can be seen in Table 3.

Table 1

Variable Measurement

Research variable	Indicator	Scale
Taxpayer compliance (TC)	1. Compliance in registering with the tax office. 2. Compliance in reporting notice of tax payable on time. 3. Compliance in calculating and paying taxes correctly. 4. Observance of paying back taxes. Adopted from [31]	Ordinal
Tax incentives (TI)	1. Tax incentives lighten the tax burden. 2. Tax incentives educate the real benefits of taxes that are felt directly. 3. Tax incentives reduce costs and increase people's purchasing power. 4. Tax incentives increase tax compliance. Adopted from [32]	Ordinal
Tax Understanding (TU)	1. Understanding of tax ID number. 2. Understanding of tax regulations. 3. Taxpayers allocate funds to pay taxes. 4. Taxpayers seek information and ways of paying taxes. 5. Taxpayers realize that education is needed to know things and their tax obligations. Adopted from [33]	Ordinal
Risk preference (RP)	1. Financial risk. 2. Health risks. 3. Social risk. 4. Job risk. 5. Safety risk. Adopted from [34]	Ordinal

Table 2

Questionnaire description

No	Information	Amount	Percentage
1	Questionnaires distributed	400	100
2	Responded questionnaire	397	99.25
3	Questionnaires that cannot be processed	3	0.75
4	Questionnaires that can be processed	397	99.25

Source: Processed data, 2022

4. Results

4.1. Results of Descriptive Statistical Analysis

Descriptive statistics include the interpretation of the mean, minimum, maximum, and standard deviation. The aim is to analyze data based on the respondents' responses to the statements of each variable. Descriptive statistics can be seen in Table 4.

The standard deviation for each variable is lower than the mean value. This result shows the data is quite good.

4.2. Outer Model test results

4.2.1. Validity test

This test uses convergent validity and discriminant validity. The loading factor and AVE values indicate whether or not an indicator is valid. A construct indicator that is said to be valid is if the value of the loading factor and AVE (Average Variance Extracted) > 0.50 [35].

The cross-loading value and correlation value of the structure's indices with other variables both show discriminant validity [36]. The results can be seen in Table 5.

As can be seen from table 5 above, every construct indicator has a loading value larger than 0.5 and an AVE value greater than 0.5. Each indicator's factor loading value is higher than that of other indicators' factors. It means that all construct indicators have fulfilled the discriminant validity requirements.

4.2.2. Reliability Test

Aggregate reliability uses Cronbach's Alpha, and synthesis reliability uses composite reliability. The questionnaire has good Cronbach alpha and composite reliability if it has a value greater than 0.7 [35]. The results of the reliability test can be seen in Table 6. Each construct shows a value greater than 0.7, which means that reliability is good.

Table 3

Characteristics of Respondents

Information	Description	Amount	Presentation
Gender	Number of Respondents: Man Woman	397 230 167	100% 58% 42%
Age	Number of Respondents: < 30 years – 30–40 years – 41–50 years >50 years	397 155 99 79 64	100% 39% 25% 20% 16%
Educational background	Number of Respondents: Senior High School Diploma Bachelor > Bachelor	397 92 84 189 32	100% 23% 21% 48% 8%

Source: Processed Data (2022)

Table 4

Descriptive Statistical Analysis

Variable	N	Min	Max	Means	std. deviation
Tax Incentives	397	3	5	4,100	0.600
Tax Understanding	397	3	5	4,140	0.650
Risk Preference	397	3	5	4,100	0.600
Taxpayer Compliance	397	3	5	4,114	0.625

Source: Primary data analysis, 2022

Table 5

Combined Loading and Cross Loading

	Indicator	TC	TI	TU	RP	AVE
Taxpayer Compliance	KWP1	**0896**	0.059	0.047	–0.02	0.748
	KWP2	**0.782**	–0.400	0.409	0.045	
	KWP3	**0.900**	0.081	–0.180	–0.230	
	KWP5	**0.678**	–0.070	0.013	0.424	
Tax Incentives	IP2	–0.050	**0.669**	–0.390	–0.10	0.715
	IP3	–0.120	**0.782**	0.117	0.033	
	IP4	–0.150	**0.860**	–0.180	–0.30	
	IP5	–0.230	**0.743**	0.102	0.669	
Tax Understanding	PPP1	0.076	0.199	**0.856**	–0.050	0.799
	PPP2	–0.360	–0.120	**0.792**	0.280	
	PPP3	0.235	–0.330	**0.774**	0.152	
	PPP4	0.211	0.281	**0.831**	0.005	
	PPP5	–0.190	–0.070	**0.735**	–0.410	
Risk Preference	PR2	0.816	0.009	–0.320	**0.865**	0.762
	PR3	–0.680	0.015	0.047	**0.565**	
	PR4	0.653	0.178	–0.560	**0.800**	
	PR5	0.059	–0.130	0.231	**0.886**	
	PR6	–0.050	–0.160	0.599	**0.797**	
	PR7	–0.750	–0.040	–0.140	**0.743**	
	PR8	0.315	–0.190	0.141	**0.863**	
	PR9	–0.570	–0.080	0.138	**0.700**	
	PR10	0.395	–0.010	0.138	**0.832**	
	PR11	0.181	–0.060	–0.280	0.797	
	PR12	–0.080	0.102	–0.430	**0.770**	

Table 6

Reliability Test Results

	Cronbach Alpha	Composite Reliability
Taxpayer Compliance (TC)	0.777	0.854
Tax Incentives (TI)	0.747	0.834
Tax Understanding (TU)	0.857	0898
Risk Preference (RP)	0.927	0941

Source: WarpPLS 7.0 processed data

Table 7

Output Results of Fit Indices Models

	Index	*P*-Values	Criteria	Explanation
R Square	0.66			
APCs	0.264	P = 0.002	P < 0.05	Received
ARS	0.66	P < 0.001	P < 0.05	Received
AVIV	2,568		Acceptable If <= 5 Ideally <= 3.3	Received
AFVIF	3,752		Acceptable If <= 5 Ideally <= 3.3	Received
Tenenhaus GoF	0.756		Small >= 0.1 Medium >= 0.25 Large >= 0.36	Received

Source: Processed data using WarpPLS 7.0

4.3. Inner Model Test Results

The results of the inner model test are divided into 2, namely: fit and quality indices models and hypothesis testing. The results of testing the fit model can be seen in Table 7.

Based on the findings in Table 7, it is clear that the factors of tax incentives, tax law comprehension, and moderation of risk preferences can all have a 66% impact on the proportion of taxpayer compliance. The study did not look at the remaining 34%.

The fit model indicated by the APC value has an index value of 0.264 with a p-value of P = 0.002. In addition, ARS has an index of 0.66 and a p-value of 0.001 at the same time. Because APC has a p-value of less than 0.001, it has satisfied the criteria. The p-value for ARS is also similar, being p-value 0.001. The AVIF value, which should be 5 and ideally 3.3, has been satisfied because it is 2,568 based on these facts [37].

4.4. Hypothesis test

Hypothesis testing using Warp Pls 7.0 can be seen in Figure 1 and Table 8.

Hypothesis 1 states that Tax Incentives affect Taxpayer Compliance. The test results show the p-value TI → TC 0.01 which is smaller than 0.05. Thus hypothesis 1 is accepted with a path coefficient of 0.22.

Hypothesis 2 states that understanding tax regulations affects taxpayer compliance. The test results show that the p-value TU → TC < 0.001 is smaller than 0.05, and the path coefficient is 0.69. Thus hypothesis 2 is accepted.

Hypothesis 3 states that Tax Incentives affect Taxpayer Compliance moderated by Risk Preference. The interaction test of Tax Incentives with Risk Preference results shows that the p-value RP*TU → TC < 0.001 is smaller than 0.05, and the path coefficient is –0.2. Thus hypothesis 3 is accepted.

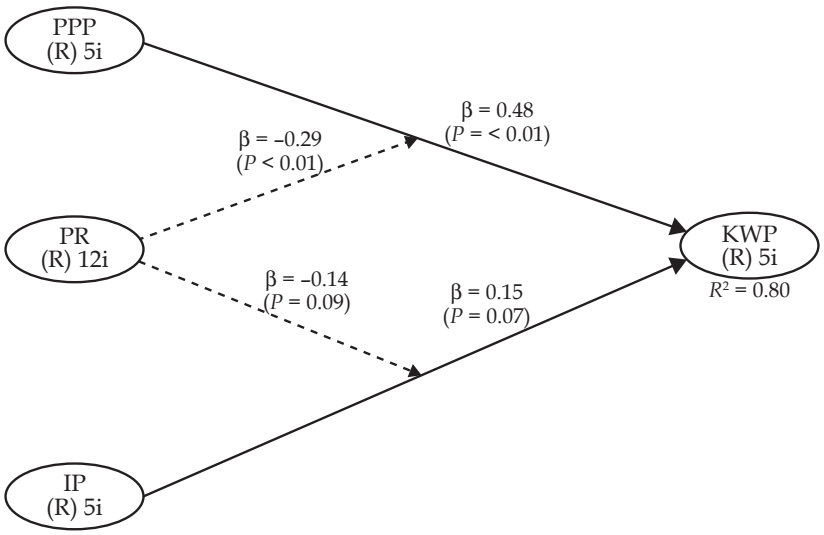

Figure 1. **Structural Equation Model**

Table 8

Hypothesis Test Results

Hypothesis	Research hypothesis	Path Coefficient	P-values	Information
H1	TI → TC	0.22	0.01	Accepted
H2	TU → TC	0.69	< 0.001	Accepted
H3	RP*TI → TC	–0.25	< 0.001	Accepted
H4	RP*TU → TC	0.34	< 0.001	Accepted

Hypothesis 4 states that Understanding Regulations influences Taxpayer Compliance moderated by Risk Preference. The results of testing the interaction of understanding regulations with risk preferences show that the p-value RP*TU → TC < 0.001 is less than 0.05, and the path coefficient is 0.34. Thus hypothesis 4 is accepted.

5. Discussion

5.1. Effect of Tax Incentives on Taxpayer Compliance

It is known that tax incentives affect taxpayer compliance based on the description of the research findings above. This hypothesis is accepted because it follows attribution theory, that a person's behavior is determined by internal and external attributions [20].

An external factor that affected MSME taxpayers' tax-paying behavior during the COVID-19 pandemic was the existence of tax incentive regulations. The findings demonstrated that stronger tax incentives boosted MSME tax compliance during the COVID-19 epidemic.

Government policy to reduce tax rates during the COVID-19 period by issuing regulations in the form of Ministry of Finance Decree no. 23/PMK.03/2020 provides convenience for MSME taxpayers who encounter economic difficulties during the Covid-19 period. MSMEs can easily continue to fulfill their tax obligations thanks to this tax reduction. The study's findings are consistent with previous research [5; 6; 23].

5.2. Effect of Understanding Tax Regulations on Taxpayer Compliance

Based on the explanation of the research results, it is known that understanding tax regulations affects MSME taxpayer compliance. The study results show that with the increasing knowledge of MSME taxpayers on rules, the taxpayers will respect their tax payments and increase taxpayer compliance.

The results of this study also support the attribution theory. The internal and external conditions of the taxpayer strongly influence taxpayer compliance. It includes his understanding of tax regulations as an internal factor and his experience in understanding other people's behavior as an external factor, so his knowledge of tax regulations influences taxpayer compliance with tax regulations. This research is in line with research [8–10] which proves that tax understanding affects tax compliance.

5.3. Role of Risk Preference in Moderating the Effect of Tax Incentives on Taxpayer Compliance

The results show that risk preference can moderate the Effect of tax incentives on tax compliance. The path coefficient shows a negative value which means high risk, even though there are incentives provided by the government that will reduce the level of tax compliance.

Avoiding danger is one of the characteristics of a person who can influence his behavior [38]. RequiredMSME taxes face a choice when taxpayers face risks during the COVID-19 pandemic. The existence of tax incentives causes taxpayers to choose to avoid hazards rather than expose themselves to risks. Taxpayers can be influenced by their risk-averse behavior, which helps ease the burden on taxpayers to report taxes on time and improve tax compliance. For MSME taxpayers, tax incentives are beneficial and can increase taxpayer compliance with the risks they face.

At low risk, the existence of tax incentives will increase tax compliance. However, if the dangers faced by MSME taxpayers are high, even though the government provides tax incentives, it remains a consideration for taxpayers to carry out their tax obligations [28].

5.4. The Role of Risk Preference in Moderating the Effect of Tax Understanding on Taxpayer Compliance

The study results show that risk preference moderates tax understanding toward tax compliance. The high-risk taxpayers face them to increase their knowledge of regulations. For example, the low risk of late paying taxes can be caused by the taxpayer's lack of understanding of tax regu-

lations. During the COVID-19 period, the government issued various regulations to help MSMEs. These regulations make it easier for MSMEs to reduce the risks faced by MSMEs. The new regulation requires MSME taxpayers to increase their understanding to fulfill their tax obligations.

Research conducted [39] used prospectus theory to test the Effect of risk preference on tax payer compliance, and the study results showed that risk preference had a positive effect on tax payer compliance. A study [26] indicates the taxpayer's risk management behavior does not mean that the taxpayer will not fulfill his tax obligations. These findings are supported by research [40], which explains that risk preference can change the relationship between tax literacy and compliance.

6. Conclusion

Based on this research, several conclusions were drawn that tax incentives and understanding of taxation affected MSME taxpayer compliance during the COVID-19 pandemic.

Tax incentives provided by the government could increase MSME taxpayer compliance. Taxpayers' knowledge of regulations can also improve tax compliance. This study also found that the level of risk preference affects tax compliance differently. The existence of risk preferences can increase the understanding of taxpayers so that it has an impact on their tax compliance. However, a high-risk choice will reduce tax compliance even if the government provides tax incentives. Tax compliance depends on the high or low-risk preferences of MSME taxpayers during the COVID-19 pandemic.

This research has limitations, namely, not being able to cover a wider area. This research was only conducted on SMEs in the food sector. This study also found that the R square was worth 66%, which means that there is still another variable of 34% that has yet to be studied in this study. Therefore, this study suggests that further research, in addition to expanding the research area, can also conduct research on various MSME sectors. Other studies are also advised to test different variables that have not been studied in this study.

This research has contributed to the theory, especially the theory of attribution. The influence of tax incentives, tax understanding, and risk preferences on tax compliance proves the existence of internal and external attributions that influence the behavior of taxpayers in paying their taxes. This research can also be used as a comparison with research studies before the COVID-19 era.

References

1. Warsito W., Samputra P.L. Potensial of Tax Declining and Tax Policy Strategyto Anticipate the Impact of the Covid-19 Pandemic:A National Resilience Perspective. *Jurnal Ekonomi & Kebijakan Publik*. 2020;11(2):93–108. https://doi.org/10.22212/jekp.v11i2.1933

2. Alm J., Blaufus K., Fochmann M., Kirchler E., Mohr P., Olson N.E., Togler B. *Tax Policy Measures to Combat the SARS-CoV-2 Pandemic and Considerations to Improve Tax Compliance: A Behavioral Perspective*. No 2102, Working Papers from Tulane University, 2020. https://doi.org/10.1628/fa-2020-0014

3. Inasius F. Factors influencing SME tax compliance: Evidence from Indonesia. *International Journal of Public Administration*. 2019;42(5):367–379. https://doi.org/10.1080/01900692.2018.1464578

4. Alm J., Liu Y., Zhang K. Financial constraints and firm tax evasion. *International Tax and Public Finance*. 2019;26(1):71–102. https://doi.org/10.1007/s10797-018-9502-7

5. Feld L.P., Frey B.S. Tax compliance as the result of a psychological tax contract: The role of incentives and responsive regulation. *Law & Policy*. 2007;29(1):102–120. https://doi.org/10.1111/j.1467-9930.2007.00248.x

6. Fan Z., Liu Y. Tax compliance and investment incentives: firm responses to accelerated depreciation in China. *Journal of Economic Behavior & Organization*. 2020;176:1–17. https://doi.org/10.1016/j.jebo.2020.04.024

7. Khairiyah Y.R., Akhmadi M.H. Studi Kualitatif: Dampak Kebijakan Insentif Pajak Usaha Kecil Dan Menengah Terhadap Kepatuhan Pajak Dan Penerimaan Negara. *Jurnal Manajemen Keuangan Publik*. 2019;3(2):36–45. https://doi.org/10.31092/jmkp.v3i2.620

8. Bhegawati D.A.S., Dicriyani N.L.G.M. Tax Reporting Compliance During Covid-19 Time In Dalang Village. *Academy of Accounting and Financial Studies Journal*. 2021;25(25):1–11. Available at: https://www.abacademies.org/articles/tax-reporting-compliance-during-covid19-time-in-dalang-village-11394.html

9. Supriyati S., Hapsari I. Tax Avoidance, Tax Incentives and Tax Compliance During the Covid-19 Pandemic: Individual Knowledge Perspectives. *Journal of Accounting and Strategic Finance*. 2021;4(2):222–241. https://doi.org/10.33005/jasf.v4i2.174

10. Mujiyati, Khalimaturrosyida R. Determinant of Tax Compliance of MSME Taxpayers During the Covid-19 Pandemic. In: International Conference on Economics and Business Studies (ICOEBS 2022). Atlantis Press; 2022, pp. 216–223. https://doi.org/10.2991/aebmr.k.220602.028

11. Ridwan R.E., Nawir I.S. Buku Ekonomi Publik. Pustaka Pelajar; 2021. Available at: http://eprints2.ipdn.ac.id/id/eprint/721/1/Ekonomi%20publik.print.2%20%282%29.pdf

12. Ayuba A., Saad N., Ariffin Z.Z. Perceived service orientation, economic factors, psychological factors and tax compliance: Evidence from Nigerian SMEs. *Malaysian Management Journal*. 2016;20:41–57. https://doi.org/10.32890/MMJ.20.2016.9040

13. Mata R., Frey R., Richter D., Schupp J., Hertwig R. Risk preference: A view from psychology. *Journal of Economic Perspectives*. 2018;32(2):155–172. https://doi.org/10.1257/jep.32.2.155

14. Alm J., Torgler B. Culture differences and tax morale in the United States and in Europe. *Journal of Economic Psychology*. 2006;27(2):224–246. https://doi.org/10.1016/j.joep.2005.09.002

15. Wulandari R. The Effect of Understanding and Tax Sanctions on Taxpayer Compliance with Risk Preference as a Moderating Variable. *Journal of Business and Banking*. 2020;10(1):169–179. https://doi.org/10.14414/jbb.v10i1.2298

16. Kartika A. The Influence of Understanding of Tax Regulations and Tax Apparatus Services on Taxpayer Compliance with Risk Preference as a Moderating Variable (Case Study of MSMEs registered at KPP Pratama Demak). *Dinamika Akuntansi Keuangan dan Perbankan*. 2015;4(1):29–38. Available at: https://www.unisbank.ac.id/ojs/index.php/fe9/article/view/3815

17. Mei M., Firmansyah A. Kepatuhan Wajib Pajak Dari Sudut Pandang Pengetahuan Pajak, Kualitas Pelayanan, Sanksi Pajak: Pemoderasi Preferensi Risiko. *E-Jurnal Akuntansi*. 2022;32(11):3272–3288. https://doi.org/10.24843/EJA.2022.v32.i11.p06

18. Alabede J.O., Ariffin Z.Z., Idris K.M. Individual taxpayers' attitude and compliance behaviour in Nigeria: The moderating role of financial condition and risk preference. *Journal of Accounting and Taxation*. 2011;3(5):91–104. https://doi.org/10.5897/JAT11.010

19. Myers D.G. Social psychology. New York: Mc Graw Hill., 2010. Available at: https://diasmumpuni.files.wordpress.com/2018/02/david_g-_myers_social_psychology_10th_editionbookfi.pdf

20. Graham S. An attributional theory of motivation. *Contemporary Educational Psychology*. 2020;61:101861. https://doi.org/10.1016/j.cedpsych.2020.101861

21. Tamborini R., Grall C., Prabhu S., Hofer M., Novotny E., Hahn L., et al. Using Attribution Theory to Explain the Affective Dispositions of Tireless Moral Monitors Toward Narrative Characters. *Journal of Communication*. 2018;68(5):842–871. https://doi.org/10.1093/joc/jqy049

22. Brauner Y. The future of tax incentives for developing countries. In: Brauner Y., Stewart M. (eds). *Tax, law and development*. Edward Elgar Publishing; 2013. Ch. 2, pp. 25–56. https://doi.org/10.4337/9780857930019.00011

23. Smith K.W., Stalans L.J. Encouraging Tax Compliance With Positive Incentives: A Conceptual Framework and Research Directions. *Law & Policy*. 1991;13(1):35–53. https://doi.org/10.1111/j.1467-9930.1991.tb00056.x

24. Robbins S.P., Judge T.A. *Organizational Behavior*. Salemba Empat, 2013. Available at: https://onesearch.id/Record/IOS2750.8.527

25. Yunianti L.N., Putri N.K., Sudibyo Y.A., Rafinda A. The Influence of Awareness, Moral Obligations, Tax Access, Service Quality and Tax Sanctions on Taxpayer compliance in Paying Motor Vehicle Tax. *Journal of Accounting and Strategic Finance*. 2019;2(1):1–13. https://doi.org/10.33005/jasf.v2i1.20

26. Rabiyah U., Suryani A., Karim A. The Effect of Awareness, Fiscus Services and Taxation Knowledge on Taxpayer Compliance At Madya Makassar Kpp. *International Journal of Innovation Scientific Research and Review*. 2021;3(1):797–799. http://journalijisr.com/sites/default/files/issues-pdf/IJISRR-375.pdf

27. Septyana K.P., Suprasto H.B. Effect of taxation knowledge, fiscus service, and tax sanctions on tax obligation compliance with tax amnesty as moderated variables. *International Research Journal of Management, IT and Social Sciences*. 2019;6(6):111–117. https://doi.org/10.21744/irjmis.v6n6.773

28. Aswar K., Ermawati, Saragih R. The Influencing Factors on Taxpayer Compliance: A Conceptual Approach. *Information Management and Business Review*. 2020;11(4):27–32. https://doi.org/10.22610/imbr.v11i4(I).2987

29. Alabede J.O., Affrin Z.B.Z., Idris K.M. Tax service quality and compliance behaviour in Nigeria: Do taxpayer's financial condition and risk preference play any moderating role? *European Journal of Economics, Finance and Administrative Sciences*. 2011;(35):90–108. Available at: https://repo.uum.edu.my/id/eprint/3854

30. Wardani D.K., Nistiana L.D. The Effect of Understanding of Tax Regulations on Taxpayer Compliance with Risk Preference as a Moderating Variable. *Jurnal Simki Economic*. 2022;5(2):106–118. https://doi.org/10.29407/jse.v5i2.141

31. Susyanti J., Anwar S.A. Effects of Taxpayer Attitudes, Taxpayer Awareness, Tax Knowledge on Tax Compliance During Covid 19. *Sebatik*. 2020;24(2):171–177. Available at: https://jurnal.wicida.ac.id/index.php/sebatik/article/view/1166

32. Syanti D, Widyasari, Nataherwin. Effect of Tax Incentives, Tax Rates, Tax Sanctions and Tax Services on Taxpayer Compliance During the Covid-19 Pandemic. *Jurnal Ekonomika dan Manajemen*. 2020;9(2):108–124. https://doi.org/10.36080/jem.v9i2.1248

33. Nurkhin A., Novanty I., Muhsin M., Sumiadji S. The influence of tax understanding, tax awareness and tax amnesty toward taxpayer compliance. *Jurnal Keuangan dan Perbankan*. 2018;22(2):240–255. https://doi.org/10.26905/jkdp.v22i2.1678

34. Wulandari R. Analysis of Understanding and Tax Sanctions on Taxpayer Compliance Through Risk Preference as a Moderating Variable. *Vokasi: Jurnal RisetAkuntansi*. 2020;9(2):150–157. https://doi.org/10.23887/vjra.v9i2.29378

35. Hair Jr., Hult G., Ringle C.M., Sarstedt M., Danks N.P., Ray S. *Partial Least Squares Structural Equation Modeling (PLS-SEM) Using R*. Springer International Publishing; 2021. https://doi.org/10.1007/978-3-030-80519-7

36. Latan H., Ghozali I. *Partial Least Squares: Concepts, Methods and Applications using WarpPLS 4*. Diponegoro University Press; 2014. Available at: https://www.researchgate.net/publication/283574629_Partial_Least_Squares_Concepts_Methods_and_Applications_using_WarpPLS_4

37. Sholihin M., Ratmono D. *Analisis SEM-PLS dengan Warp PLS 3.0*. Yogyakarta Andi Offset; 2013. Available at: https://inlis.madiunkota.go.id/opac/detail-opac?id=427

38. Aryobimo P.T., Cahyonowati N. The Effect of Taxpayer Perceptions of Fiscal Service Quality on Taxpayer Compliance with Taxpayer Financial Conditions and Risk Preference as a Moderating Variable (Empirical Study of Individual Taxpayers in Semarang City). *Diponegoro Journal of Accounting*. 2012;1(2):1–12. Available at: https://ejournal3.undip.ac.id/index.php/accounting/article/view/598

39. Alabede J.O., Ariffin Z.Z., Idris K.M. Public Governance Quality and Tax Compli- ance Behavior in Nigeria : The Moderating Role of Financial Condition and Risk Preference. *Issues in Social and Environmental Accounting*. 2011;5(1):3–24. https://doi.org/10.22164/ISEA.V5I1.54

40. Dhawan A., Ma L., Kim M.H. Effect of corporate tax avoidance activities on firm bankruptcy risk. *Journal of Contemporary Accounting & Economics*. 2020;16(2):100187. https://doi.org/10.1016/j.jcae.2020.100187

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The Impact of Indirect Taxation on Inequality in Russia

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ABSTRACT

The purpose of this study is to consider the effects of indirect taxes, VAT in particular, on inequality. The study tests the hypothesis that indirect taxation in Russia does not have a significant impact on inequality but has a potential to reduce it. Methodologically, the study relies on correlation regression analysis, time series analysis, structural analysis and the index method. The data used for the analysis are provided by the Federal State Statistics Service (Rosstat) and Federal Tax Service for the period from 1992 to 2021. Calculations were conducted with the help of Data Analysis ToolPak in MS Excel. A classification of the types of economic inequality is proposed together with the corresponding fiscal instruments used to tackle each type. Indirect taxes are considered to be capable of reducing consumption inequality. To evaluate the influence of indirect taxation on inequality, the following parameters were considered: VAT-to-GDP ratio and the share of VAT in total tax revenues of the consolidated budget, share of revenue raised through 10% VAT in the total volume of VAT, and the decile ratio of consumption spending. It was found that indirect taxes in Russia do not have a significant impact on inequality. Although in some years VAT receipts accounted for a larger share in total tax revenues and in GDP and this trend was accompanied by lower levels of inequality, this happened because of the influence of other factors, for example, the use of the progressive scale of the personal income tax in the 1990s. To reduce inequality, a viable solution for the government would be to apply a system of differentiated VAT rates to balance disparities in consumption of the wealthiest and poorest households (these differences are reflected in Rosstat data on consumption). Moreover, since utilities, telecommunications and food constitute up to 70% of the poor's expenditures, it would make sense to lower the VAT rate for these categories of goods and services while raising the rate for such categories as hospitality services, cafes and restaurants, recreation and leisure services because in total, these categories account for 13.2% of the expenditures of the wealthiest households. Unfortunately, in 2022, the government took the decision to apply zero-rated VAT to these services as part of the anti-crisis program.

KEYWORDS

indirect taxes, VAT, inequality, monetary inequality, differentiation, stratification, equalization

JEL H21, H24

УДК 336.228

Оценка влияния косвенного налогообложения на неравенство граждан в России

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АННОТАЦИЯ

Цель исследования – определение возможностей сглаживания неравенства граждан с помощью косвенного налогообложения на основе оценки их взаимосвязи. Гипотеза исследования: косвенное налогообложение в России не

оказывает существенного влияния на неравенство граждан, но обладает потенциалом его сглаживания. В рамках проверки гипотезы применен корреляционно-регрессионный анализ, анализ рядов динамики, структурный анализ и индексный метод. Расчеты проведены с использованием пакета «Анализ данных» в MS Excel за период с 1992 по 2021 г. на основе данных Росстата и Федеральной налоговой службы. В рамках разработанной классификации экономического неравенства граждан обосновано, что именно косвенные налоги направлены на сглаживание неравенства потребления. Для оценки влияния косвенного налогообложения на неравенство проведен расчет доли НДС в ВВП и совокупных налоговых доходах консолидированного бюджета РФ, доли облагаемых НДС товаров по ставке 10% в общем объеме НДС, а также децильного коэффициента фондов по расходам на потребление. Установлено, что косвенные налоги в России не оказывают существенного влияния на сглаживание неравенства, а более высокий удельный вес НДС в сумме налоговых доходов и ВВП в отдельные годы при более низких показателях неравенства в это время является следствием иных факторов, например, прогрессивной шкалы подоходного налога в 1990-е гг. Для сглаживания неравенства целесообразна дифференциация ставок НДС с учетом структуры потребления наиболее и наименее обеспеченных граждан, которая определена на основе данных Росстата о неравенстве потребления в России. Кроме того, сглаживанию неравенства поспособствовало бы снижение ставки НДС по жилищно-коммунальным услугам и связи, которые наряду с питанием составляют до 70% расходов бедных граждан, и повышение НДС по гостиницам, кафе, ресторанам и отдыху (в совокупности 13,2% расходов наиболее обеспеченных граждан), по которым в рамках антикризисной программы 2022 г. введена ставка НДС 0%.

КЛЮЧЕВЫЕ СЛОВА
косвенные налоги, налог на добавленную стоимость, неравенство, монетарное неравенство, дифференциация, расслоение, сглаживание

1. Introduction

In many countries inequality is seen as a major threat to the economic security of the state. Inequality reduction was included by the United Nations as one of the goals into its 2030 Agenda for Sustainable Development[1]. According to the World Economic Forum[2], inequality in the wealthiest countries has now reached its highest level in the last fifty years. In Russia, inequality has remained consistently high in the last 30 years, that is, since the beginning of the market reforms.

Given the rise of the consumer economy, the gross divide between the rich and the poor manifested most starkly in consumption inequality. It also makes consumption taxes, such as VAT and excise duties, a potentially suitable tool for tackling the inequality problem.

The questions this study seeks to address are as follows. How can different fiscal tools be used to counteract different types of economic inequality? Does VAT affect inequality in Russia? What are the differences in the final consumption patterns of the highest- and lowest-income households in Russia? How can these differences be taken into account by policy-makers to develop measures and policies that could keep inequality in check? How can indirect taxes be used to curb inequality?

The purpose of this study is to consider the potential of indirect taxes as tools to reduce inequality by evaluating the relationship between VAT and inequality in Russia.

The hypothesis is that indirect taxation in Russia does not have a significant impact on inequality but has a potential to reduce it.

The paper is structured as follows. The section "Literature Review" surveys the most up-to-date scholarly knowledge on the impact of indirect taxation on inequality in different countries. The section "Methodology and Materials" describes

[1] https://www.un.org/sustainabledevelopment/ru/sustainable-development-goals/

[2] https://www3.weforum.org/docs/WEF_Global_Risk_Report_2020.pdf

the methodological framework and data used in this study. The section "Results" presents the study's key findings. The section "Discussion" compares the results with the evidence provided by prior research and examines the potential of indirect taxes as tools for tackling inequality. The conclusions are drawn in the final section of the article.

2. Literature review

In contemporary financial and economic research, much scholarly attention is focused on the relationship between taxation, including indirect taxation, and inequality.

A seminal work on the topic of inequality was written by Simon Kuznets, a Nobel Prize Laureate in Economics [1]. Kuznets hypothesized that in the era of industrialization, economic growth went hand in hand with increasing inequality; this trend continued until the 1920s, after which inequality started to decline while economic growth continued, accompanied by a rise in real income. To describe this process, he proposed the inverted U-shaped curve called the Kuznets Curve, which related income inequality with economic growth.

Piketty [2] extrapolated this curve with new data to show that if 19th century data are included into analysis, the graph takes a horizontal S shape, rather than an inverted U-shape. Piketty also demonstrated that since the 1970s, the income gap has been widening and the concentration of wealth has been increasing.

Yurevich [3] has empirically shown the negative influence of inequality on economic growth. There are, however, other points of view. For instance, Brückner & Lederman [4] argue that in poor countries inequality has a significant positive effect on gross domestic product per capita.

Stiglitz [5] argues that inequality is a phenomenon that is inherent in a market economy and that once inequality emerges, it keeps reproducing itself. To achieve greater equality, it is necessary to "rewrite the rules" governing the market economy through government regulation and in particular fiscal regulation.

Atkinson [6] believes that in order to reduce inequality, new tools are needed in addition to taxes and state support for the poor. Atkinson identified five main areas of policy to tackle inequality: technology, employment, social security, the sharing of capital, and taxation.

In the spectrum of studies on inequality and taxation, income taxation is one of the key research areas. Alvaredo et al. [7], Piketty et al. [8], Auten & Splinter [9] agree on the ability of direct taxes to curb inequality, although they have some disagreements as to what extent.

Of special interest in this respect are the cases of countries with flat income tax systems, primarily Eastern European and Middle Asian countries, former members of the Socialist bloc. Moździerz [10] has demonstrated a decrease in inequality in Slovakia after the country's government decided to return to the progressive tax. Mihaescu & Voinea [11] and Ilie [12] argue that in Romania the use of proportional taxation has led to an increase in inequality. Tanchev [13] used economic-mathematical modeling to show that proportional income taxation in Bulgaria contributes to inequality. Pugachev [14] argues that the tax system that existed in Russia before 2021 increased monetary inequality while income taxation as part of the tax system exacerbated this situation.

Let us now look at the current state of research on the effects of indirect taxes on inequality.

Martorano et al. [15] studied 14 Latin American countries in the period between 1990 and 2010 and found that an increase in the proportion of direct taxes in comparison with indirect taxes contributes to inequality reduction. Martorano [16] investigated the relationship between fiscal policy and inequality in Latin America in the 1970s and found that an increase in indirect taxes causes an increase in inequality. This happened, for example, in El Salvador and Honduras, where inequality was growing while the general tax burden remained low and indirect taxes prevailed over direct taxes.

Interestingly, earlier studies of Latin American countries, for example, Hanni

et al. [17] and Goñi et al. [18], on the contrary, demonstrated that due to the large share of indirect taxes in the tax system, taxation in general has a modest or regressive impact on income distribution.

Ciminelli et al. [19] found that indirect taxes significantly contributed to the reduction in income inequality in 16 OECD countries (in the period between 1978 and 2012). Indirect tax increase hits poor people the hardest because their marginal propensity to consumer is higher.

Ilaboya & Ohomba [20] examined the impact of taxation on inequality in Nigeria in a 30-year period starting from the 1980s and found that a decrease in the share of indirect taxes in total tax revenues contributes to inequality.

Webber & Thomas [21], in their study of the influence of taxes on inequality in the UK in 1977–2014, using the data on the progressivity and the average rate (in proportion of income) of indirect taxes, have shown that in this period, indirect taxes were regressive, which contributed to income inequality.

Similar evidence regarding the correlation between indirect taxation and inequality was obtained by Barnard [22] for the UK; Martinez-Vazquez et al. [23] for a large panel of countries; Cuceu & Văidean [24] for Romania; and Gornia [25] for Latin America.

On the other hand, there are studies that show the absence of any significant influence of indirect taxes on inequality. For example, Blasco et al. [26] argue that indirect taxes have an insignificant influence on inequality. The redistributive effect of indirect taxes varies across countries due to the differences in the average tax rate. They also emphasize that in countries with insignificant influence of indirect taxes on inequality, inequality reduction cannot be used to justify tax cuts.

Muinelo-Gallo & Roca-Sagalés [27] conducted an empirical study of OECD countries, covering the period of 1972–2006, and found that in comparison with direct taxes, indirect taxes are less effective at reducing inequality. They tend to be used more often in poor countries to minimize the negative influence on economic growth. There is evidence showing the important role of income inequality in the development of budget policy (see, for example, Bénabou [28]).

Hindriks & Myles [29] believe that indirect taxes do not have a significant impact on inequality because the same rates are applied to such categories of goods as essential goods and luxury goods.

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

Decoster et al. [31] demonstrate that indirect taxes are regressive with respect to disposable income but proportional or progressive with respect to total expenditures. Thus, indirect taxes are less significant for inequality reduction than direct taxes.

Similar conclusions were made by Figari & Paulus [32] for European countries, Savage [33] for Ireland, Bargain et al. [34] for the USA for the period of 1978–2009.

Thus, despite the vast body of research on the influence of indirect taxes on inequality, there is still no consensus on this matter: while some scholars are convinced of the considerable potential that indirect taxes hold to curb inequality, others, on the contrary, believe that this effect is insignificant at best, especially in the light of the regressive nature of indirect taxes and the absence of differentiated rates for different groups of commodities.

As far as Russia is concerned, there is still a perceived lack of scholarly inquiry into the influence of indirect taxes on inequality in this country, which means that more research is necessary to gain insights into the specific aspects of this problem. For instance, it is still unclear what direct vs indirect tax ratio should be in the tax burden structure to ensure an inequality-reducing impact. Another question concerns the impact of differentiated indirect taxes on inequality reduction. All of the above determines the relevance of this study.

3. Methodology and materials

To study the impact of indirect taxation on inequality, first and foremost, it is necessary to clarify our understanding of inequality as contemporary economic science offers no uniform approach to this concept. Economic inequality means the unequal distribution of income (earnings) or wealth in a society.

This study proposes a classification of types of economic inequality (income inequality, wealth inequality or monetary inequality, and consumption inequality) and identifies fiscal tools that can be used to better tackle each specific type (see Table 1).

The proposed classification shows that, in order to tackle the problem of inequality, it is necessary to go beyond personal income taxation and take a broader view of the fiscal tools that could be used for this purpose. Personal income tax (PIT) can help reduce income inequality but some of the wealthiest citizens may not have current earnings but have large amounts of accumulated capital. This means that such tools as property taxes may be needed to deal with inequality of this kind.

This paper tests the hypothesis about the influence of indirect taxes on inequality in Russia on the macro-economic level with the help of correlation regression analysis. The following parameters will be used for this purpose:

(1) Relationship between the Gini coefficient and the share of VAT in total tax revenues of the consolidated budget in a 30-year period – from 1992 to 2021.

(2) VAT-to-GDP ratio in a 27-year period – from 1995 to 2021.

(3) The share of revenue raised through VAT levied at 10% (reduced-rate VAT) in the total volume of VAT in a 12-year period, from 2010 to 2021.

(4) The decile ratio of consumption spending and the share of reduced-rate VAT in the total volume of VAT in a 10-year period, from 2012 to 2021.

The analysis relies on the official statistical data provided by Rosstat and the data of the Federal Tax Service from 1-NDS Report "Report about the Structure of Value Added Tax Charges". These indicators are listed and described in Table 2.

To evaluate the possible impact of VAT on consumption inequality, we need to conduct a structural analysis of the consumption patterns of the richest and poorest households by using Rosstat statistics by deciles. Our calculations of the structure and dynamics of final consumption expenditures in the first and tenth decile groups in Russia in 2012 and 2021 will help us reveal the consumption disparities for specific categories of goods and services between the lowest- and highest-income households.

The average rate of VAT on aggregate spending of decile groups was calculated by applying the formula of weighted arithmetic mean. The shares of expenditure categories in the total volume of expenditures were taken as weights under the assumption that the general VAT rate (20, 10 or 0%) for each category applies to all expenditures in this category.

Table 1

Classification of the types of economic inequality and corresponding fiscal tools

Types of economic inequality	Description	Fiscal tools to reduce inequality
Income inequality	Disparities in the distribution of current income – wages, pensions, welfare payments, interest payments, rent income, etc.	Personal income taxation
Monetary inequality – inequality by the level of capital accumulated or wealth	Disparities in the distribution of accumulated capital – property, vehicles, financial assets, securities, etc.	Personal income taxation
Consumption inequality	Disparities in consumption	Indirect taxation

Compiled by the author.

Table 2

Macro-economic indicators reflecting the impact of indirect taxation on income inequality in Russia

Indicators	Identifier	Description	Formula	Source of data and the period for which data are available
Gini coefficient	G	Universal measure of income inequality and income distribution. Takes values [0; 1], where 0 expresses perfect equality and 1, perfect inequality.	$G = \frac{\sum_{i=1}^{n}\sum_{j=1}^{n}\lvert x_i - x_j\rvert}{2n^2 \cdot \bar{x}}$, where x is the share of the income of a given household in the total volume of income of all households, n is the number of households	Rosstat[1] 1992–2021
Share of VAT in total tax revenues of the consolidated budget	d_1	Shows the role of VAT in the generation of tax revenues of the consolidated budget	$d_1 = \frac{VAT}{TR}$, where VAT is VAT receipts and TR stands for tax revenues of the consolidated budget.	Rosstat[2] 1992–2021
VAT revenue as a percentage of GDP (tax-to-GDP ratio)	d_2	Measure of the government's revenue from VAT relative to the size of national economy	$d_2 = \frac{VAT}{GDP}$	Rosstat[3] 1995–2021
Share of revenue raised through reduced-rate VAT (10%) in the total volume of VAT	d_3	Shows the share of reduced-rate VAT applied to essentials (10%) in the total volume of VAT. We assume that there is no difference between VAT charged and paid.	$d_3 = \frac{VAT_{charged}\,10\%}{VAT_{charged}}$, where $VAT_{charged}$ is the amount of VAT charged, $VAT_{charged}$ is the amount of VAT charged at the rate of 10%.	Federal Tax Service of the Russian Federation[4] 2010–2021
Decile ratio of consumption spending	k_1	Ratio of final consumption expenditures per capita of the richest 10% to that of the poorest 10 %.	$k_1 = \frac{\overline{x_{10}}}{\underline{x_1}}$, where $\overline{x_{10}}$ is PIT receipts per capita in the 10% of regions with the highest tax revenues, $\underline{x_1}$ PIT receipts per capita in the 10% of regions with the lowest tax revenues	Rosstat[5] 2012–2021

Note.

[1] https://www.fedstat.ru/indicator/31165;

[2] https://gks.ru/bgd/regl/b06_13/Main.htm, https://www.fedstat.ru/indicator/42547;

[3] https://gks.ru/bgd/regl/b06_13/Main.htm, https://www.fedstat.ru/indicator/42547, https://www.fedstat.ru/indicator/30946, https://www.fedstat.ru/indicator/57319;

[4] https://www.nalog.gov.ru/rn77/related_activities/statistics_and_analytics/forms/;

[5] https://rosstat.gov.ru/folder/13723

Compiled by the author.

4. Results

As Figure 1 illustrates, there is a strong inverse correlation between the share of VAT in total tax revenues of the consolidated budget and the Gini coefficient in 1992–2021. The higher is the share of indirect taxes in comparison with direct taxes and property taxes, the lower is income inequality.

An even stronger correlation is found between the VAT-to-GDP ratio and Gini coefficient (see Fig. 2).

Based on these findings, we can suppose that differentiated VAT rates may hold considerable potential to reduce inequality, especially regarding the reduced rate (10%) of VAT applied to specific categories of essentials – food, medications, and children's goods. However, the evaluation of the relationship between the share of reduced-rate VAT (goods taxed at 10%) in the total volume of VAT and the Gini coefficient in Russia in 2010–2021 has shown a moderate inverse correlation

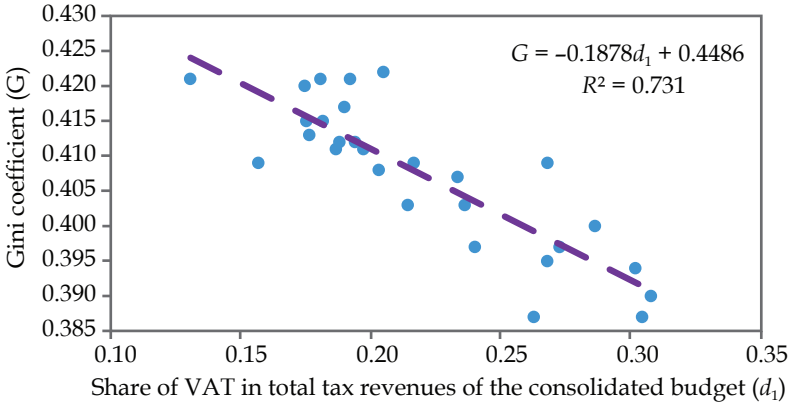

***Figure 1*. Relationship between the share of VAT in total tax revenues of the consolidated budget and the Gini coefficient in 1992–2021**

Note. Here and elsewhere in the figures the indicator values are given in percentages and points are labelled with years

Compiled by the author by using Rosstat data (https://www.fedstat.ru/indicator/31165, https://gks.ru/bgd/regl/b06_13/Main.htm, https://www.fedstat.ru/indicator/42547)

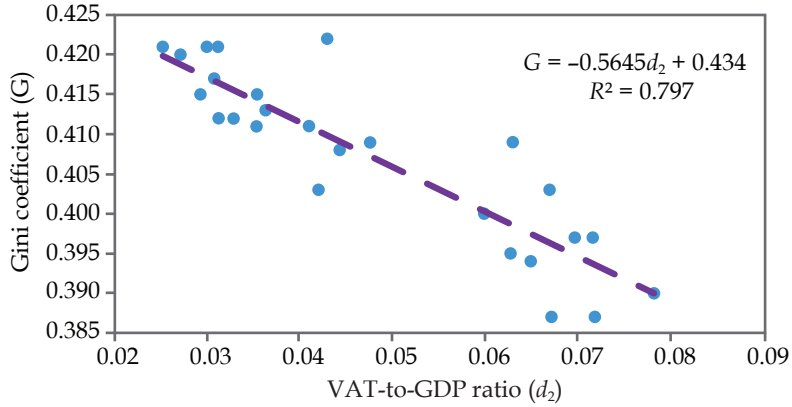

***Figure 2*. Relationship between the VAT-to-GDP ratio and Gini coefficient in 1995–2021**

Compiled by the author by using Rosstat data (https://www.fedstat.ru/indicator/31165, https://gks.ru/bgd/regl/b06_13/Main.htm, https://www.fedstat.ru/indicator/42547, https://www.fedstat.ru/indicator/30946, https://www.fedstat.ru/indicator/57319)

(r = –0.613, R^2 = 0.3757) (see Fig. 3), which means that this supposition is false. In our estimation of the share of reduced-rate VAT in the total volume of VAT, we assume that this figure is the same for VAT charged and VAT paid.

Since indirect taxes are mostly aimed at reducing consumption inequality, it makes sense to look at the relationship between the share of reduced-rate VAT (goods taxed at the rate of 10%) in the total volume of VAT and the decile ratio of consumption spending (see Fig. 4). Correlation coefficient r = –0,1129 points to a weak inverse correlation, which means that the application of reduced-rate VAT in Russia has virtually no effect on consumption. This might be explained by the fact that the goods taxed at the reduced rate are the basic necessities such as food, medications, and children's goods. These goods exhibit low price elasticity of demand, which is why VAT is distributed evenly among the consumers – both wealthy and poor.

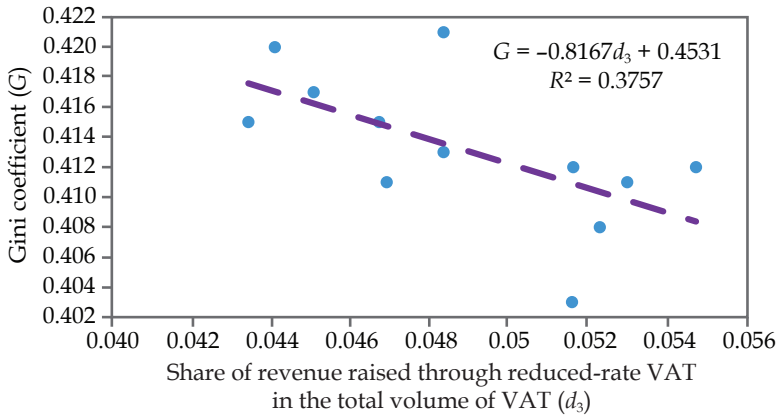

***Figure 3*. Relationship between the share of revenue raised through reduced-rate VAT in the total volume of VAT and the Gini coefficient in Russia in 2010–2021**

Compiled by the author by using the data of Rosstat (https://www.fedstat.ru/indicator/31165) and the Federal Tax Service (https://www.nalog.gov.ru/rn77/related_activities/statistics_and_analytics/forms/)

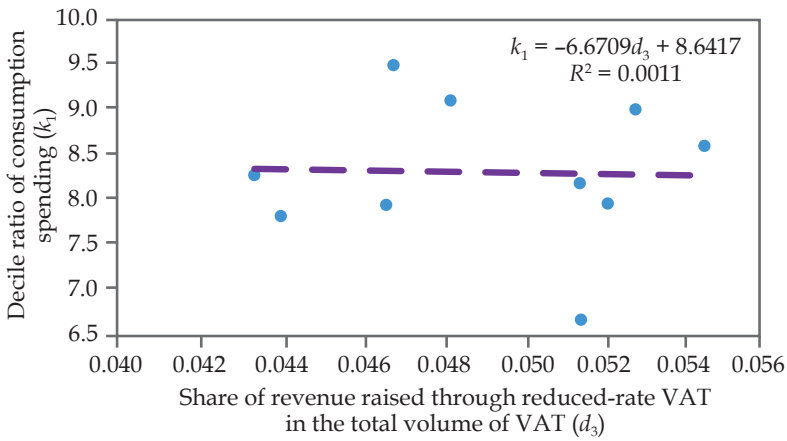

***Figure 4*. Relationship between the share of revenue raised through reduced-rate VAT in the total volume of VAT and the decile ratio of consumption spending in 2010–2021**

Compiled by the author by using the data from Rosstat (https://rosstat.gov.ru/folder/13723) and the Federal Tax Service (https://www.nalog.gov.ru/rn77/related_activities/statistics_and_analytics/forms/)

Table 3 summarizes the results of the correlation regression analysis of the impact of indirect taxes on inequality in Russia reflected in the macro-economic indicators.

Correlation regression analysis has shown a strong inverse correlation between the Gini coefficient and VAT-to-GDP ratio as well as the share of VAT in total tax revenues of the consolidated budget. There is also a weaker correlation between the share of reduced-rate VAT in the total volume of VAT and the inequality indicators – the Gini coefficient and the decile ratio of consumption spending. This means that indirect taxes do not have a significant impact on inequality in Russia while the larger proportion of VAT in total tax revenues and in GDP in some years in combination with lower levels of inequality result from the influence of other factors. If we look at Figures 1 and 2, we can see that the points in the lower right part of the graph mostly correspond to the 1990s, when the progressive PIT scale was in force and the level of inequality was on the rise (Gini coefficient, 0.39–0.40) but had not yet reached its peak (0.41–0.42 in 2000–2020).

If we exclude from the analysis the period when the progressive PIT scale was in force, we will see that the relationship between the share of VAT in total tax revenues of the consolidated budget and the Gini coefficient in 2001–2021 becomes weaker (Fig. 5) (correlation coefficient

Table 3

Results of correlation regression analysis of the impact of indirect taxes on inequality in Russia

Indicator	Factors	Linear regression equation	Correlation coefficient (r)	Coefficient of determination (R^2)	Level of significance (α) in the F-test	Standard error	Strength of correlation on the Chaddock scale
G	d_1	$G = -0.1878 d_1 + 0.4486$	–0.855	0.731	0.01	0.0055	Strong
	d_2	$G = -0.5645 d_2 + 0.434$	–0.893	0.797	0.01	0.0053	Strong
	d_3	$G = -0.8167 d_3 + 0.4531$	–0.613	0.3757	0.01	0.0041	Noticeable
k_1	d_3	$k_1 = -6.6709 d_3 + 8.6417$	–0.1129	0.0011	0.01	0.8496	Weak

Compiled by the author.

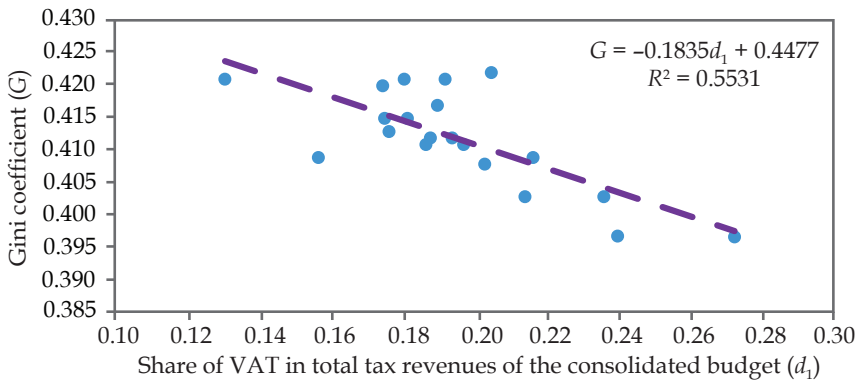

***Figure 5*. Relationship between the share of VAT in total tax revenues of the consolidated budget and Gini coefficient in 2001–2021**

Compiled by the author by using Rosstat data (https://www.fedstat.ru/indicator/31165, https://gks.ru/bgd/regl/b06_13/Main.htm, https://www.fedstat.ru/indicator/42547)

r = –0.744 and determination coefficient R^2 = 0.553; in 1992–2021 they were 0.855 and 0.731 respectively).

The exclusion from the analysis of the 1990s, when the progressive PIT was in effect, has decreased the tightness of the relationship between the share of VAT in total tax revenues of the consolidated budget and inequality even though the share of VAT in that period was larger (25–31%). This means that indirect taxes in Russia do not have a significant impact on the income and consumption gaps.

Therefore, in order to reduce inequality, among other things, it is necessary to change the indirect taxation system, taking into account the disparities in consumption. Let us now consider the characteristics of consumption of the wealthiest and poorest households in Russia (see Table 4).

Food makes up the main part of final consumption expenditures of lowest-income earners – 51.3%. For highest-income earners this figure is 19.8%. Most of these goods are taxed at the reduced rate of 10%. The prevalence of expenditures in this category (goods charged at reduced VAT) leads to a decrease in the tax burden on the lowest-income earners, even though, as we have found earlier, this does not result in a reduction in inequality. This can be explained by the following: first, these are the expenditures that consumers cannot avoid due to their essential character and, second, in absolute values, expenditures in this category remain 3.1 times smaller for the lowest-income earners than for the highest-income earners – 3,561 roubles per month against 10,950 roubles per month per capita.

Transport makes a significant part of the wealthiest citizens' expenditures – 25.8%, which is 4.69 times higher than for the poor. The share of expenditures for the highest-income groups persistently exceeds the share of expenditures for the lowest-income groups in such categories as hotels, cafes and restaurants (7.5 times, 4.5% of expenditures of the 10th decile group) and in recreation and leisure (4.83 times, 8.7% of expenditures of the 10th decile group). To support these sectors, in 2022, the Russian government

Table 4

Structure and dynamics of final consumption expenditures of the first and tenth decile groups in Russia in 2012 and 2021

Expenditure categories	First decile			Tenth decile			Ratio of the tenth decile to the first	
	2012, %	2021, %	Change, in percentage points	2012, %	2021, %	Change, in percentage points	2012, times	2021, times
Groceries	48.0	51.3	3.3	17.1	19.8	2.7	0.36	0.39
Clothing and footwear	8.0	7.7	–0.3	7.8	6.9	–0.9	0.98	0.90
Housing and communal services	15.7	13.5	–2.2	7.8	9.7	0.9	0.50	0.72
Home appliances	2.9	2.9	0	6.6	6.1	–0.5	2.28	2.10
Transport	6.1	5.5	–0.6	35.3	25.8	9.5	5.79	4.69
Telecommunications	4.8	5.6	1.2	2.2	3.5	1.3	0.46	0.63
Health care	2.2	2.9	0.7	3.0	3.5	0.5	1.36	1.21
Education	0.5	1.2	0.7	0.8	0.8	0	1.60	1.14
Recreation and leisure	2.9	1.8	–0.9	6.7	8.7	2.0	2.31	4.83
Hotels, cafes, restaurants	0.8	0.6	–0.2	4.5	4.5	0	5.63	7.50

Compiled by the author by using Rosstat data (https://rosstat.gov.ru/folder/13723).

set the rate of VAT to zero for these services. Taking into account the structure of consumption of the wealthiest and poorest households, these anti-crisis measures are likely to widen the inequality gap because the categories where goods and services are zero-rated occupy a significant place in the expenditures structure of the wealthy (13.2%) while remaining quite insignificant for the poor (2.4% or 5.5 times less).

Let us now calculate the average rate of VAT on aggregate spending for the first and tenth decile groups. It should be noted that health care services are zero-rated for VAT. Similarly, since 2022, a zero rate has been set for services of cafes and restaurants as well as for hospitality and tourism services. If we assume that goods from the category "Groceries" are taxed at 10%, goods and services from categories "Health care", "Recreation and leisure", and "Hotels, cafes and restaurants", at 0%, and goods and services from all the other categories, at 20%, then the average rate of VAT on aggregate spending for the first decile group will be 13.81% and for the tenth decile group, 14.68%, that is, it will be by 0.87 percentage points lower. Undoubtedly, the application of the reduced rate for certain categories of essential goods is necessary to lower the tax burden on the poor although this measure is not very helpful in bridging the inequality gap because zero-rated VAT for those goods and services that make up a larger share of rich people's expenditures than those of the poor (leisure, hotels, cafes and restaurants) will inevitably produce the opposite effect and increase inequality.

Differentiated VAT rates could provide a viable solution to the problem of inequality: the VAT rate should be raised for luxury goods as well as for those goods, works and services that are major components of the consumer basket for the wealthiest groups while occupying an insignificant part of the basket of the poorest households. At the same time, reduced VAT rates should be applied to the goods that are considered essential. As Table 4 shows, it would make sense to apply a higher VAT rate to hospitality services, cafes, restaurants, and transport while at present the services in all of these categories, except for transport, are zero-rated.

To reduce inequality, it would be necessary to lower VAT rate for those items that account for a much larger share of the consumption structure of the first decile group in comparison with the tenth group: groceries, utilities, and telecommunications. Together, these categories will form 70.4% of expenditures of the poorest and only 33% of the wealthiest households.

If we suppose that for cafés and restaurants, for hospitality and leisure services, the VAT rate will be returned to the level of 20% while for utilities and telecommunications, it will be reduced to 10%, similar to reduced-rate VAT charged on essential goods, then, provided that the consumption structure remains the same as in 2021, the average rate of VAT on aggregate spending for the first decile group will be 12.97% (lower by 0.84 percentage points in comparison with the current level) and for the tenth decile group, 16.67% (higher by 1.99% percentage points in comparison with the current level). The difference between average rates will increase from 0.87 to 3.7 percentage points. Thus, the proposed measures can help the government tackle the problem of inequality while avoiding the negative effects on tax revenues collected in the country.

Adjustment of VAT rates should take into account the elasticity of demand and the possibility of tax burden shifts, because for goods, works and services for which the demand is highly elastic (this includes luxury goods, which consumers can quickly choose to stop buying once the price goes up), most of the tax burden resulting from the higher tax rate is borne by the producer or seller. It should also be noted that the marginal propensity to consume in lower-income groups is higher than in the wealthiest groups while the marginal propensity to save is, on the contrary, higher for the wealthy, which is why a rise in consumption taxes will influence primarily the most disadvantaged households.

5. Discussion

The results of the analysis confirmed the hypothesis that indirect taxation in Russia does not have a significant impact on inequality but has a potential to reduce it.

These findings correspond to those of the previous studies on Latin American countries: for example, Hanni et al. [17]; Goñi et al. [18], whose study covered 22 OECD countries in the period from 1999 to 2013; Guillaud et al. [26]; and Blasco et al. [22]

Within the framework proposed by Muinelo-Gallo & Roca-Sagalés [23], Russia can be classified as belonging to the group of high-income countries that choose not to use indirect taxes to reduce inequality to avoid the negative impact on economic growth.

The proposed classification of the types of economic inequality shows that indirect taxes are aimed at reducing consumption inequality.

Correlation regression analysis has shown that there is a strong inverse relationship between the VAT-to-GDP ratio, the share of VAT in total tax revenues of the consolidated budget and the Gini coefficient (r = –0.855 and –0.893; R^2 = 0.797 and 0.731). The relationship between the share of reduced-rate VAT (10%) in the total volume of VAT and the indicators of inequality (Gini coefficient and decile ratio of consumption spending) is weaker (r = –0.613 and –0.1129; $R2$ = 0.3757 and 0.0011). These results point to the absence of any significant impact of indirect taxes on inequality, especially if we pay attention to the fact that after we excluded from the analysis the period of the 1990s, when the progressive PIT scale was in force and the levels of inequality were lower, this relationship became weaker even though in this period the share of VAT in total tax revenues of the consolidated budget was larger (25–31%) than in 2001–2021 (14–24%).

Even though so far indirect taxation has had no significant impact on inequality in Russia, there are grounds to believe that indirect taxes still hold certain potential in this respect. Studies of other countries (see, for example, Ciminelli et al. [19], Hindriks & Myles [25], Guillaud et al. [26]) provide sufficient evidence to confirm this fact.

The structure of final consumption expenditures of the wealthiest and poorest households, according to official Rosstat data, is different. The largest part of expenditures for the lowest-income households consists of food, utilities, and telecommunications (in total 70%). For the highest-income households, the share of expenditures in such categories as hotels, cafes and restaurants persistently exceeds the corresponding expenditures of the lowest-income households (7.5 times, 4.5% of expenditures of the 10th decile group). We find a somewhat similar picture in the category of recreation and leisure services (4.83 times, 8.7% of expenditures of the 10th decile group).

The average rate of VAT on aggregate spending of the richest and poorest households is 14.68% and 13.875 respectively, that is, the difference is insignificant. In calculating this figure, we proceeded from the assumption that for each category, the general VAT rate (20, 10 or 0%) applies to all of the expenditures in this category.

The anti-crisis measures taken by the Russian government in 2022 included setting the rate of VAT to zero for leisure and recreation services, hospitality services, services of cafés and restaurants. Unfortunately, this step does not lead to a reduction in inequality because the share of expenditures in these categories for the highest-earning households is 4.8–7.5 times higher in comparison with the poorest households.

To reduce inequality in Russia, it would make sense to apply the rate of 10% to utilities and telecommunications the same way as the reduced rate is now applied to essentials. At the same time, the VAT rate should be raised to the standard level of 20% for leisure and hospitality services, cafés and restaurants. This will lead to a decrease in the average VAT rate on aggregate spending of the poor – to 12.97% (this figure will fall by 0.84 per-

centage points in relation to its current level) and to an increase in the average VAT rate for the rich – to 16.67% (a rise by 1.99 percentage points). This way indirect taxation will contribute to inequality reduction in Russia.

6. Conclusions

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

1. Economic inequality comprises income inequality, monetary inequality or inequality in accumulated wealth, and consumption inequality. Each of these types of inequality can be considered in connection to certain fiscal tools that are used to reduce it: income taxes, property taxes and indirect taxes respectively.

2. VAT in Russia does not have a significant influence on consumption inequality. The situation was exacerbated by the introduction of the zero-rated VAT for tourism and hospitality services, cafes and restaurants as an anti-crisis measure, because it decreased the tax burden on the rich: for the rich, the share of spending in these categories exceeds the corresponding expenditures of the poor 4.8–7.5 times. Despite the apparent disparities in consumption of the richest and poorest households, the average rate of VAT on aggregate spending of these groups is virtually the same.

3. To reduce consumption inequality in Russia, a viable solution would be to lower the rate of VAT for utilities and telecommunications, similar to the way the reduced rate is applied to necessities and to raise the rate to the standard level (20%) for leisure and recreation, hospitality services, cafes and restaurants. This will result in a lower average rate of VAT on aggregate spending for the poorest households and in a higher average VAT rate for the richest.

Thus, our initial hypothesis that indirect taxation in Russia does not have a significant impact on inequality but has a potential to reduce it has been confirmed.

On the practical level, these findings can be of interest to policy-makers and government agencies in search of ways to tackle inequality with the help of indirect taxation. This research on the potential of indirect taxes to curb inequality in Russia opens up avenues for further exploration.

References

1. Kuznets S. Economic Growth and Income Inequality. *The American Economic Review*, 1955;1(45):1–28. Available at: https://assets.aeaweb.org/asset-server/files/9438.pdf

2. Piketti T. *Capital in XXI century*. Cambridge Massachusetts: The Belknap Press of Harvard University Press; 2014. Available at: https://dowbor.org/wp-content/uploads/2014/06/14Thomas-Piketty.pdf

3. Yurevich M. Social Inequality, Investment, and Economic Growth. *Journal of Economic Regulation*. 2019;4(10):35–46. https://doi.org/10.17835/2078-5429.2019.10.4.035-046

4. Brückner M., Lederman D. Effects of Income Inequality on Aggregate Output. *Policy Research Working Paper*. 2015;6:2–32. Available at: http://hdl.handle.net/10986/22203

5. Stiglitz J. *The price of inequality: how today's divided society endangers our future*. New York; 2012. http://resistir.info/livros/stiglitz_the_price_of_inequality.pdf

6. Atkinson A.B. *Inequality: What can be done?* Harvard University Press; 2015. Available at: https://www.acarindex.com/dosyalar/kitap/acarindex-1436513133.pdf

7. Alvaredo F., Chancel L., Piketty T., Saez E., Zucman G. *World Inequality Report – 2018. Executive Summary*. World Inequality Lab; 2017. 20 p. Available at: https://wir2018.wid.world/files/download/wir2018-summary-english.pdf

8. Piketty T., Saez E., Zucman G. Distributional national accounts: methods and estimates for the United States. *The Quarterly Journal of Economics*. 2018;133(2):586–587. https://doi.org/10.1093/qje/qjx043

9. Auten G., Splinter D. *Income Inequality in the United States: Using Tax Data to Measure Long-Term Trends*. February 18, 2022. 44 p. Available at: http://davidsplinter.com/AutenSplinter-Tax_Data_and_Inequality.pdf

10. Moździerz A. Tax Policy and Income Inequality in the Visegrad Countries. *Naše gospodarstvo/Our Economy*. 2015;61(6):12–18. https://doi.org/10.1515/ngoe-2015-0022

11. Mihaescu F., Voinea L. *The Impact of the Flat Tax Reform on Inequality: The Case of Romania.* Wiiw Balkan Observatory Working Papers. No. 81, 2009. 23 p. Available at: https://wiiw.ac.at/the-impact-of-the-flat-tax-reform-on-inequality-the-case-of-romania-dlp3217.pdf

12. Ilie S. Income Inequalities in Romania in the Aftermath of the 2008 Economic Crisis. *Romanian Journal of Economic Forecasting*. 2020;23(2):115–130. Available at: https://ipe.ro/rjef/rjef2_20/rjef2_2020p115-130.pdf

13. Tanchev S. How the proportional income taxation increases inequality in Bulgaria. *Journal of Tax Reform*. 2021;7(3):244–254. https://doi.org/10.15826/jtr.2021.7.3.101

14. Pugachev A.A. Taxation-Based Indicators as a Measure of Income Inequality in Russian Regions. *Journal of Tax Reform*. 2022;8(1):40–53. https://doi.org/10.15826/jtr.2022.8.1.107

15. Martorano B. Taxation and inequality in developing countries: Lessons from the recent experience of Latin America. *Journal of International Development*. 2018;30(2):256–273. https://doi.org/10.1002/jid.3350

16. Martorano B. *Tax Policy and Inequality in Latin America*. June 2018. 30 p. Available at: https://internationalbudget.org/wp-content/uploads/tax-policy-and-inequality-latin-america-english-2018.pdf

17. Hanni M., MartnerFanta, R., Podestá A. The Redistributive Potential of Taxation in Latin America. *CEPAL Review*. 2015;116:7–26. Available at: http://hdl.handle.net/11362/39603

18. Goñi E., Lopéz J., Servén L. Fiscal Redistribution and Income Inequality in Latin America. *World Development*. 2008;39(9):1558–1569. https://doi.org/10.1016/j.worlddev.2011.04.025

19. Ciminelli G., Ernst E., Meriola R. Giuliodori M. The composition effects of tax-based consolidations on income inequality. *European Journal of Political Economy*. 2019;57:107–124. https://doi.org/10.1016/j.ejpoleco.2018.08.009

20. Ilaboya O.J., Ohomba N. Direct Versus Indirect Taxation and Income Inequality. *European Journal of Accounting Auditing and Finance Research.* 2013;1(1):1–15. Available at: https://www.eajournals.org/wp-content/uploads/DIRECT-VERSUS-INDIRECT-TAXATION-AND-INCOME-INEQUALITY.pdf

21. Webber D., Thomas N. *The effects of taxes and benefits on income inequality: 1977 to financial year ending 2015*. Census; 2021. 25 p. Available at: https://www.ons.gov.uk/peoplepopulationandcommunity/personalandhouseholdfinances/incomeandwealth/bulletins/theeffectsoftaxesandbenefitsonincomeinequality/1977tofinancialyearending2015

22. Barnard A. The effect of taxes and benefits on household income 2008/2009. *Economic & Labour Market Review*. 2010;4(7):36–47. https://doi.org/10.1057/elmr.2010.95

23. Martınez-Vazquez J., Dodson B.M., Vulovic V. The impact of tax and expenditure policies on income distribution: Evidence from a large panel of countries. *Hacienda P´ublica Espa˜nola*. 2012;200(1):95–130. https://doi.org/10.2139/ssrn.2188608

24. Cuceu I., Văidean V. Redistributing Income through VAT. *Economic Sciences Series*. 2018;18(2):588–592. Available at: https://ideas.repec.org/a/ovi/oviste/vxviiiy2018i2p588-592.html

25. Gornia G. Inequality trends and their determinants. *World Institute for Development Economics Research Working Paper*. 2012/09. 44 p. Available at: https://www.wider.unu.edu/sites/default/files/wp2012-009.pdf

26. Blasco J., Guillaud E., Zemmour M. Consumption taxes and income inequality An international perspective with microsimulation. *Luxembourg Income Study Working Papers Series.* 2020;785:1–35. Available at: https://hal.archives-ouvertes.fr/hal-02735145/document

27. Muinelo-Gallo L.; Roca-Sagal´es O. Joint determinants of fiscal policy, income inequality and economic growth. *Economic Modelling*. 2013;30:814–824. https://doi.org/10.1016/j.econmod.2012.11.009

28. Bénabou R. Unequal Societies: Income Distribution and the Social Contract. *American Economic Review*. 2000;90:96–129. https://doi.org/10.1257/aer.90.1.96

29. Hindriks J., Myles G.D. *Intermediate Public Economics.* The MIT Press, Cambridge, Massachusetts; 2013. Available at: https://dspace.uef.edu.vn/bitstream/123456789/29440/1/Intermediate%20public%20economics%20-2013-336r.pdf

30. Guillaud E., Olckers M., Zemmour M. Four levers of redistribution: The impact of tax and transfer systems on inequality reduction. *Luxembourg Income Study Working Papers Series.* 2017;695:1–38. Available at: https://hal.archives-ouvertes.fr/hal-02735326/document

31. Decoster A., Loughrey J., O'Donoghue C., Verwerft D. How regressive are indirect taxes? A microsimulation analysis for five European countries. *Journal of Policy analysis and Management.* 2010;29(2):326–350. https://doi.org/10.1002/pam.20494

32. Figari F., Paulus A. The Distributional Effects of Taxes and Transfers Under Alternative Income Concepts: The Importance of Three «I» s. *Public Finance Review*. 2015;43(3):347–372. https://doi.org/10.1177/1091142113506930

33. Savage M. Integrated Modelling of the Impact of Direct and Indirect Taxes Using Complementary Datasets. *The Economic and Social Review*. 2017;48(2):171–205. Available at: https://www.esri.ie/system/files/media/file-uploads/2017-06/JA201727.pdf

34. Bargain O., Dolls M., Immervoll H., Neumann D., Peiechl A., Pestel N., Seigloch S. Tax policy and income inequality in the U.S., 1976–2009: A Decomposition Approach Society for the Study of Economic Inequality. *SSRN Electronic Journal*. 2011;5910:1–45. https://doi.org/10.2139/ssrn.1913617

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Fuels Taxation in the Context of Tax Reforms in the Czech Republic

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ABSTRACT
The article evaluates the development of the tax burden and its influence on fuel consumption in the Czech Republic in the years 2001–2022. Petrol and diesel are subject to universal and selective indirect taxation. Using the methods of analysis, description, comparison, synthesis and regression and correlation analysis, it is analysed whether the tax burden of these products is constant despite minimal tax reforms or whether it is changing. To assess the real tax burden, the effective tax rate indicator is calculated. Input data for the analysis consists of average fuel prices and tax rates in the analysed period. Compared to the first analysed year – 2001 and the last analysed year 2022, the value-added tax rate increased by one percentage point. Selective excise duty rates also increased by about 1 CZK., The results of the analysis examining the development of the tax burden using the effective tax rate show that the tax burden on fuel is constantly changing. However, this is not due to many tax reforms in this area of taxation. The reason is mainly the unit type of tax rate for excise duties. This fact causes the increase in the price of fuel leads to decrease the percentage of tax to the total price of fuel, and the tax burden thus develops regressively. Excise duties and value-added tax have a negative effect on consumption. In the context of tax theories, one of the reasons for the higher tax burden on fuels is the limitation of their consumption. It can thus be concluded that in the Czech Republic, these taxes are fulfilled. At the same time, the high tax burden creates relatively stable revenues for the state budget. This fact confirms the importance of excise duties.

KEYWORDS
diesel, effective tax rate, excise duty, petrol, tax burden, tax reform, value-added tax

JEL C10, H29, H31, K34, Q41

УДК 336.201

Налогообложение топлива в контексте налоговых реформ в Чешской Республике

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АННОТАЦИЯ
В статье оценивается налоговая нагрузка на топливо и ее влияние на потребление топлива в Чешской Республике в 2001–2022 гг. Бензин и дизельное топливо подлежат универсальному и селективному косвенному налогообложению. С помощью методов анализа, описания, сравнения, синтеза и регрессионно-корреляционного анализа анализируется, остается ли налоговая нагрузка на топливо постоянной, несмотря на минимальные налоговые реформы, или она меняется. Для оценки реальной налоговой нагрузки рассчитывается показатель эффективной налоговой ставки. Исходными данными для анализа явля-

ются средние цены на топливо и налоговые ставки за анализируемый период. По сравнению с первым анализируемым 2001 г. и последним анализируемым 2022 г. ставка НДС увеличилась на один процентный пункт. Выборочные ставки акцизного сбора также увеличились примерно на 1 крону. Результаты анализа динамики налоговой нагрузки с использованием эффективной налоговой ставки показывают, что налоговая нагрузка на топливо постоянно меняется. Однако это не связано со налоговыми реформами в этой области налогообложения. Причиной в основном является изменение налоговой ставки по акцизам. Этот факт приводит к тому, что рост цены на топливо приводит к уменьшению доли налога в общей стоимости топлива, а налоговая нагрузка при этом развивается регрессивно. Акцизы и НДС отрицательно сказываются на потреблении топлива. В контексте налоговых теорий одной из причин более высокой налоговой нагрузки на топливо является ограничение его потребления. Таким образом можно сделать вывод, что в Чешской Республике эти налоги уплачиваются. В то же время высокая налоговая нагрузка создает относительно стабильные доходы государственного бюджета. Этот факт подтверждает важность акцизов на топливо.

КЛЮЧЕВЫЕ СЛОВА
дизельное топливо, эффективная налоговая ставка, акциз, бензин, налоговая нагрузка, налоговая реформа, налог на добавленную стоимость

1. Introduction

Fuels such as petrol or diesel are burdened in their sales price by indirect taxes such as value-added tax and excise duties, specifically tax on mineral oils. Tax reforms changing tax rates on mineral oils are not very frequent in the Czech Republic or many other European countries. However, the research question remains whether the tax burden of these commodities is also unchanged.

In the Czech Republic, the Excise Tax Act governs the taxation of mineral oils. Nowadays a valid law was created as part of the tax reform on January 1, 2004. However, fuel was also subject to excise duty until this date. From 2004 until the end of 2022, the provisions of the law regarding tax rates changed minimally. The tax reform in 2010 increased the burden on both commodities by CZK 1.

In 2021, the excise duty rate for diesel has been reduced to the value originally valid in 2004–2009. Due to the increase in fuel prices in 2022, there was a temporary reduction in excise duties rates on mineral oils by CZK 1.50. Compared to other taxes, it can be assumed at first sight that the tax burden on fuel is constant and unchanging since few reforms were changing this tax rate. The development of excise duties tax rates on diesel or gasoline since 2000 is documented in Figure 1.

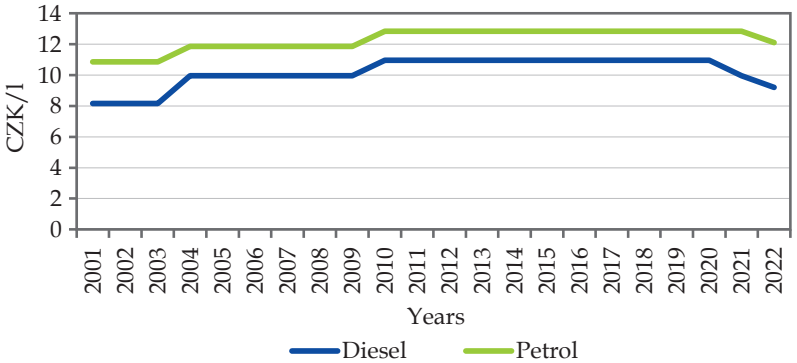

Figure 1. **Tax rate for diesel or petrol**

Source: own processing

Mineral oils are subject to selective tax and universal indirect tax, i.e., value-added tax. There have been more changes in this area compared to excise duties. Tax rates varied only in the order of one percent. More detailed information is provided by Figure 2.

The article aim is evaluating the development of the tax burden on fuel in the Czech Republic from 2001 to the end of 2022.

Are there only minimal changes in the tax burden, or is the real amount of the tax burden changing even though no tax reform has taken place? How does the tax rate affect fuel consumption? The following analysis in this article will answer all these questions. In the article, the first analysed year is 2001, and the last is 2022, representing a time series of 22 years. Such a long time series provides a reliable basis for performing the analysis. The examined period is also limited by the availability of data on prices, or fuel consumption, which the Czech Statistical Office has fully published since 2001.

Another goal is to evaluate the development of fuel consumption – petrol and diesel in the context of the implemented tax reforms affecting the fuels tax burden. Does the consumption of these fuels increase as the tax burden decreases?

The structure of the article is as follows. The introduction mentions the basic aspects of the issue and the research questions. The following section deals with an overview of research studies already carried out in this area. The main part is the chapter evaluating the tax burden and fuel consumption development. The final part is focused on summarizing new findings from this analysis.

Following the above analysis of the current situation, it is possible to formulate the *hypothesis* that the tax burden on fuel does not change significantly in the Czech Republic. The reason for this hypothesis is only minimal tax reforms in excise duties.

2. Literature

Several studies have analysed aspects of fuel taxation. For example, the price elasticity of fuels in connection with the taxation of these products was examined.

Hammar et al. [1] or Damania & Fredriksson [2] mentions that fuel demand is highly price elastic. It follows that if the goal is to reduce fuel consumption, the way to achieve this goal is to increase the tax burden. When determining the tax burden, it is necessary to consider and distinguish price elasticity in the short and long term [3]. This study also mentions the need to consider the specifications and differences of each country. This is confirmed by the findings of Ghoddusi et al. [4].

The above studies show that price elasticity is essential in imposing any tax. This elasticity affects the consumption of the commodity that is burdened by the tax.

According to the conclusions of Akkaya & Hepsag [5], on the contrary, the demand for fuels is rather a price inelastic, so an increase in the tax burden on petrol or diesel does not lead to a drastic reduction in consumption. The fact that a tax reform increasing the fuel tax rate may not lead to a more significant re-

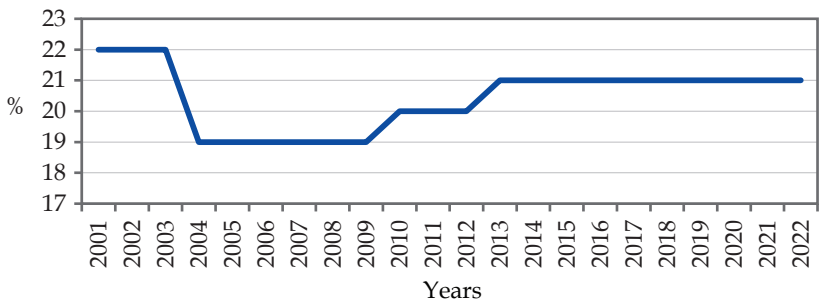

Figure 2. **Tax rate of value-added tax**

Source: own processing

duction in the consumption of these products is also evidenced by the analyses carried out in research Harju et al. [6] or Coglianese et al. [7].

Harju et al. [6] among other things, emphasize that the factor that determines consumption is, for example, territory. The consumption and price elasticity of fuel in a big city differs from the price elasticity in villages. These differences arise especially when the price of fuel increases, and it can take up to one year for these differences to balance out.

Coglianese et al. [7] also mention that it is necessary to consider whether the possible tax reform will increase or decrease the tax burden. If, for example, a reduction in the tax burden is expected, consumers will postpone fuel consumption.

Porcher & Porcher [8] chose an alternative approach – the Markov-switching approach – when investigating the effect of the tax burden on fuel consumption. The conclusions of the analysis indicate that consumers react quite strongly to an increase in the tax burden on fuels.

Using the Markov-switching approach, Boroumand et al. [9] confirmed that higher price elasticity is when fuel prices rise. And that, whether with an increase in the tax burden or an increase in oil price. Conversely, fuel sellers and consumers react less flexibly to a decrease in the tax burden of oil prices.

One of the reasons for applying excise duties, in general context of tax theories, is the reduction of the consumption of harmful products. The consumption of fuel is characterized according to Parry et al. [10] by certain harmfulness, and thus it can be stated that the goal of a higher tax burden is the reduction of consumption.

Stinson et al. [11] mention that it is also possible to approach the construction of excise duties in an alternative way. This consists of the existence of tax advantages and reliefs. However, this approach has not been widely adopted in the field of excise duties, which is also evidenced by the results of the David [12].

David [12] also discovered that the amount of excise duties cannot be imposed precisely in the amount of damage caused by the consumption of a specific commodity burdened with an excise tax. In that case, the tax burden would have to be four times greater.

Kamruzzaman & Mizunoya [13] investigated the effect of fuel taxation on consumption in Bangladesh. It was found that by taxing fuels, their consumption decreased by approximately one-fifth.

Similar conclusions regarding the effect of fuel taxation on fuel consumption in China were found by Xiao & Ju [14]. The effects of fuel taxation on consumption were also analysed by other studies, e.g., in Japan by Tanishita [15], which also states that the tax burden on fuels reduces their consumption. Despite this fact, however, fuel consumption is developing in an increasing trend. The study does not agree with the idea of an alternative approach, e.g., in the form of tax reliefs or higher taxation of cars, for example, stated by [11].

Studies analysed fuel taxation from a more comprehensive perspective of several countries, e.g., in the countries of the European Union were also done. According to Kantarci [16], the average tax burden on gasoline in the countries of the European Union is around 66%, and on diesel around 61%.

Shao et al. [17] also mention a high tax burden, which, on the one hand, is beneficial to limit environmental harm. On the other hand, such a high tax burden can reduce economic growth.

Fukui & Mioyshi [18], analysing the effect of fuel taxation on consumption in the USA, states that when the tax burden increases, consumption of these fuels decreases in the short term. On the contrary, when assessing these effects in the long term, the decrease in consumption is less significant than in the short time.

Gordeev & Galeeva [19] investigated fuel taxation in Russia. An increase in excise duty by about 0.4 rubbles per litre would be reflected in a decrease in consumption by about 1%.

As Bjertnaes [20] mentioned, ecological aspects should also be considered at legislation of fuel taxes. In practice, as the study states, this would mean a reduced

tax rate for vehicles with lower average fuel consumption.

According to Shao et al. [21], another way to increase the tax burden of these commodities through indirect taxes could be stimulating the behaviour of economic subjects towards ecologically desirable activities in the form of subsidies.

During reforms dealing with fuel taxation, it is desirable to discuss according to results Carvalho & Guillen [22] not only the issue of tax rates. Tools for changing the consumption of commodities can be, for example, the elimination of cases in which the use of items such as petrol or diesel is exempt from excise duties.

Hájek et al. [23], using multi-panel regression analysis, found that emission allowances are a tool to limit the consumption of environmentally harmful commodities.

During tax reforms changing the tax burden of excise duty commodities, the government must consider the commodity's tax burden and the impact on state budget revenues and adjust the tax mix accordingly. This is also related to changes in other direct or indirect taxes. Janoušková & Sobotovičová [24] found that, for example, land taxation in the Czech Republic is very low compared to other countries. Municipalities have the option of applying coefficients to increase tax revenue. However, only approximately 10% of municipalities use this option.

The results of the study by Andrejovská & Glova [25] show that a high tax quota can have a negative effect on economic growth. There are cases when a higher tax burden is justified, e.g., by the exclusivity or attractiveness of a specific place or product.

Thottoli & Mamari [26] mention that when setting up new taxes or changing existing ones, communication between the government and citizens is necessary so that citizens understand the meaning and purpose of the tax changes.

From the overview of research studies, it follows those fuels, unlike e.g., basic foodstuffs, are characterized by a higher tax burden. This tax burden ensures stable tax revenue, on the other hand, it also limits fuel consumption. Limiting fuel consumption is positive from an ecological point of view, but it can cause a reduction in economic growth. Thus, studies confirm that there is dependence between fuel consumption and the level of taxation.

3. Data and Methodology

3.1. Data

The input data for the analysis is a database for the period from 2001 to 2022. The availability of data limits the analysed period.

To fulfil the objective of the article, the following data are used for analysis:

1) Average price of diesel and petrol[1];

2) Diesel and petrol consumption in analysed years[2];

3) Excise duty rates for diesel and petrol, and value-added tax rates.

The average price of diesel, petrol and the consumption of diesel and petrol were obtained from the above sources. Value added tax rates from the applicable Value Added Tax Act, petrol, or diesel tax rates from the Excise Act. The total tax burden of 1 litre of diesel or petrol was also calculated for analysis purposes. Furthermore, the effective tax rate was determined.

3.2. Methodology

The article uses standard scientific methodology including methods of description, analysis, synthesis, and comparison. To assess the real tax burden on petrol, or for diesel, the effective tax rate indicator (1) is used,

$$ETR = \frac{T_{VAT} + T_{ED}}{P_i}, \qquad (1)$$

where ETR is the effective tax rate, T_{VAT} is value-added tax, T_{ED} is excise duty and P_i is the price of 1 litre of fuel in an analysed year. In contrast to the nominal tax rate, it is possible to display the real tax burden using the effective rate indicator [27; 28].

[1] Average price of Petrol and Diesel. Prague: Czech Statistical Office, 2023. Available at: https://www.czso.cz/csu/czso/ceny-pohonnych-hmot-od-roku

[2] Consumption of Diesel and Petrol. Prague: CEPRO, 2023. Available at: https://www.cappo.cz/cisla-a-fakta/spotreba-pohonnych-hmot-v-cr

The tax rate on diesel and petrol is of unit type, while the value-added tax rate is of ad-valorem type [29; 30]. To determine whether the tax burden on fuel is constant, progressive, or regressive according to the development of the price of a litre of fuel, can be formulated (2–4),

$$ETR_H < ETR_L, \quad (2)$$

$$ETR_H > ETR_L, \quad (3)$$

$$ETR_L = ETR_H, \quad (4)$$

where ETR_H is the effective tax rate expressing the tax burden on fuel at a higher selling price, and ETR_L is the effective tax rate at a lower selling price. If equation (2) applies, the tax burden develops regressively. Equation (3), on the contrary, confirms the progressive development of the tax burden. Equation (4) shows the constant development trend.

Modelling the dependence of fuel consumption on the tax burden of excise duty and value-added tax will be performed using regression analysis [31; 32]. The equation expressing the dependence of petrol consumption on excise duty and value-added tax is determined by the formula (5),

$$Y = b_0 + b_1 \cdot X_1 + b_2 \cdot X_2, \quad (5)$$

where Y is the amount of the petrol consumption, X_1 is the amount of excise duty on petrol per 1 liter and X_2 is the amount of value-added tax per 1 liter of petrol. The dependence of diesel consumption on the amount of excise duty on diesel and value-added tax can be expressed similarly. It is captured by equation (6),

$$Y = b_0 + b_1 \cdot X_1 + b_2 \cdot X_2, \quad (6)$$

where Y is the value of diesel consumption, X_1 is the amount of excise duty on diesel per 1 litre, and X_2 is the amount of value-added tax on 1 litre of diesel.

4. Results

4.1. Descriptive statistics

Before performing the dependency analysis, a section containing the basic descriptive statistics of the analysed variables in Table 1 is sorted, i.e., the price of diesel, the price of petrol, the consumption of diesel, the consumption of the petrol, the rate of excise duty per litre of diesel, the rate of excise tax per litre of petrol, the value- added tax on 1 litre of diesel, or the value-added tax on 1 litre of petrol.

4.2. Evaluation of the development of the tax burden on fuel

Fuels such as petrol and diesel have the same tax rate in the context of universal indirect tax – value-added tax. What differs, on the other hand, is the excise duty rate. For both commodities, it is of the unit type, but its amount is different. Diesel has a lower rate. From the point of view of value-added tax, the standard tax rate is applied for the entire analysed period 2001–2022. From 2001 to 2003, it was 22%. In 2004 decreased to 19%, from 2013 to the present, the rate is 21%.

Table 1

Descriptive statistics

	Unit	Mean Value	Median	Minimum	Maximum
Price of diesel	CZK/Litre	30.173	30.03875	21.743	43.438
Price of petrol	CZK/Litre	30.885	30.27	24.364	41.743
Consumption of diesel	Kilotons	4145.227	4125.5	2561	5154
Consumption of petrol	Kilotons	1790.591	1783.5	1468	2103
Rate of excise duty for diesel	CZK/Litre	10.170	10.45	8.15	10.95
Rate of excise duty for petrol	CZK/Litre	12.260	12.84	10.84	12.84
Value-added tax of diesel	CZK/Litre	6.168	6.072	4.734	9.122
Value-added tax of petrol	CZK/Litre	6.318	6.170	5.089	8.766

Source: own calculation

Assessing the tax burden only based on nominal tax rate values is incorrect. Better reporting power is provided by the effective tax rate. The development of these rates for petrol and diesel is shown in Figures 3 and 4.

The tax burden on petrol has changed in the analysed period. Tax reforms increasing the rate of excise duty on petrol took place in 2004 and 2010. Despite this fact, when the nominal tax rate increased, the real tax burden, on the contrary, decreased. The most significant decrease occurred at the end of the analysed period. In 2022, on the other hand, the excise duty rate was reduced, and the petrol price increased simultaneously. These facts caused the real tax burden to fall. Conversely, the value-added tax burden in percentage terms remains almost unchanged over the analysed period.

Also, the results presented in Fig. 4 confirm that the tax burden on diesel does not change linearly. The excise tax reform between 2003 and 2004 increased the rate of excise duty on diesel, which also led to an increase in the effective tax rate. On the contrary, the value added tax rate was reduced by three percentage points. This fact caused the overall tax burden on diesel to decrease.

In 2010, the rate of excise duty on diesel was increased by CZK 1. Paradoxically, the effective tax rate has decreased. Nominal tax rate was unchanged until the end of 2020. Nevertheless, according to Fig. 4 there are changes in the real tax burden. The reason for this is the fact that it is a unit-type tax rate. Thus, the tax burden of 1 litre of fuel does not change only in terms of an absolute figure. A factor significantly affecting the value of the effective tax rate is the price of this product.

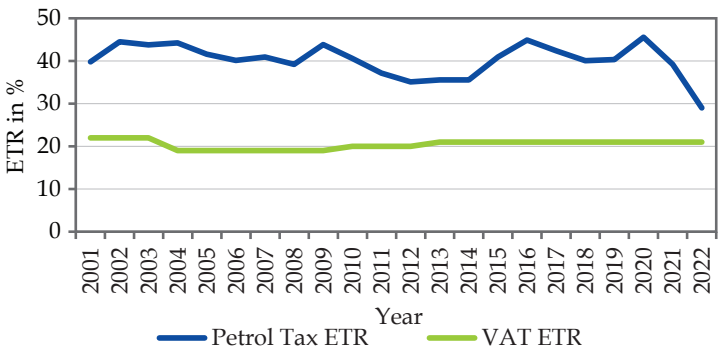

***Figure 3.* ETR petrol**

Source: own calculation

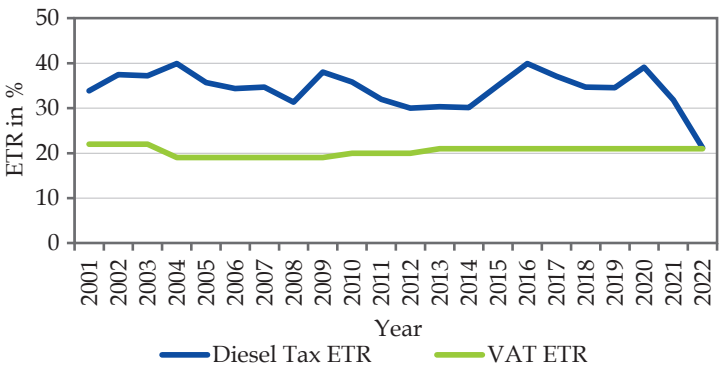

***Figure 4.* ETR diesel**

Source: own calculation

If both effective tax rates (value-added tax rate and excise duty rate) were added together, the value of the total effective tax rate for petrol would be close to 60%, and for diesel around 55%. In the case of petrol, these are values that are also common in other countries, in the case of diesel, the tax burden is slightly lower. On average, the tax contributes to the price of fuel, according to the results of Kantarci et al. [16] around 60%.

Using the correlation analysis in Table 2, it will be evaluated whether there is a dependence between the effective tax rate and the price of petrol and diesel. If confirmed, it will subsequently be determined whether this dependence is direct i.e., the tax is progressive or indirect, indicating the regressive character of the development of the tax liability.

From the data of the correlation matrix presented in Table 2, it follows that there is an indirect degree of very high dependence between the price of the commodity – petrol and diesel and the effective tax rate. As the price for each litre of fuel increases, the real tax burden thus decreases. And this is although no tax reform adjusting tax rates took place. For this reason, the overall tax burden on fuel is developing regressively. Conversely, if there is a decrease in fuel price, the percentage of tax on the price increases. The reason is that the amount of excise duty remains the same in absolute terms. Thus, when the price increases, only the value-added tax increases absolutely, the same when it decreases, only the value-added tax decreases absolutely.

Table 2

Correlation analysis

	Diesel price	Petrol price	ETR diesel	ETR petrol
Diesel price	1			
Petrol price	0.986	1		
ETR diesel	–0.855	–0.844	1	
ETR petrol	–0.887	–0.887	0.975	1

Source: own calculation

4.3. Evaluation of the impact of the tax burden on consumption

The results of the partial analysis showed that, although tax reforms in fuel taxation were rare, the tax burden was different in the analysed years. Not only the tax burden changed, but also the volume of fuel consumption. The research question of this part is whether this tax burden affects the level of fuel consumption. The answer to this question is provided by the results of the regression analysis in Table 3. The dependence of petrol or diesel consumption on the tax burden of excise duty and value-added tax is analysed.

Table 3

Regression analysis

	Model 1 – Diesel		Model 2 – Petrol	
	Coef.	Sig.	Coef.	Sig.
X_1 – Value-added tax	–281.8	0.018	–105.6	0.007
X_2 – Excise duty	–417.8	0.003	–145.09	0.005
Constant	1842.01	0.122	4236.9	0.001
Observation	22		22	
R^2	0.790		0.832	
F-test	15.8	0.001	21.3	0.001
Durbin-Watson test	1.880		1.918	

Source: own calculation

In the case of model 1 expressing the dependence of diesel consumption on the tax burden, the equation has the form (7),

$$y = -281.8x_1 - 417.8x_2 + 1842.01. \quad (7)$$

In the equation, both variables are statistically significant. The R^2 coefficient expressing the quality of the regression model indicates that the model describing the dependence of diesel consumption on the tax burden is of sufficient quality. The value of the *F*-test and the result of the Durbin-Watson test are also statistically in accordance with the requirements for regression modelling. More about the *F*-test e.g. [33], about the Durbin-Watson test e.g. [34]. In accordance with the recommendation of O'Gorman or Pinelis [35; 36], a significance level of 5% is chosen.

It follows from equation (7) that the tax burden on fuels reduces their consumption. This can be stated based on the negative values of the coefficients X_n in the equation. Regarding the strength of the effect on consumption, this value is higher for the excise duty. This conclusion is logical since excise duty also had a higher effective tax rate than value-added tax. The stated results agree with the results of studies [14; 21; 37].

The model of the dependence of petrol consumption on the tax burden is captured by equation (8),

$$y = -105.6x_1 - 145.09x_2 + 4236.9. \quad (8)$$

The conclusions of the analysis regarding the effect of taxation on petrol consumption are identical to the research regarding diesel. Value-added tax and excise duty reduce this consumption. Again, a higher negative effect is demonstrated for excise duty, as coefficient X_2 increases more than coefficient X_1.

On the contrary, what is different between equations (7) and (8) are the values of these coefficients in the regression equations. Taxation of diesel has a more significant effect on consumption than petrol. This is related to the different price elasticity of demand for petrol and diesel [38].

The conclusions thus agree, for example, with the study by Tang & Sjoquist [39] that the effects of the same tax on different fuels may not be the same, even if the principle of how the tax works is similar. One of the reasons why this tax is part of the tax system is to limit the consumption of petrol or diesel [40], which, as the results of this analysis confirm, is fulfilled in the case of the Czech Republic.

5. Discussion

Excise duty and value-added tax make up more than half of the final sales price. In the context of comparison with other countries, it was found that the Czech Republic does not show significantly higher or lower values in this regard. The above can be compared, for example, with the results of the study Kantarci [16]. Especially tax burden of petrol is at a similar level to other OECD countries.

A study investigating the fuel tax burden in the context of consumption in the Czech Republic has not yet been conducted. However, the results found can be compared with those of other studies. The regression analysis results confirmed that excise duty, particularly, impacts fuel consumption and that the tax burden is a factor in reducing this consumption. These results agree with studies [1; 10]. On the contrary, these conclusions deviate from the findings of studies [5–7]. It is precisely the high tax quota for petrol and diesel that aims to limit the consumption of these fuels. It must be emphasized that the reduction of this consumption is not only due to excise duties but also to value-added tax. Although, as the analysis results show, the value-added tax's effect on reducing consumption is smaller. In the context of the fuel type, the tax burden has a higher impact on diesel consumption than petrol consumption. This is valid although tax rate for diesel is lower than tax rate for petrol.

It is thus also possible to identify with the conclusions of studies [13–15]. It is also necessary to consider that diesel and gasoline do not have the same degree of price elasticity of demand, which agrees with the study's conclusions of Akkaya & Hepsag [5]. Based on the data on the development of fuel consumption, it is in accordance with the conclusions Boroumand et al. [9] about the different degrees of price elasticity when fuel prices rise and fall.

The relatively high tax burden on fuel can be viewed from two points of view. One of them is the fact that the high tax burden limits the consumption of these products. This is a positive from an ecological point of view. However, the conclusions of studies [20-22] demanding consideration of environmentally friendly behaviour have not yet been implemented into the tax legislation regulating this area of taxation.

Currently, there are no plans to implement discounts or tax bonuses into the legislation governing excise duties.

Progue et. al [41] or Pedrosa et al. [42] also recommend subsidizing public transport or other ecological activities. On the other hand, ecological elements are implemented in the tax system in the Czech Republic in a certain way. These are specifically environmental taxes that burden natural gas. This tax burden is lower than the excise duties on fuels. Electric cars are also subject to a lower tax burden. Tax reforms in the Czech Republic are different from the path recommended, for example, by the studies mentioned above [11; 18; 21]. Respecting the age of the vehicle in the tax burden, as recommended by e.g. Leontyeva & Mayburov [43], was in the legislation regulating road tax in the Czech Republic until the end of 2021. From 2022, this ecological aspect was abolished.

In the beginning of the text of the study, the hypothesis was formulated that the tax burden on fuel does not change due to only minimal changes in tax rates. This hypothesis is not accepted. In this case, the factor that changes the tax burden on fuel is not so much the tax rates or the way the tax base is constructed. The selling price of fuel is a decisive factor. This price is not constant and as the final selling price develops the tax burden changes accordingly.

It was found that the tax burden on fuel from the point of view of the effective tax rate is changing, while tax reforms are not the only factor affecting this fact. Due to the specific type of excise duty rate – the unit rate – the nominal value of the rate did not change except the years when tax reforms took place. However, this was not the case for the effective tax rate. It was found that the factor affecting this fact is not only the nominal tax rate but also the amount of fuel selling price.

The data for analysis were obtained for the period 2001–2022. The period examined may be a limitation of this study. Specifically, the first year analysed was 2001. This fact is due to the limit of availability of fuel consumption data. Even so, it can be concluded that the analysed period has a sufficiently long time series, this is also confirmed by the tests on regression models.

6. Conclusion

The aim of the article was to evaluate the impact of the tax burden on fuel consumption in the Czech Republic in 2001–2022. Another goal was to evaluate the development of the tax burden on 1 litre of fuel – petrol and diesel in the context of the implemented tax reforms affecting the tax burden on fuel.

The effective tax rate was used to assess the tax burden on fuel. Comparing the first analysed year, 2001, and the last, 2022, the tax burden on fuel decreased in the context of the share of tax on the sales price. It can therefore be stated that the tax burden on fuel has developed degressively in many cases. As the value of fuel increases due to the unit rate of excise duty, this tax contributes to the final price to a lesser extent.

This does not apply if it is another indirect tax that also taxes fuel, i.e., value-added tax. Here, on the other hand, the tax burden develops linearly, the reason being the way the tax base is constructed and the nominal and real linear rate of this tax. In the case of the absolute amount of excise duty, this rate increased in the case of diesel from CZK 8.15 in 2001 to CZK 10.95 in 2020. From 2021, on the other hand, the tax reform reduced this rate by CZK 1. The absolute tax amount of petrol also increased from CZK 10.84 to CZK 12.84. This has been the case since 2010, except for the last analysed year, when the petrol tax rate was temporarily reduced.

Further tax reforms can be expected in the future, not only in excise duty and value-added tax. In addition to classic changes such as tax rates or how the tax base is constructed, it is also possible to approach the reform of fuel taxation in another way. This could be, for example, the creation of a so-called uniform tax, which would be a direct income of the municipal budgets and would include a specific fuel tax for the city [44]. However, according Söllner [45], it is necessary to respect many general principles of taxation as well as, for example, compatibility with the law of the European Union.

The potential for further research can be directed in this direction. Another direction of research in this area may consist in extending the length of the researched period and conducting a comparative study in the future. This conducted study can then be a treasure for comparing the results.

Excise duties and value-added tax will continue to be important indirect taxes not only in the tax system of the Czech Republic. As with other taxes, even with excise duty or value-added tax, further tax reforms can be expected in the future. This reform would impact the tax burden and thus fuel consumption.

References

1. Hammar H., Lofgren A., Sterner T. Political Economy Obstacles to Fuel Taxation. *Energy Journal*. 2014;25(3):1–17. https://doi.org/10.5547/ISSN0195-6574-EJ-VOL25-NO3-1

2. Damania R., Fredriksson P.G. On the Formation of Industry Lobby Groups. *Journal of Economics Behaviour & Organization*. 2000;41(4):315–335. https://doi.org/10.1016/S0167-2681(99)00079-7

3. Aklilu A.Z. Gasoline and Diesel Demand in the EU: Implications for the 2030 Emission Goal. *Renewable & Sustainable Energy Reviews*. 2020;118:109530. https://doi.org/10.1016/j.rser.2019.109530

4. Ghoddusi H., Morovati M., Rafizadeh N. Dynamics of Fuel Demand Elasticity: Evidence from Iranian Subsidy Reforms. *Energy Economics*. 2022;110:106009. https://doi.org/10.1016/j.eneco.2022.106009

5. Akkaya S., Hepsag A. Does Fuel Tax Decrease Carbon Dioxide Emissions in Turkey? Evidence from an Asymmetric Nonlinear Cointegration Test and Error Correction Model. *Environmental Science and Polution Research*. 2021;28(26):35094–35101. https://doi.org/10.1007/s11356-021-12907-9

6. Harju J., Kosonen T., Laukkanen M., Palanne K. The Heterogeneous Incidence of Fuel Carbon Taxes: Evidence from Station-level Data. *Journal of Environmental Economics and Management*. 2022;112:102607. https://doi.org/10.1016/j.jeem.2021.102607

7. Coglianese J., Davis L.W., Kilian L., Stock J.H. Anticipation, Tax Avoidance, and the Price Elasticity of Gasoline Demand. *Journal of Applied Econometrics*. 2017;32(1):1–15. https://doi.org/10.1002/jae.2500

8. Porcher S., Porcher T. Fuel Taxes and Consumer Behaviour: a Markov-switching Approach. *International Journal of Global Energy Issues*. 2018;41(1):14–24. https://doi.org/10.1504/IJGEI.2018.10013431

9. Boroumand R.H., Goutte S., Porcher S., Porcher T. Asymmetric Evidence of Gasoline Price Responses in France: A Markov-switching approach. *Economic Modelling*. 2016;52(B):467–476. https://doi.org/10.1016/j.econmod.2015.09.027

10. Parry I., Norregaard J., Heine D. Environmental Tax Reform: Principles from Theory and Practice. *Annual Review of Resource Economics*. 2012;4:101–125. https://doi.org/10.1146/annurev-resource-110811-114509

11. Stinson S., Barnes B., Buchheit S., Morrow M. Do Consumer-Directed Tax Credits Effectively Increase Demand? Experimental Evidence of Conditional Success. *Journal of the American Taxation Association*. 2019;40(2):1–19. https://doi.org/10.2308/atax-51960

12. David P. Basic Economic Gap Related to Smoking: Reconciling Tobacco Tax Receipts and Economic Costs of Smoking-attributable Diseases. *Tobacco Control*. 2019;28(5):558–561. https://doi.org/10.1136/tobaccocontrol-2018-054307

13. Kamruzzaman M.H., Mizunoya T. Quantitative Analysis of Optimum Corrective Fuel Tax for Road Vehicles in Bangladesh: Achieving the Greenhouse Gas Reduction Goal. *Asia-pacific Journal of Regional Science*. 2021;5(1):91–124. https://doi.org/10.1007/s41685-020-00173-5

14. Xiao J., Ju H. Market Equilibrium and the Environmental Effects of Tax Adjustments in China's Automobile Industry. *Review of Economics and Statistics*. 2014;96(2):306–317. https://doi.org/10.1162/REST_a_00444

15. Tanishita M., Kashima S., Hayes W. Impact Analysis of Car-related Taxes on Fuel Consumption in Japan. *Journal of Transport Economics and Policy*. 2003;37(2):133–155. Available at: https://www.jstor.org/stable/20053929

16. Kantarci H. The Comparison of Fuel Taxes between Turkey, EU and OECD. *Sosyoekonomi*. 2018;26(35):229–247. https://doi.org/10.17233/sosyoekonomi.316162

17. Fang G., Chen G., Yang K., Yin W., Tian L. Can Green Tax Policy Promote China's Energy Transformation? – A Nonlinear Analysis from Production and Consumption Perspectives. *Energy*. 2023;269:126818. https://doi.org/10.1016/j.energy.2023.126818

18. Fukui H., Miyoshi C. The Impact of Aviation Fuel Tax on Fuel Consumption and Carbon Emissions: The Case of the US Airline Industry. *Transport Research part D: Transport and Environment*. 2017;50:234–253. https://doi.org/10.1016/j.trd.2016.10.015

19. Gordeev D., Galeeva E. Increase in Excise Tax Rates on Gasoline and Diesel Fuels – a Negative Effect on the Budget and the Economy. *Ekonomicheskaya Politika*. 2022;1:126–153. https://doi.org/10.18288/1994-5124-2022-1-126-153

20. Bjertnaes G. Efficient Combination of Taxes on Fuel and Vehicles. *Energy Journal*. 2019;40(1):387–408. https://doi.org/10.5547/01956574.40.SI1.gbje

21. Shao H., Ye B., Pan H. Energy Conservation and Emission Reduction Effects of Fuel Tax and Assessment of Economic Impacts-based on the Beijing 3E-CGE Model. *Letters in Spatial and Resource Sciences*. 2022;15(3):377–399. https://doi.org/10.1007/s12076-021-00294-1

22. Carvalho N., Guillen J. Economic Impact of Eliminating the Fuel Tax Exemption in the EU Fishing Fleet. *Sustainability*. 2021;13(5):2719. https://doi.org/10.3390/su13052719

23. Hájek M., Zimmermannová J., Helman K. Environmental Efficiency of Economic Instruments in Transport in EU Countries. *Transportation Research Part D: Transport and Environment*. 2021;100:103054. https://doi.org/10.1016/j.trd.2021.103054

24. Janoušková J., Sobotovičová Š. Fiscal Autonomy of Municipalities in the Context of Land Taxation in the Czech Republic. *Land Use Policy*. 2019;82:30–36. https://doi.org/10.1016/j.landusepol.2018.11.048

25. Andrejovska A., Glova J. Corporate Tax Rates in the Context of Macroeconomic Indicators in the EU Member Countries. *Ad-Alta – Journal of Interdisciplinary Research*. 2022;12(1):23–31. Available at: http://www.magnanimitas.cz/ADALTA/1201/papers/A_andrejovska.pdf

26. Thottoli M., Mamari N. Determinants of Value Added Tax in Oman. *Journal of Tax Reform*. 2022;2(8):157–159. https://doi.org/10.15826/jtr.2022.8.2.114

27. Glavaski O., Pucar E., Beljic M., Stojkov S. Coordination vs. Competitiveness of Effective Average Tax Rates in Relation to FDI: The Case of Emerging EU Economies. *Sustainability*. 2023;15(1):227. https://doi.org/10.3390/su15010227

28. Uemura T. Evaluating Japan's Corporate Income Tax Reform Using Firm-specific Effective Tax Rates. *Japan and the World Economy*. 2022;61:101115. https://doi.org/10.1016/j.japwor.2022.101115

29. Ueng K.G., Huang C.-C., Hu J.-L. Specific Versus Ad Valorem Taxation with Tax Evasion in Imperfectly Competitive Markets. *Hitotsubashi Journal of Economics*. 2017;58(2):107–119. https://doi.org/10.15057/28954

30. Krzikallová K., Tošenovský F. Is the Value Added Tax System Sustainable? The Case of the Czech and Slovak Republics. *Sustainability*. 2020;12(12):4925. https://doi.org/10.3390/su12124925

31. Zheng Z., Li Y., Wu J., Wang Y. Sequential Scaled Sparse Factor Regression. *Journal of Business & Economics Statistics*. 2020;40(2):595–604. https://doi.org/10.1080/07350015.2020.1844212

32. He Y., Xu X., Cai Y., Cheng M. An Evaluation of the Effectiveness of Three Early-Warning Models on Financial Indexes. *Applied Economics Letters*. 2022;29(20):1880–1884. https://doi.org/10.1080/13504851.2021.1965079

33. El-Horbaty Y.S. A Note on Covariance Decomposition in Linear Models with Nested-error Structure: New and Alternative Derivations of the F-test. *Journal of Statistical Theory and Practice*. 2022;16:69. https://doi.org/10.1007/s42519-022-00291-7

34. Turner P. Critical Values for the Durbin-Watson Test in Large Samples. *Applied Economics Letters*. 2019;27(18):1495–1499. https://doi.org/10.1080/13504851.2019.1691711

35. O'Gorman T.W. A Generalized Normal Scores Test that Increases the Power of a Test of Significance for a Coefficient in a Linear Model. *Communication in Statistics-Theory and Methods*. 2021. https://doi.org/10.1080/03610926.2021.1987471

36. Pinelis I. An Asymptotically Optimal Transform of Pearson's Correlation Statistic. *Mathematical Methods of Statistics*. 2020;28(4):307–318. https://doi.org/10.3103/S1066530719040057

37. Slavík M. Demand for Fuel and its Consequences for Indirect Taxation: A Microeconomic View. *Finance a uver*. 2004;54(5-6):202–233. Available at: https://journal.fsv.cuni.cz/storage/972_s_202_233.pdf

38. Hasanov M. The Demand for Transport Fuels in Turkey. *Energy Economics*. 2015;51:125–134. https://doi.org/10.1016/j.eneco.2015.05.023

39. Tang S.X., Sjoquist D.L. Differential Effects of Federal and State Gasoline Taxes on Gasoline Consumption. *Hacienda Publica Espanola-Review of Public Economics.* 2019;229(2):11–32. https://doi.org/10.7866/hpe-rpe.19.2.1

40. Miceikiene A., Ciuleviciene V. The Effectiveness Assessment of Excise Duties in View of State Goals. *Transformation in Business & Economics.* 2017;16(2):188–203. Available at: http://www.transformations.knf.vu.lt/41/article/thee

41. Proque A.L., Baterelli A.A., Perobelli F.S. Fuel Tax, Cross Subsidy and Transport: Assessing the Effects on Income and Consumption Distribution in Brazil. *Research in Transportation Economics*. 2022,95:101204. https://doi.org/10.1016/j.retrec.2022.101204

42. Pedrosa G., Leontyeva Y., Mayburov I. Promoting Zero Emissions Buses Programs: A Study of Ekaterinburg Residents' Willingness to Pay. *International Journal of Energy Production and Management*. 2018;3(4):253–265. https://doi.org/10.2495/EQ-V3-N4-253-265

43. Leontyeva Y., Mayburov I. Theoretical Framework for Building Optimal Transport Taxation System. *Journal of Tax Reform*. 2016;2(3):193–207. https://doi.org/10.15826/jtr.2016.2.3.024

44. Hirte G., Tscharaktschiew S. Optimal Fuel Taxes and Heterogeneity of Cities. *Review of Regional Research.* 2015;35(2):173–209. https://doi.org/10.1007/s10037-014-0095-z

45. Söllner F. Road Traffic Taxation in Germany: The Present System, its Problems and a Proposal for Reform. *Journal of Tax Reform*. 2018;4(1):57–72. https://doi.org/10.15826/jtr.2018.4.1.045

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Economic Growth and Optimal Tax Burden: A Case of Uzbekistan's Economy

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ABSTRACT

Taxes have always been the largest contributor to the government budget revenue, so it is critical to collect maximum amount of tax revenue to meet policy objectives. The revenue performance of the countries, in turn, depends primarily on optimality of tax burden in an economy and capacity of revenue agencies to levy taxes set by the law. These factors have been major issues for all countries around the world, particularly for transition economies which are on the verge of major economic transformation. Uzbekistan as one of such countries, since 2017 has implemented multiple fiscal reforms to improve the fiscal capacity of the tax system, thereby increasing economic growth. To assess to what extend current tax policies are efficient, we put forward aim of the article as to elaborate the efficiency of Uzbekistan's tax system using tax effort index to measure collection capability of potential tax revenue and optimal tax burden to maximize economic growth. In this study, we first using mathematical model identified tax effort index for Uzbekistan, which appeared to be approximately 45%. This implies that revenue agencies of Uzbekistan failed to collect on average half of the potential tax revenue over the period 2010–2020. Furthermore, we attempted to determine the optimal tax burden using the Ordinary Least Squares (OLS) method. According to the results of the econometric analysis, the optimal level of tax burden in Uzbekistan for the years 2000–2019 is estimated to be around 19%. Targeting tax burden to this level could reduce GDP gap by 1%.

KEYWORDS

optimal tax burden, tax effort, economic growth, fiscal policy, taxation, tax system, potential tax revenue

JEL H20, H21, H26, O4

УДК 338.27

Экономический рост и оптимальная налоговая нагрузка: пример экономики Узбекистана

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АННОТАЦИЯ

Налоги всегда были основным источником доходов государственного бюджета, поэтому крайне важно собрать максимальную сумму налоговых поступлений для достижения целей экономического роста. Динамика доходов стран зависит, прежде всего, от оптимальности налоговой нагрузки в экономике и способности

налоговых органов взимать в полной мере налоги, установленные законом. Эти факторы являются основными проблемами для всех стран мира, особенно для стран с переходной экономикой, которые находятся на грани крупных экономических преобразований. Узбекистан, как одна из таких стран, в 2017 г. осуществил многочисленные фискальные реформы для улучшения фискального потенциала налоговой системы, тем самым увеличив экономический рост. Чтобы оценить, насколько эффективна действующая налоговая политика, мы выдвинули цель статьи по повышению эффективности налоговой системы Узбекистана с использованием индекса налоговых усилий для оценки размера потенциальных налоговых поступлений и величины оптимальной налоговой нагрузки, способствующим максимизации экономического роста. В данном исследовании мы впервые с помощью математической модели определили индекс налоговых усилий для Узбекистана, который оказался примерно 45%. Это означает, что фискальные органы Узбекистана не смогли собрать в среднем половину потенциальных налоговых поступлений за период 2010–2020 гг. Кроме того, мы попытались определить оптимальную налоговую нагрузку с помощью метода обыкновенных наименьших квадратов (OLS). По результатам эконометрического анализа оптимальный уровень налоговой нагрузки в Узбекистане на 2000–2019 гг. оценивается примерно в 19%. Ориентация налоговой нагрузки на этот уровень позволит сократить Правительству Узбекистана разрыв в ВВП на 1%.

КЛЮЧЕВЫЕ СЛОВА

оптимальная налоговая нагрузка, налоговые усилия, экономический рост, фискальная политика, налогообложение, налоговая система, потенциальные налоговые поступления

1. Introduction

Increasing living standards of nations has been major policy objective of the governments around the world over the last several decades. According to welfare economics, well-being of an individual primarily requires high consumption level and availability of preferred goods and services [1], which are in turn depend on economy's gross domestic product (GDP). However, it is not just GDP in a particular period that plays a central role in improving living standards, but the maximum rate of its growth and the duration that matters the most [2].

The degree at which economy expands depends on the rate of total factor productivity, capital accumulation, and labor force [3]. Since, capital and labor have limited contribution to the economic growth due to diminishing marginal productivity, total factor productivity (efficient & effective use of production factors) have been considered a key driver of the long-run sustainable economic growth [2].

According to the endogenous theory [4] the level of productivity is highly correlated with the advancement of human capital, infrastructure, and technology, whose development require continues investment. It is a national saving rate (e.g., private and public sector saving rates) that ensures an adequate level of investment each year [5], which is heavily influenced by the government's fiscal policy. In this perspective, fiscal policy by arbitrarily allocating gross national income between the government and the private sector using different types of taxes creates fund to investment in different types of public goods which then help to boost the economic growth in the long-run.

The budget revenue from taxes enables the government to direct investment to a specific direction that can be critical to economic growth but would not occur or would be insufficient without government intervention. However, there are two main issues that governments around the world, particularly developing countries are struggling to solve:

– first, whether revenue authorities are enough capable of administering and levying all taxes imposed by the law that otherwise would be in underground economy, thereby, limiting capacity of fiscal policies.

– second, to what extent national income should be taxed that does not jeopardize investment capacity of private sector, thereby, maximizing economic growth.

Uzbekistan as one of the low-middle income developing countries due to low economic growth has recently implemented a number of fiscal reforms in order to optimize collection capacity and the tax burden on both the demand and supply sides of the economy. However, regardless of the reforms, according to the Central Bank of Uzbekistan economic growth has been below its potential level, expanding GDP gap by 1–1.5% during 2021 [6].

This necessitates identifying to what extent tax authority is effective to collect potential tax liability imposed by tax law, and whether current tax burden is optimal to the economy of Uzbekistan, or it deviates from the ideal level.

To assess to what extend current tax policies are efficient, we put forward *aim of the article* as to elaborate the efficiency of Uzbekistan's tax system using tax effort index to measure collection capability of potential tax revenue and optimal tax burden to maximize economic growth.

Based on the above arguments we set following *hypotheses*:

H1. Tax effort in Uzbekistan is well below than its potential level.

H2. Tax burden in Uzbekistan is high than growth maximizing optimal level.

Thus, in this article we first focus on determining how much on average potential tax revenue is being collected using *tax effort index*. Because, actual and potential tax revenues may not be optimal to the economic growth, the second part of the study is devoted to estimating growth maximizing *optimal tax burden* for Uzbekistan.

2. Literature Review

2.1. Literature on tax effort index

The sound fiscal policy has become pivotal instrument to boost economic growth through raising revenue and investing them into education, infrastructure, healthcare and other necessary directions. In this perspective, tax revenue performance depends primarily on the fiscal adequacy and administrative feasibility of the tax system. The former concept requires revenues by imposed taxes to be sufficient to cover government expenditures, whereas the latter requires revenue agencies to be capable of efficiently and effectively administrating process of taxation in order to encourage compliance.

Thus, to measure to what extent revenue agencies are effective to levy taxes imposed by the law are significant to plan fiscal policy.

There are several approaches that employed by researchers; however, taxable capacity and tax effort index are the most referred indicators that used to calculate taxation performance.

Taxable capacity is a hazy and evasive term that is challenging to explain because views vary greatly at various points in time and in differing situations [7]. Howard [8] defines it as the amount of tax that may be justly or reasonably charged on a nation. According to Fenochietto & Pessino [9], tax capacity refers to the highest amount of tax income that a nation is capable of collecting.

According to Gupta [10], absolute taxable capacity is the excess of output over the lower limit of production per capita that ensures to maintain the basic living standards relatively steady over a period of time. Furthermore, he defined relative taxable capacity as the level of tax burden that should be placed on different individuals in order to fund public goods.

Martin & Lewis [11] established the first statistical method to determine taxable capacity. Using total tax revenue and GDP ratio they analyzed the patterns in taxation of various countries at various phases of economic development. Findings revealed that tax jurisdiction with higher income, openness, industrialization, and urbanization levels tend to have higher overall taxable capacity.

Since taxable capacity is based on ratio of actual tax revenue to the GDP, it fails to concentrate on specification of tax laws and capture specific factors influencing economies tax capacity. Therefore, studies on the topic suggest that the best

way to measure taxable capacity is to determine tax effort. Previous studies have recognized the critical role of tax effort in determining the economy's and individuals' capacity to carry the tax burden at different periods, which help policymakers to consider introduction of new taxes or changing tax rates [12].

In studies there are various definition of tax effort which gives idea of measurement of methods. In fact, Leuthold [13] defines it as the effort a nation does to levy its tax income taking into account existing tax instruments. Estimating tax effort for 8 African countries by taking the ratio of the actual tax share to the predicted tax share, he found that low tax effort is the result of imbalanced share of direct and indirect taxes in budget revenue.

Similarly, Gillis [14] defines tax effort as governments ability to what degree it can efficiently use of its taxable capacity. Using ratio of actual tax revenues to taxable capacity he found that level, structure, and administration are the three main dimensions determining national tax effort. He further, stated that the structure is the focal point because it determines how easily any given level can be achieved and how efficiently taxes will be administered. It also determines tax policy's allocating, redistributing, and stabilizing functions.

Lee et al. [15] using the tax effort as a ratio of the tax burden to the taxable capacity evaluated 104 countries between 1994 and 2003. According to him, tax effort considers the nation's unique economic, demographic, and institutional characteristics in comparison to its peers and so offers a more complete view of the nation's tax performance. Research suggests that low tax effort associates with structural problems of taxation. Therefore, all nations must choose a long-term strategy for tax reforms by ignoring idea of "one size fits all" approach. Along with structural considerations, the politics of taxation play a crucial role in revenue reforms in all nations with widely varying levels of development.

According to Stotsky & Wolde-Mariam [16], tax effort is calculated as the ratio of the real tax share and the estimated (or potential) tax share. They studied 43 sub-Saharan African nations between 1990 and 1995 and found that the GDP shares of mining and agriculture had a negative and substantial impact on tax collection, whereas the GDP proportions of exports and per capita income had a positive and significant impact.

Mertens [17] researched Central and Eastern European (CEE) countries the years of 1992–2000. The results show that tax effort of these countries effected heavily by the level of economic growth and sectoral shares of GDP.

Dalamagas et al. [18] analyzing 30 European countries found that on average, the actual tax burden was lower than the potential tax burden. In particular, the average tax effort index was 0.83, which means that the actual tax revenue is only 83% of the potential tax revenue. In this study potential tax revenue is defined as the difference between GDP and personal consumption.

These studies are mainly based on two common methodologies to measure tax effort: (1) the potential tax revenue method and (2) the average tax ratio method. In the first method, which uses multiple regression, the tax share is measured as the ratio of actual tax revenue to potential tax revenue and is estimated through GDP. In the second method, tax effort is estimated by the share of tax revenue in GDP. Based on the research by Kim [19], it can be said that both methods define the tax effort as the ratio of the actual value to the potential value.

In all of the discussed studies on tax effort the threshold for identifying how well a country is using its taxable capacity is set as follows:

1) "low tax effort" – when the value is less than one. It indicates a bad use of the tax base in the process of collecting taxes. This implies that the tax burden less than the taxpayer's ability to pay. Therefore, it is necessary for a government to improve so-called tax handles to raise tax revenue [16].

2) "average tax effort" – when the value is equal to one. It indicates that economy effectively utilizing tax handles

to capture all potential tax bases and may indicate the appropriate policy for dealing with a fiscal imbalance [15].

3) "high tax effort" – when the value is higher than one. It indicates the correct use of the tax base. But it is suggested countries with high tax effort index may need to look at reducing expenditures rather than raising taxes [16].

Studies on determinants of low tax effort show socio-economic factors as the major contributors. In fact, according to Bird et al. [20] and Murunga et al. [21] shown that institutional variables including corruption, democracy, and transparency are the primary factors affecting level of tax effort index.

Similarly, study by Fenochietto & Pessino [9] revealed that tax effort of the countries influenced by income per capita, structure of the economy, openness, public debt, literacy, and institutional characteristics such as corruption and governance.

Considering above mentioned factors it is reasonable to expect that Uzbekistan has low tax effort, since the country is struggling to solve institutional deficiency in recent years.

2.2. Literature on optimal tax burden

Impact of taxes burden on economic growth has long been challenged by academics. While authorities vigorously pushed development by employing tax incentives, others have long claimed that taxes had little effect on growth. However, no consensus has been reached on their relationship because different studies have produced contradictory results.

In fact, studies by Romer & Romer [22], have shown that increasing taxes has negative impact on economic growth of South African countries, while researches by Asaolu et. al. [23] and Babatunde et al. [24] revealed positive relationship between taxation and economic growth and concluded that taxation is a powerful tool for economic prosperity.

Supply-side economics, which emerged in the late 1970s [25], and Laffer's [26] work demonstrated that there is an ideal level of taxation for a particular economy that maximizes economic growth. Similarly, Barro [27], and Armey [28] presented theoretical and empirical existence of an optimal, growth-maximizing tax rate as illustrated by an inverse U curve. Growth rate is increasing at a decreasing rate up until the tax rate becomes equal to t^* (where growth rate is G^*) but decreases thereafter. The general argument is that government public goods and services maximize the productivity of private economic activity when taxes reach t^* and further tax rate hikes are counterproductive (Fig. 1).

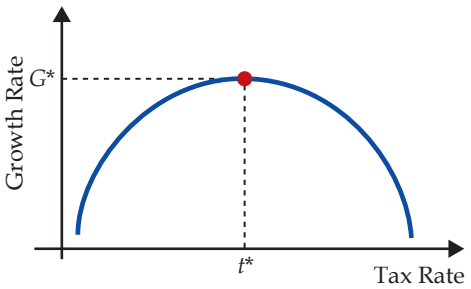

Figure 1. **Armey Curve**

Generally, according to the theory of optimal taxation, there are two important factors that determine tax revenues: namely private consumption and the production potential of the country (gross domestic product). Since GDP and consumer spending reflect the impact of almost all factors on tax revenues, the rest of the macroeconomic and microeconomic factors can be ignored.

That is why, to determine optimal level of the tax burden one should bear in mind that tax is an important tool of fiscal policy to finance public goods and at the same time financial charges levied on taxpayers who drives economic growth by producing and consuming goods.

In public finance, there are two ways to evaluate the tax burden:

First, as a monetary payment arising from the choice of the tax rate or as a share of collected tax revenue in GDP.

Second, by identifying the losses of taxpayers in connection with the payment of taxes.

Keynes [29] emphasized how fiscal policy interventions by the government can have an impact on economic activity. According to the Keynesian hypothesis, taxes

have an impact on the level of income, overall demand, and consequently, the amount of output. Taxation and economic growth have a positive and negative relationship, according to the theoretical underpinnings of the two concepts. Over-taxation is the cause of a negative relationship, whereas the success of tax-financed spending is the cause of a positive relationship [30].

Thus, a tax increase more than optimum level is commonly viewed as an inducement to a loss of economic efficiency, also known as a deadweight loss or excess tax burden, because it reduces consumer and producer surplus, which does not fully reach the government. The amount of unrecoverable loss grows as the tax rate rises. As a result, higher tax rates result in greater economic inefficiency, which leads to lower economic growth [31].

In fact, Amgain [32] employing the Scully baseline model and the quadratic model calculated the optimal tax rate for 32 Asian countries from 1991 to 2012. According to the findings of the research, optimal share of tax revenues in the gross domestic product appeared to be 18%. The findings support the theoretical assumption that there is a tax rate that maximizes economic growth.

Similarly, to examine the nature of the relationship between tax burden and growth in Vietnam and China over a ten-year period, Liu et al. [33] used qualitative and quantitative analyses over 2002–2011. The study demonstrated effect of the tax burden on Vietnam's pace of economic growth. According to China's experience, it is also believed that the country's economic growth is currently 6.55 percent, and that if taxes are decreased to 18.17 percent from their present level of 22.8%, economic growth may rise to 10.16 percent.

In the same vein, using quarterly data for the years 1994 to 2016, Saibu [34] and assessed South Africa's optimal tax rates using an ARDL bound-testing methodology. The findings indicate that there was no discernible link between taxation and economic development over the research period. Keho [35] calculated the ideal tax burden for the Côte d'Ivoire economy using data from 1960–2006 with Scully and quadratic regression models. The outcomes support the hypothesis that high tax rates are harmful to economic growth. Chokri et al. [36] calculated the ideal tax burden for Tunisia using data from 1966 to 2015 and a quadratic model and a basic Scully model. According to the results of the analysis the ideal tax burden should fall between 12.8% and 19.6%.

In the following sections to estimate optimal tax burden and tax effort for Uzbekistan we employ the Ordinary Least Squares (OLS) method based on the quadratic function.

3. Methodology

3.1. Data

The research used annual data from the Statistics Committee of the Republic of Uzbekistan, the Tax Committee of the Republic of Uzbekistan, the World Development Indicators database of the World Bank, and the World Economic Outlook database of the International Monetary Fund. The analysis spans the years 2000 to 2019. Due to a lack of data for other years, the study was limited to a relatively short time period.

We, first, built model to estimate potential tax revenue and tax effort index employing, the classical profit maximization method for Uzbekistan over a covered period of time. Then, the optimal tax burden is calculated based on the OLS model with a quadratic functional form and Scully's tax burden optimization model.

3.2. Potential tax revenue and tax effort index (OLS regression model)

The first approach is a standard regression approach in terms of estimating the potential level of tax revenue and compliance with that tax burden. Within a standard regression approach, regression can be performed as described in the literature using tax burden as the dependent variable and all other economic and non-economic factors as independent variables as follows:

$$T_{it} = \alpha + \beta X_{it} + u, \qquad (1)$$

where T – tax burden (the share of tax revenue in GDP); X – is a vector of inde-

pendent variables (includes economic and non-economic factors); α – intersept; β – slope of relevant variables (coefficient); u – is the error term; $i = 1, \ldots, N$ (country indicator); and $t = 1, \ldots, K$ (time indicator).

The subsequent studies have mainly attempted to determine the potential level of tax revenue using modeling. Fundamental research is based on Arrow-Debreu economics [37]. In particular, the potentialization of tax revenues and tax burden is carried out taking into account the assumptions of the Arrow-Debreu economy. According to the basic assumptions, it can be noted that there is no savings in the Arrow-Debreu economy and that the labor supply is fixed. Moreover, the economy consists of N number of households, whose preferences are identical and based on two components: private consumption and public services. Thus, the utility functions of households are:

$$U(Y, G) = ln(Y) + ln(G), \quad (2)$$

where U – stands for the utility of households; Y – is GDP; G – goods and services provided by the state.

The rationale of the utility function is that production resources in the economy are divided into two parts: the private sector (production of goods and services in the private sector) and the public sector (goods and services provided by the state). Since, capital is transferred from the private to the public sectors through taxation, fiscal decision is crucial in this process. It should also be underlined that resources should be allocated by politicians to the potential level between the private and public sectors for a given degree of production capacity. Due to the high likelihood of private sector insolvency, low-profit sectors are typically funded by the government. Additionally, the government has responsibilities to its citizens and must offer them crucial social, legal, and infrastructure services.

Thus, to achieve Pareto efficiency (the first most efficient distribution of resources), the government must select income vectors (private consumption) and goods and services delivered by the government to maximize social welfare (the gross utility function of households). In this situation, it is important to consider the requirement of collecting sufficient tax money to guarantee the required level of goods and services provided by the state. On the other hand, the state budget is predicated on the assumption that the government revenue solely based on the personal income tax (a direct tax) and tax on the consumption of goods and services (an indirect tax) as follows:

$$G = T = T_y + T_p, \quad (3)$$

where G – state budget income; T – is tax revenue; T_y – personal income tax revenue; T_p – is consumption tax revenue.

It should be noted here that according to the general equilibrium theory of the Arrow-Debreu economy, there will be no private savings and no government borrowing in the economy. The model also makes the assumption that there is no preference for products and services offered by the government. This is because it is presumed that government action in the market does not alter consumer choices for commercial goods and services. Additionally, the government uses equal-valued labor to enter the labor market and serve the populace with non-tradable goods and services (including defense and the justice system).

The government taxes household income on a progressive scale and applies marginal rates as income increases. The sum of these progressive tax scales is assumed to be the tax base for personal income tax:

$$T_y = \sum_{j=1}^{M} t_{y,j} y_j, \quad (4)$$

where t_y – is the marginal tax rate for the relevant scale of income; y_j – is the income of households in the relevant income scale; $j = 1, ..., M$ – is the number of income scales.

Now it is possible to work on the average tax rate as shown in equation (5):

$$\overline{t}_y = \frac{\sum_{j=1}^{M} t_{y,j} y_j}{\sum_{j=1}^{M} y_j}, \quad (5)$$

where $\overline{t}_y$ – is the average rate of personal income tax.

In general, personal income tax has three main features:

1) average and marginal rates of taxes increase as incomes increase.

2) the average tax rate is lower than the marginal tax rate.

3) income tax elasticity is greater than one.

The above properties can also be proved mathematically. For this, it is necessary to show the progressive functional form of tax revenue in relation to income. A quadratic function is the simplest progressive functional form:

$$T_y = \beta Y^2, \quad (6)$$

where $0 < \beta < 1$ – tax rate.

Now we can determine the marginal and average tax rates. The marginal tax rate is the first derivative of the function and is equal to:

$$t_{y,j} = \frac{dT_y}{dY} = 2\beta Y, \quad (7)$$

average tax rate is:

$$\overline{t}_y = \frac{T_y}{Y} = \beta Y, \quad (8)$$

income tax elasticity is:

$$e = \frac{dT_y}{dY}\frac{Y}{T_y} = \frac{t_{y,j}}{\overline{t}_y} = 2. \quad (9)$$

Thus, in this article we will use the above (simplest) progressive (6) functional form of personal income tax.

Another tax in the economy is the taxation of raw materials, in which a proportional (*flat*) tax rate is applied to its tax base (*consumption*).

$$T_p = t_p C, \quad (10)$$

where T_p – consumption tax revenue; t_p – proportional (flat) consumption tax rate; C – consumer spending.

However, there is also a regressive tax rate of consumption tax on household income.

$$T_p = t_r Y, \quad (11)$$

where t_r – is the regressive consumption tax rate.

Because a consumption tax is regressive on income because as income increases, the limited (or average) propensity to consume (the ratio of consumption expenditure to income) decreases.

$$c = \frac{C}{Y} = \frac{\lambda}{Y^2}, \text{ or } t_p c = \frac{t_p C}{Y} = \frac{t_p \lambda}{Y^2}, \quad (12)$$

where $\lambda > 1$ is a fixed number.

This implies that, as income increases, consumption also increases, but the rate of consumption growth is not as high as the rate of income growth (12). Alternatively, the acceleration of the growth trend of consumption will be slower than that of income. Also, with an increase in income, the share of consumption decreases.

By equating formulas (10) and (11) and combining with formula (12), tax rates can be related to income and consumption as follows:

$$T_p = t_p C = t_r Y, \text{ or } \frac{t_r}{t_p} = \frac{C}{Y} = \frac{\lambda}{Y^2}, \quad (13)$$

and

$$t_r = t_p \frac{\gamma}{Y^2}, \text{ or } t_p = t_r \frac{Y^2}{\gamma}, \quad \text{or } \gamma = \frac{t_r}{t_p} Y^2 = \frac{C}{Y} Y^2 = CY. \quad (14)$$

From the equation (14) it can be seen that the regressive consumption tax is inversely proportional to income, that is, as income decreases, the tax rate increases.

Now we can estimate the potential tax revenue and, hence, the potential tax burden. To do so, we take disposable (after-tax) income as follows:

$$Y^d = \frac{(1 - t_y)Y}{(1 + t_p)P}, \quad (15)$$

where Y_d is disposable (after-tax) income; Y represent income (gross domestic product); P is the standard price level per unit; t_y stands for income tax rate; t_p denotes consumption tax rate.

We can assume from equation (15) that disposable (after-tax) income has a positive effect on total income, whereas the price level, after accounting for the indirect tax, has a negative effect on it. Furthermore, the model includes a direct tax on income, which has a negative impact on disposable (after-tax) income. It should be noted that income tax is calculated as

a percentage of total income, whereas commodity tax is calculated as a percentage of total personal consumption.

Furthermore, the budget is filled by direct (income tax) and indirect (commodity tax) taxes, which are used to fund the public goods provided by government. It can be illustrated as follows:

$$G = T = t_y Y + t_p C = T_y + T_p. \quad (16)$$

This is the state budget standard constraint of the potentialization problem. In particular, in the potentialization problem, we try to maximize the utility function, which is the sum of disposable income and tax revenues to the budget, under the conditions of state budget constraints. We define the Lagrange function as follows:

$$L = ln(1-t_y)Y - ln(1+t_p)P + \\ + lnG + \lambda(G - t_y Y - t_p C). \quad (17)$$

Now we can potentiate direct and indirect tax rates, which are the only source of state budget revenues:

$$\frac{dL}{dt_y} = -\frac{Y}{(1-t_y)Y} - \lambda Y = 0 \Rightarrow \\ \Rightarrow -\frac{1}{1-t_y} = \lambda Y, \quad (18)$$

$$\frac{dL}{dt_p} = -\frac{P}{(1+t_p)P} - \lambda C = 0 \Rightarrow \\ \Rightarrow -\frac{1}{1+t_p} = \lambda C. \quad (19)$$

In addition, from equation above by taking the first-order condition, the potential level of state budget revenues (*G*) can be obtained:

$$\frac{dL}{dG} = \frac{1}{G} + \lambda = 0 \Rightarrow \lambda = -\frac{1}{G}. \quad (20)$$

Calculating problems (18), (19) and (20) simultaneously, we can get the following result:

$$G = (1-t_y)Y = Y - T_y, \quad (21)$$

$$G = (1+t_p)C = C + T_p. \quad (22)$$

Now by equating equation (21) to (22) we can estimate potential tax revenue as follows:

$$Y - T_y = C + T_p, \quad (23)$$

$$Y - C = T_y + T_p, \quad (24)$$

$$Y - C = T. \quad (25)$$

As can be seen from (25), the potential tax revenue should be equal to the difference between income (GDP) and private consumption.

We attempt to utilize a slightly different utility function using private consumption instead of disposable income to make the model more realistic. Thus, the utility function now consists of two parts: personal consumption and goods and services provided by the government.

$$U = U(C, G) = lnC + lnG. \quad (26)$$

As a result, personal consumption will also have a slightly different form according to formulas (6), (10), (11), (12), (13) and (14) above:

$$C = \frac{c(1-t_y)Y}{1+t_p} = \frac{c(1-\beta Y)Y}{1+t_r\frac{Y^2}{\gamma}}. \quad (27)$$

On the other hand, the state budget constraint remains the same as before, that is:

$$T = T_y + T_p = t_y Y + t_p C = \beta Y^2 + \frac{t_r Y^2}{\gamma} C. \quad (28)$$

It should be noted that personal income tax is a progressive type of tax that takes into account household income. Moreover, taxation of commodities is regressive in terms of consumption and proportional in terms of income. However, gross tax revenues from commodity taxation remain unchanged, despite having proportional and regressive characteristics.

$$T_p = t_p C = t_r Y. \quad (29)$$

We can adjust the Lagrange function to maximize the utility, subject to budget constraints, as follows:

$$L = \ln[c(1-\beta Y)Y] - \ln\left(1 + \frac{t_r Y^2}{\gamma}\right) + \\ + \ln G + \lambda\left(G - \beta Y^2 - \frac{t_r Y^2 C}{\gamma}\right). \quad (30)$$

Now, we can determine the efficiency condition by taking the first-order of β and γ:

$$\frac{dL}{d\beta} = -\frac{cY^2}{c(1-\beta Y)Y} - \lambda Y^2 = 0, \quad (31)$$

$$\frac{dL}{d\gamma} = -\frac{\frac{t_r Y^2}{\gamma^2}}{1+\frac{t_r Y^2}{\gamma}} + \lambda \frac{t_r Y^2 C}{\gamma^2} = 0 \quad (32)$$

(6), (10), (11), (12), (13) and (14) can now be linked to the two efficiency conditions:

$$G = (1-t_y)Y, \quad (33)$$

$$G = \left(1+\frac{t_r}{\gamma}Y^2\right)C = (1+t_p). \quad (34)$$

By equating (33) and (34), we can determine the potential tax burden along with the potential level of tax revenues:

$$(1-t_y)Y = (1+t_p)C, \quad (35)$$

$$Y - t_y Y = C + t_p C, \quad (36)$$

$$Y - C = t_y Y + t_p C \quad (37)$$

$$\text{or } Y - C = T. \quad (38)$$

In models with progressive and regressive tax rates, it is clearly evident that the potential level of tax revenue must be equal to the difference between income (GDP) and private consumption. The outcomes were in line with those from the above-mentioned simple model.

There are still a few issues with the model, though. For instance, the objective function of the empowerment model might not meet efficiency and/or fairness requirements. It just considers the potentiality condition. This is mostly caused by the model's singular focus on gross tax revenue estimation. We must consider the structure of several types of taxes, such as the personal income tax and commodities taxation, in order to give society an effective and equitable tax system.

4. Results

4.1. Tax burden analysis

According to the reviewed literature above, there are several methods of determining the optimal tax revenue, all of which identify the optimal tax revenue as the difference between GDP and private consumption. Based on the methodology discussed, first we determine the potential tax revenue, then the tax effort index, that is, the ratio of real tax revenue to potential tax revenue. Estimations show that average the tax effort in Uzbekistan for the years 2010 to 2020 is equal to 45%. Which means that in Uzbekistan on average only 0.45 fraction of tax revenue was collected over the period in the study (Fig. 2).

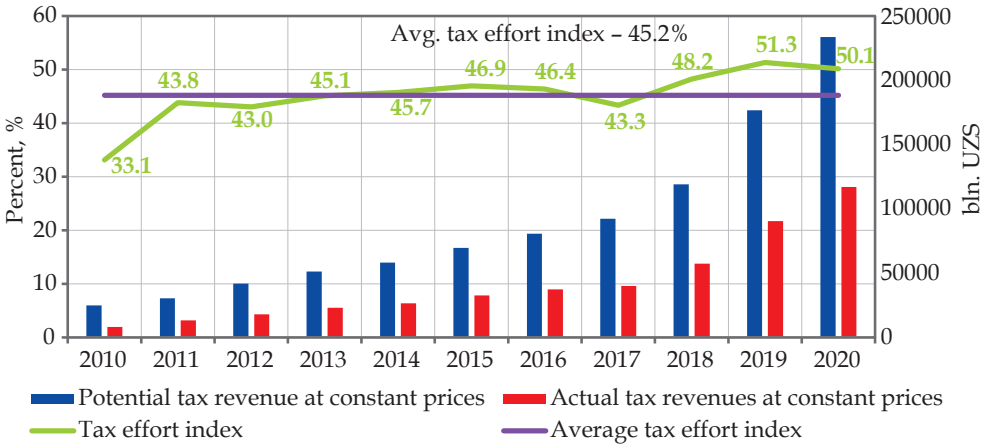

Figure 2. **Potential and actual tax revenue, and tax effort index**

Source: Authors estimations based on date form State Tax committee of Uzbekistan (https://soliq.uz)

Since the index is less than one, it can be concluded that the economy has "low tax effort" which evidence confirmation of research hypothesis. Such a low tax effort implies that Uzbekistan's tax system is ineffective to capture all potential tax base, reflecting there is room for enhancing taxation instrument increase tax revenue.

This large difference can be explained by several intrinsic problems. First possible explanation could be high level of shadow economy in the economy. The studies on this issue revealed that in Uzbekistan share of shadow economy amounted to on average 50 percent of GDP [38].

Regarding structural problems of the tax system, it is important to analyze major taxes that contribute large portion of the budget revenue. Value added tax (VAT) is the largest contributor of tax revenue and income tax comes next [39]. This implies that Uzbekistan's tax policy focused more on indirect taxation of consumption rather than taxing directly incomes. In turn, in the economy with high tax burden, profit-seeking tax agents (companies) try to conceal potential tax base, thereby reducing tax effort.

In fact, research by Rakhmonov & Safarov [40], the average amount of VAT revenue that is actually being collected is just 51% of potential VAT revenue in 2020. In other words, tax system in Uzbekistan is failing to collect 49 percent of potential value-added tax revenue due to huge policy gap (36%) and compliance gap (23%) issues.

Given the importance of personal income tax contributions after value-added tax in terms of the share of overall tax revenue, a large portion of the potential tax revenue is being wasted because of the inadequate labor market regulations and tax administration. In fact, according to the Tax Committee of the Republic of Uzbekistan, due to the presence of huge informal labor market, in 2020, the ratio of personal income tax to the officially employed people was approximately 33 percent. It means that Uzbekistan is losing approximately 67 percent of potential personal income tax revenues from individuals.

It can be concluded that, in Uzbekistan there is the opportunity to increase tax revenues while reducing the tax burden. To accomplish this, the tax system should undergo political, systematic, and structural changes aimed at covering as much tax bases as possible.

4.2. Optimization of the tax burden

Tax burden in Uzbekistan is believed to be considerably high that is preventing economy to grow at its potential level. As for the Fig. 3, it can be seen that the tax burden in Uzbekistan has steadily decreased between 2000 and 2017.

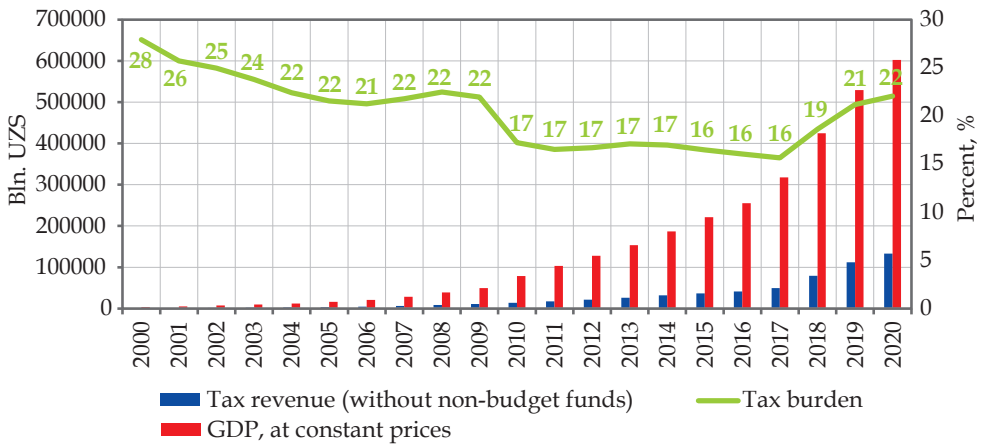

Figure 3. **Tax burden and economic growth in Uzbekistan**

Source: State Tax committee of Uzbekistan (https://soliq.uz) and State statistics committee (https://stat.uz/uz)

It is interesting that after the fiscal reforms implemented in the country, the tax burden started to increase from 2017 and has continued to grow until now. In fact, in 2020 the tax burden reached approximately 22%. Although, tax burden has increased in recent years, it does not mean current level of tax burden has negative impact on economic growth. To identify whether existent tax burden is optimal for economic growth or not, in the next section we conduct analysis.

4.3. OLS model based on a quadratic function

We first attempt to estimate the relationship between the level of the tax burden and the rate of economic growth or GDP per capita based on the OLS model. Empirical specifications support a concave parabolic trend consistent with the Laffer curve.

This method employs square shapes to represent an inverted U-curve. As a result, we define a 2nd-order polynomial relationship between the growth rate (G_t) and the tax burden (T_t).

$$G_t = \beta_0 + \beta_1 \cdot T_t + \beta_t \cdot (T_t)^2 + e_t. \quad (39)$$

Now, by deriving the tax burden from G_t, it is possible to determine the optimal level of the tax burden that maximizes economic growth as follows:

$$T_t^* = -\frac{\beta_1}{2\beta_2}. \quad (40)$$

The coefficients β_1 and β_2 have opposite signs. The first coefficient (β_1), which measures the impact of taxes on growth, should be positive. The second coefficient (β_2) should be negative, which indicates the effects of the tax burden being higher than the optimal rate.

4.4. Regression Results

Based on the above model, we constructed an econometric regression model to estimate the optimal level of the tax burden for Uzbekistan in the period from 2000 to 2019 (Table 1).

Based on the regression results the parameters of equation (39) can be determined. Specifically, in the case of Uzbekistan equation (39) can be formulated as follows:

$$G_t = -25.71 + \\ + 3.107 \cdot T_t - 0.0766 \cdot (T_t)^2 + e_t. \quad (41)$$

Now we can determine the optimal tax burden using equation (40) as below:

$$T_t^* = -\frac{3.107}{2 \cdot (-0.0766)} = 20.28. \quad (42)$$

At this point, it is worth noting that with the above optimal tax burden of 20.28%, Uzbekistan could achieve high growth rates of GDP per capita in 2000–2019. In particular, according to the data of the World Bank, between 2000 and 2019, the average annual growth rate of GDP per capita was 4.85 percent. If the tax burden were targeted at around 20.28% per year, the average annual growth rate of GDP per capita could be 5.79%, which is 0.94% higher than actual growth rate.

In addition, we also performed regression with control variables ($\check{Z}$).

$$G_t = \beta_0 + \beta_1 \cdot T_t + \beta_2 \cdot (T_2)^2 + \beta_t \cdot \check{Z}_t + e_t. \quad (43)$$

Specifically, the model includes following indicators as controlling variables ($\check{Z}$) fixed capital investment, age dependency ratio, employment rate, birth rate, gross final consumption expenditure, share of the population using the Internet, labor force participation rate, life expectancy and unemployment rate. We added indicators as control variables. Another difference from the first model is that we took the annual GDP growth rate rather than the annual GDP per capita growth rate as the dependent variable (Table 2).

Table 1

Regression Results

Variables	(Eq.1)
	GDP per capita
Tax burden	3.107***
	(1.037)
Tax burden (square)	–0.0766***
	(0.0247)
Constant	–25.71**
	(10.65)
Observations	20
R^2	0.396

Significance levels: *** $p < 0.01$ (99%), ** $p < 0.05$ (95%), * $p < 0.1$ (90%).

Table 2

Regression Results

Variables	(Eq. 1)	
	GDP growth	Std. Err.
Tax burden	6.737***	(1.124)
Tax burden (square)	–0.177***	(0.028)
Gross capital formation	–0.354***	(0.084)
Age dependency ratio	5.523***	(0.816)
Total employment	19.84***	(2.454)
Fertility rate	7.118***	(1.088)
Final consumption ratio	–0.314***	(0.058)
Number of internet users	–0.309***	(0.062)
Labor participation	–60.98***	(9.054)
Life expectancy	49.36***	(7.814)
Unemployment	12.03***	(1.634)
Constant	–936.9***	(155.1)
Observations	20	
R-squared	0.991	

4.5. The optimal tax burden

Based on the regression results, the parameters of equation (43) can be determined. Specifically, in the case of Uzbekistan, equation (43) is as follows:

$$G_t = -936.9 + \\ + 6.737 \cdot T_t - 0.177 \cdot (T_t)^2 + \ldots + e_t. \quad (44)$$

Now we can determine the optimal tax burden using equation (40) as below:

$$T_t^* = -\frac{6.737}{2 \cdot (-0.177)} = 19.03. \quad (45)$$

According to the results of this regression, the optimal tax rate is approximately 19%. Graphically it can be illustrated as in Fig. 4.

As we can see in the case of optimal tax burden results are in line with set research hypothesis. In fact, in 2020 observed actual tax burden (excluding other mandatory contribution) was 22 percent, while estimated optimal tax burden recorded 19%.

5. Discussion

According to the "World Economic Outlook" report of the International Monetary Fund, the actual average annual growth of GDP in Uzbekistan in the period from 2000 to 2019 was almost 6.5%. In order to calculate economic growth by targeting tax burden to an optimal level we simulated data based on the regression results. Specifically, we modeled the rate of economic growth by arbitrary setting the tax burden at 19%, and discovered that, if the tax burden had been fixed at 19% per year, the average annual GDP growth rate between 2000 and 2019 would have been approximately 7.5%, which is 1% higher than actual economic growth.

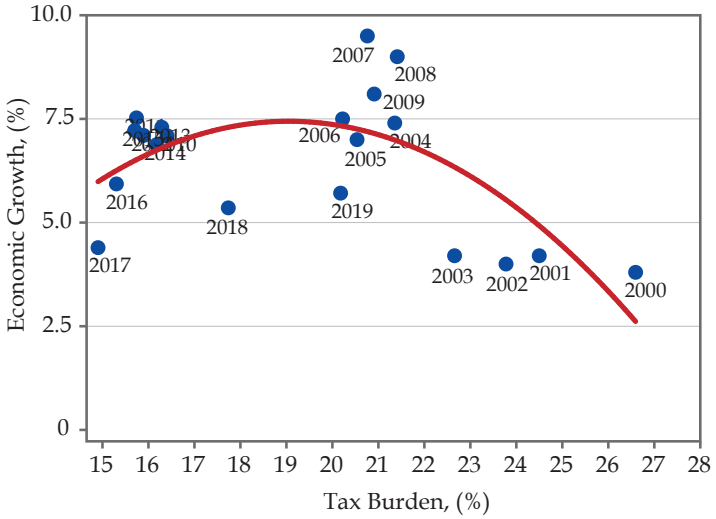

Figure 4. **Economic growth and Tax burden**

Our findings fairly diverge from previous studies of optimal tax burden for Uzbekistan. Study by Abdullaev & Konya [41], which covered period between 1996–2011, shows that to maximize economic growth it is necessary for Uzbekistan to keep tax burden at 22 percent. However, the main difference of this research from current one is that former one to estimate optimal tax burden include other mandatory payments, while in our research we focused only on taxes. The second difference comes from the tax policy of the two different time periods. Starting 2017 Uzbekistan adopted new concept of tax policy and in 2020 new version of the tax code both of which may affect tax burden that economic entities bear.

As a result, in the process of this study, we confirmed both hypotheses of the study: (1) Tax effort in Uzbekistan is well below than its potential level; (2) Tax burden in Uzbekistan is high than growth maximizing optimal level.

Although the methods and findings are unquestionably original, this study has a number of limitations.

First, empirical analysis is based on the limited number of annual time series data due to unavailability of quarterly statistics data. Thus, it is possible that using quarterly data and increasing number of observations will enable to capture effects of short-term shocks and give more detailed results.

Second, we used total tax burden for our analysis, ignoring specific effects of the direct and indirect taxes on tax burden. Analyzing weight of each tax category will reveal issues of the tax policy in detail. We leave all these shortcomings to future studies, which might produce more comprehensive conclusions.

6. Conclusion

According to the literatures, we found that the optimal tax burden and tax effort index are the theoretically most reasonable methods to determine an economy's optimal tax revenue. These methods, in particular, are based on the utility maximization model and aimed to optimize the general welfare function under the conditions of a balanced budget. It should be noted that general welfare equals the sum of personal disposable income plus government goods and services.

Based on the various literature suggestions, we build up model in order to identify to what extent tax policy and tax administration in Uzbekistan are capable of collecting taxes using mathematical model and data for the years 2010–2020. The results revealed that average tax effort index for Uzbekistan was approximately 45%, implying that fiscal capacity of revenue agencies in Uzbekistan were twice in-effective.

This, first, can be explained by high level of shadow which causing collection of less than half of the potential tax liability imposed by tax law that was in force at these periods. Further investigation revealed that such a large disparity was caused by losses from two major revenue contributors, namely VAT and income tax, as a result of compliance and policy deficiencies.

In order to identify optimal tax burden that maximizes economic growth of Uzbekistan, we utilized two model, specifically, OLS regression model. The estimations confirmed that from 2000 to 2019, optimal tax burden for Uzbekistan's economy was around 19–20%. If the government of Uzbekistan targeted its tax burden to that optimal level, it could have been achieved up to about 7.5% economic growth over the period covered in the study. This means that there is still room for increasing tax revenue by taxing shadow economy to improve tax effort and reducing tax burden to boost the economic growth in Uzbekistan.

The main policy outcome of this study is that it is likely to be ineffective to implement any additional tax policy in Uzbekistan. Therefore, along with the raising direct taxes and lowering indirect taxes, tax policy reform should focus on addressing the fundamental problems with the tax system.

References

1. Ng Y.-K. Welfare economics. In: Wright J.D. (ed.) *International Encyclopedia of the Social & Behavioral Sciences*. 2nd ed. Elsevier; 2015, pp. 497–503. https://doi.org/10.1016/B978-0-08-097086-8.71014-2

2. Abel A.B., Bernanke B., Croushore D.D. *Macroeconomics*. 10th ed. Harlow: Essex: Pearson Education Limited; 2017.

3. Cobb C.W., Douglas P.H. A Theory of Production. *American Economic Review*. 1928;18(1):139–165. Available at: https://www.aeaweb.org/aer/top20/18.1.139-165.pdf

4. Jones L.E., Manuelli R.E. Endogenous growth theory: An introduction. *Journal of Economic Dynamics and Control*. 1997;21(1):1–22. https://doi.org/10.1016/0165-1889(95)00924-8

5. Solow R.M. A Contribution to the Theory of Economic Growth. *The Quarterly Journal of Economics*. 1956;70(1):65–94. https://doi.org/10.2307/1884513

6. The Central Bank of Uzbekistan (CBU). *Monetary policy review*. IV quarter, 2021. Central Bank of the Republic of Uzbekistan. Tashkent; 2022. Available at: https://cbu.uz/upload/iblock/968/Monetary-Policy-Review-for-Q4_-2021_.pdf

7. Meghir C., Phillips D. Labour supply and taxes. In: *Dimensions of tax design: The Mirrlees review*. Institute for Fiscal Studies; 2010, pp. 202–274. Available at: https://econpapers.repec.org/RePEc:oxp:obooks:9780199553754

8. Howard M.M. *Public Sector Economics for Developing Countries*. University of the West Indies Press; 2001. 318 p. Available at: https://www.studocu.com/row/document/addis-ababa-university/public-finance-and-taxation/michael-howard-public-sector-economics-for-develbook-fi/44863701

9. Fenochietto R., Pessino C. *Understanding Countries' Tax Effort*. International Monetary Fund (IMF). Working Paper WP/13/244. 2013. https://doi.org/10.5089/9781484301272.001

10. Gupta A. *Determinants of Tax Revenue Efforts in Developing Countries*. IMF Working Paper No. WP/07/184. 2007. https://doi.org/10.5089/9781451867480.001

11. Martin A., Lewis W.A. Patterns of public revenue and expenditure. *The Manchester School of Economic and Social Studies*. 1956;24(3):203–244. https://doi.org/10.1111/j.1467-9957.1956.tb00985.x

12. Malik A. *Political Survival in Pakistan*. London: Taylor and Francis Publishers; 2010. https://doi.org/10.4324/9780203842225

13. Leuthold J.H. Tax shares in developing economies: A panel study. *Journal of Development Economics*. 1991;35(1):173–185. https://doi.org/10.1016/0304-3878(91)90072-4

14. Gillis M. (ed.) *Tax Reform in Developing Countries*. Durham, London: Duke University Press; 1989. Available at: https://pdf.usaid.gov/pdf_docs/PNABC844.pdf

15. Le T., Moreno-Dodson B., Bayraktar N. *Tax Capacity and Tax Effort: Extended Cross-Country Analysis from 1994 to 2009*. World Bank Policy Research Working Paper No. 6252, 2012. Available at: https://ideas.repec.org/p/wbk/wbrwps/6252.html

16. Stotsky J.G., WoldeMariam A. *Tax Effort in Sub-Saharan Africa*. IMF Working Paper. No. 107, 1997. https://doi.org/10.5089/9781451852943.001

17. Mertens J.B. Measuring Tax Effort in Central and Eastern Europe. *Public Finance & Management*. 2003;3(4):530–563. Available at: https://www.academia.edu/download/50939471/Measuring_Tax_Effort.pdf

18. Dalamagas D., Palaios P., Tantos S. A New Approach to Measuring Tax Effort. *Economies*. 2019;7(3):1–25. https://doi.org/10.3390/economies7030077

19. Kim S. A more accurate measurement of tax effort. *Applied Economics Letters*. 2007;14(7):539–543. https://doi.org/10.1080/13504850500425345

20. Bird R.M., Martinez-Vazquez J., Torgler B. Tax Effort in Developing Countries and High Income Countries: The Impact of Corruption, Voice and Accountability. *Economic Analysis and Policy*. 2008;38(1):55–1. https://doi.org/10.1016/S0313-5926(08)50006-3

21. Murunga J., Muriithi M., Kiiru J. Tax Effort and Determinants of Tax Ratios in Kenya. *European Journal of Economics, Law and Politics*. 2016;3(2):24–36. https://doi.org/10.19044/elp.v3no2a2

22. Romer C.D., Romer D.H. The Macroeconomic Effects of Tax Changes: Estimates Based on a New Measure of Fiscal Shocks. *American Economic Review*. 2010;100(3):763–801. Available at: https://www.aeaweb.org/articles?id=10.1257/aer.100.3.763

23. Asaolu O., Olabisi J., Akinbode S., Naimot A. Tax Revenue and Economic Growth in Nigeria. *Scholedge International Journal of Management & Development*. 2018;5(7):72–85. https://doi.org/10.19085/journal.sijmd050701

24. Babatunde O.A., Ibukun A.O., Oyeyemi O.G. Taxation revenue and economic growth in Africa. *Journal of Accounting and Taxation*. 2017;9(2):11–22. https://doi.org/10.5897/JAT2016.0236

25. Gandhi V.P. (ed.). *Supply-Side Tax Policy, Its Relevance to Developing Countries*. Washington; 1987. Available at: https://www.imf.org/en/Publications/Books/Issues/2016/12/30/Supply-Side-Tax-Policy-Its-Relevance-to-Developing-Countries-26

26. Laffer A.B. Supply-side economics. *Journal of Financial Analysts*. 1981;37(5):29–44. https://doi.org/10.2469/faj.v37.n5.29

27. Barro R. Government Spending in a Simple Model of Endogenous Growth. *Journal of Political Economy*. 1990;98(5):103–125. https://doi.org/10.1086/261726

28. Armey D. *The Freedom Revolution: The New Republican House Majority Leader Tells Why Big Government Failed, Why Freedom Works, and How We Will Rebuild America*. Washington, D.C.: Regnery Publishing; 1995.

29. Keynes J. *The General Theory of Employment, Interest and Money*. London: Macmillan and Co.; 1936. Available at: http://www.hetwebsite.net/het/texts/keynes/gt/gtcont.htm

30. Takumah W., Iyke B.N. The links between economic growth and tax revenue in Ghana: an empirical investigation. *International Journal of Sustainable Economy*. 2017;9(1):34–55. https://doi.org/10.1504/IJSE.2017.10001606

31. Macek R. The Impact of Taxation on Economic Growth: Case Study of OECD Countries. *Review of Economic Perspectives*. 2015;14(4):309–328. https://doi.org/10.1515/revecp-2015-0002

32. Amgain J. Estimating Optimal Level of Taxation for Growth Maximization in Asia. *Applied Economics and Finance*. 2017;4(3):47–55. https://doi.org/10.11114/aef.v4i3.2288

33. Liu H., Cung N.H., Huong T.T. Tax Burden and Economic Growth: Theory and Practice in Vietnam. Inter*national Proceedings of Economics Development and Research*. 2012;46:85–103. Available at: http://www.ipedr.com/vol46/015-ICBER2012-N10010.pdf

34. Saibu O. Optimal Tax Rate and Economic Growth: Evidence from Nigeria and South Africa. *EuroEconomica Issue*. 2015;1(34):41–50. Available at: https://ssrn.com/abstract=3510410

35. Keho Y. The structure of taxes and economic growth in Cote d'ivoire: An econometric investigation. *Journal of Research in Economics and International Finance*. 2013;2(3):39–48. Available at: https://www.interesjournals.org/articles/the-structure-of-taxes-and-economic-growth-in-cote-divoire-an-econometric-investigation.pdf

36. Chokri T., Anis E.A., Ali B. Optimal Taxation and Economic Growth in Tunisia: Short and Long Run Analysis. *Journal of Reviews on Global Economics*. 2018;7:157–164. Available at: https://ideas.repec.org/a/lif/jrgelg/v7y2018p157-164.html

37. Arrow K., Debreu G. Existence of an Equilibrium for a Competitive Economy. *Econometrica*. 1954;22(3):265–290. https://doi.org/10.2307/1907353

38. Maga A.A. Analysis of the scale of the shadow economy in the Republic of Uzbekistan. *Tenevaya Ekonomika*. 2020;4(1):63–69. https://doi.org/10.18334/tek.4.1.110099

39. Niyazmetov I.M., Safarov U.A. History of the value added tax in uzbekistan: mistakes, experience learned, and current problems. *International Journal of Research in Social Sciences*. 2020;10(2):80–86. Available at: https://sdbindex.com/Documents/index/00000367/00001-29894

40. Rakhmonov A., Safarov U. Compliance and administration problems of the VAT mechanism of Uzbekistan. *Society & Innovations*. 2021;2(7):113–137. https://doi.org/10.47689/2181-1415-vol2-iss7/S-pp113-137

41. Abdullaev B., Konya L. Growth Maximizing Tax Rate for Uzbekistan. *Applied Econometrics and International Development*. 2014;14(1):59–72. Available at: http://www.usc.es/economet/reviews/aeid1415.pdf

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Modeling Tax Declaration Behavior and Quality of Tax Processing: A Game Theory Approach

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ABSTRACT

Tax as one of the main levers in the micro and macro sectors of the economy it has greatly accelerated the growth of the economy, and today there are fewer countries that use it as a pillar Economic stability does not accept. On the other hand time receipt of taxes for countries is very vital and the basis of government planning for all projects and especially their budgeting. Governments are looking for ways to collect their target tax from taxpayers at the lowest possible cost. Thus, the most important step to achieve this goal is for taxpayers to declare the actual amount of tax they have paid in tax return. This paper deals with modeling the game between taxpayers and National Tax Administration. The results showed that the equilibrium declared tax of taxpayers is a function of assessed due tax, the quality of assessment groups, the number of assessments and the parameter of taxpayers' dishonesty. The taxpayers' equilibrium declared tax is increasing relative to the quality of their assessment groups and decreasing relative to other assessment groups. With increase in the likelihood of dishonesty, the declared tax of larger taxpayers will increase and the declared tax of smaller taxpayers will decrease and vice versa. Furthermore, if the quality difference of two assessment groups is only vertical, then assessed due tax and the equilibrium declared taxes will be equal. Finally, increase in the number of assessment leads to increase in the declared tax of larger taxpayers and decrease in the declared tax of smaller taxpayers and vice versa.

KEYWORDS

game theory, modeling, tax, uniform distribution, uncertainty of assessment quality

JEL C70, C63, H21, D31, D29

УДК 336.02

Моделирование поведения налогоплательщиков при декларировании доходов и качества обработки налоговых деклараций: подход теории игр

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АННОТАЦИЯ

Налогообложение как один из основных рычагов в микро- и макросекторах экономики значительно ускорило рост экономики, и сегодня стало меньше стран, которые не используют налогообложение в качестве инструмента обеспечения экономической стабильности. С другой стороны, своевременное получение налоговых доходов для стран является очень важным аспектом. Налоговые доходы являются основой для государственного планирования всех проектов и особен-

но их бюджетирования. Правительства ищут способы сбора налогов с налогоплательщиков при минимально возможных затратах. Наиболее важным шагом для достижения этой цели для налогоплательщиков является декларирование фактической суммы налога, которую они заплатили, в налоговой декларации. В данной статье рассматривается моделирование игры между налогоплательщиками и Национальной налоговой администрацией в процессе декларирования доходов и обработки этих деклараций. С увеличением вероятности недобросовестности задекларированный налог более крупных налогоплательщиков будет увеличиваться, а задекларированный налог более мелких налогоплательщиков будет уменьшаться, и наоборот. Кроме того, если разница в качестве двух групп оценки наблюдается только по вертикали, то начисленный налог и равновесные объявленные налоги будут равны. Результаты показали, что равновесный (равновесие по Нэшу) задекларированный налог налогоплательщиков является функцией начисленного причитающегося налога, качества оценочных групп, количества оценок и параметра недобросовестности налогоплательщиков. Равновесный объявленный налог налогоплательщиков увеличивается по отношению к качеству их оценочных групп и уменьшается по отношению к другим оценочным группам. Кроме того, увеличение количества начислений приводит к увеличению задекларированного налога более крупных налогоплательщиков и снижению задекларированного налога более мелких налогоплательщиков и наоборот.

КЛЮЧЕВЫЕ СЛОВА
теория игр, моделирование, налог, равномерное распределение, неопределенность качества оценки

1. Introduction

Today, taxes are the main source of government income and play a special role in their financing. Certainly, one of the main features of developed countries is the existence of tools and the use of efficient systems in timely tax collection and consequently reducing the cost of tax collection in the shadow of these systems. In addition, the economic and financial autonomy of the countries will be achieved through dynamic and efficient tax system; therefore, designing an optimal tax system is an important issue in economic theories' point of view. Evaluate impact and negative consequences the current corporate income tax system in the stability of the financial sector is in the focus of attention of financial economists, especially after the financial crises of recent years [1].

In recent years, due to change in the government's approach concerning the sources of revenue towards taxes, the need to identify effective barriers to the tax collection process and empowering the tax system is undeniable. One of the main barriers in achieving the goals of National Tax Administration, which is tax compliance (at the lowest cost), is the difference in the declared tax of taxpayers in the tax return and the due tax announced by the tax assessors. This underlying challenge leads to increased costs, longer collection process, and certainty of tax files. The tax system provides many incentives for people to change their taxes behavior, which means that people may decide not to declare some or all of them income and evasion of some taxes [2; 3].

Certainly, identification and resolving the deficiencies and factors that cause this difference will reduce the cost of tax collection and provide resources to the government in a timely manner and at the same time as of submitting tax return. Definitely, the best-case scenario for Tax Administration, (and of course governments) is to pay taxes at the self-assessment stage, as the higher is the voluntary tax rate in a tax system, the better will be tax indicators and the lower will be the tax gap, which leads to a move towards tax justice [4].

Kakaulina [5] and Szarowská [6] believes that taxes cause economic growth, redistribution, competitiveness of the country, performance labor market or fiscal federalism) in it will be the same time.

Also, in a study of Schiau et al. [7] it is confirmed that at proportional taxation the taxpayers are not stimulated to hide income and thus tax collection is increased [8].

Finally, it should be reminded that Tax Administration seeks to achieve a situation in which taxpayers declare and pay their actual tax amount at the stage of declaration (tax return) and in this way prevent the extension of the tax collection process (assessment, objection, reinvestigation and etc.), which takes long time and is costly for the organization and reduces the value of taxpayers' money overtime.

Governments are looking for ways to collect their target tax from taxpayers at the lowest possible cost. Thus, the most important step to achieve this goal is for taxpayers to declare the actual amount of tax they have paid in tax return. This paper deals with modeling the game between taxpayers and National Tax Administration.

This paper is organized into 5 sections. After introduction, literature review and game theory is presented respectively in the second and third parts. In the fourth part, the model used is presented in two sub-sections along with the proposed theorems, and in the fifth and final part, conclusions and recommendations are presented.

2. Literature review

The two main factors of tax evasion and tax avoidance are considered as the major challenges and obstacles in the tax collection process in most countries. Tax evasion is illegal escape from tax payment and often requires taxpayers to deliberately underrepresent their actual assets to the tax authorities in order to reduce their tax liability, usually through unreal report of their taxable assets such as income, profit, or earnings less than the actual amount [9]. On the other hand, tax avoidance is legal use of tax laws to one's own benefit to reduce tax burden. [10].

It should be noted that both tax evasion and tax avoidance can be considered as a form of tax incapacity [11]. It can also be said that tax avoidance, in its broadest sense, encompasses all arrangements for reducing, eliminating, or postponing tax debt [12].

Concerning the above definitions, one should distinguish tax evasion and tax avoidance. Tax avoidance is any legal method used by a taxpayer to minimize the amount of income tax owed or in fact to get around the law. In other words, tax avoidance is to take benefit of tax system of the country to reduce the tax owned [13]. Tax avoidance is in fact the use of gaps and weaknesses of the tax system to reduce tax without violating the laws and regulations. It should be noted that the focus of this paper is on tax avoidance. Tax planning strategies which utilize complex group structures to reduce a company's tax burden without violating tax laws may be morally reprehensible or highly questionable, as these methods are not illegal [14; 15].

According to agency theory, one of the motivations for profit management is to reduce tax liabilities and payments by minimizing the effective tax rate. Tax strategies reduce the effective tax rate either through short-term and opportunistic goals, or with the aim of reducing taxes in the long run and creating value for the company [16].

In following, some related literature will be presented. It is noteworthy that there is a bulk of studies on taxation and tax evasion, most of which dealing with the issue from the perspective of accounting (including the factors affecting the payment and etc.). Thus, hereunder, the studies focusing on taxation (whether modeling or any other type of study) and based on game theory, will be addressed.

Alm & McKee [17] examined the adaptive behavior when filing tax return for auditing purpose based on the deviation of each individual's tax report from the average of all taxpayers through laboratory tests. The results of their research showed that the tax ability can overcome the coordination of taxpayers through a slight and subtle change of the audit rule. They stated that this minor change targets audits in different ways without increasing the number of audits and assessment.

Kumacheva [18] presented a model in cooperative game between taxpayers and Tax Administration through game theory approach. In this paper, it was assumed that each taxpayer can declare his income level less than or equal to his real value. In addition, the tax and fixed fine rates and the assessor disclose the tax evasion by 100 percent. Finally, equilibrium points (Nash) for the players' behavior was obtained (by maximizing their revenue).

Abraham et al. [19] studied discriminatory tax evasion and social norms. They studied the effect of social norms and stated that theoretically and empirically it has been shown that the norm of tax compliance has a negative and strong (significant) effect on its amount and tax evasion is independent of it.

Cerqueti & Copier [20] studied the relation between corruption and tax evasion in the environmental policymaking. To this end, they designed a game of incomplete information, in which the government could have a strategy of its choice in two ways. The results indicated that in a highly motivated country, the motivational channel is more effective than obedience.

Sokolovskyi [21] presented a theoretical model for tax evasion game through analyzing the interaction of factors and optimizing tax burden (the problem of optimizing the real tax burden). The results show that in the presented curve, the dependency of the actual and declared tax burden is not in one point (like Laffer curve); rather, there are three relative maximum points.

Kiral & Mavruk [22] studied the paid tax of big companies through game theory approach. They considered an application of mixed strategy for unlimited iterative games, in which the company pays its tax in four payouts. One of their most important results was that the solutions sets are linear zero-sum game and variable trapezoidal sum, and to prevent tax evasion, the number of inspectors and audits should be increased.

Gubar et al. [23] examined network games and structures on corruption, income inequality, and tax control. They sought to present a model in which taxpayers (in rich and poor groups, who all pay tax) decide whether to pay tax or not concerning their personal income and preferences, as well as the audit and tax control data. Their results showed that taxpayers' initial and final preferences depend on important parameters such as tax rates, fines, audit information and costs.

Chica et al. [24] presented an evolutionary game to understand the dynamics of consumption tax fraud. They claimed that the tax paid by each player depends on the amount of tax paid (more or less) and the likelihood of subjective inspection by tax officials. Finally, they showed that increase in the likelihood of subjective auditing is more efficient for low-volume trades than for high-volume trades. Moreover, the results of their studies indicated that social rewards for those who cooperate in tax payment and alternative penalties for those who evade taxes could be effective policies, although its success depends on the distribution of audit probability for different types of transactions (small or large).

The investigations show that a lot of research has dealt with taxation (and to a very small extent, game theory); however, as it turns out, there is a limited number of studies focusing on game theory and presenting a model. On the other hand, no model has been so far presented with consideration of the utility functions used in this research. Furthermore, the existing studies have not addressed the important issues of equilibrium declared tax, optimal number of assessments, collection function of the Tax Administration and the quality of the assessing groups, that are indeed the most important issues in the game between the Tax Administration and taxpayers. Therefore, the innovation of this study is consideration of these important cases and presenting several theorems by obtaining Nash equilibrium points.

3. Game theory

Game theory is the study of methods in which the mutual selection of economic players based on their preferences, produces some results that may not be intended by any of them. Game theory utilizes mathematical models to analyze

the methods of cooperation or competition of rational and intelligent beings and tries to model the mathematical behavior governing a strategic situation (conflict of interest) [25]. This situation arises when a person's success depends on the strategies that others choose. The ultimate goal of this knowledge is to find the optimal strategy for players [26].

Some researchers compare the importance of game theory design to the discovery of the double DNA spirals and often refer to it as "a theory that can explain everything" [27].

If the number of players (agents) in opposition is limited, game theory can be very useful because in this case the behavior of each player has a significant effect on the income of other players [28]. It should also be noted that game theory allows model makers to think the same as economists when price theory cannot be accountable [29]. Game theory has evolved due to the continuous efforts of many social scientists, especially economics and pure sciences (mathematics and statistics) and today, as one of the most important achievements of human knowledge, serves various sciences including humanities, natural, technical and pure sciences [30]. Game theory is now very widely used throughout the profession and has become a major tool for the construction of new economic models [31].

The main principle of game theory is that all players in a common game have common knowledge. In other words, all players in a game know the structure of the game, as well they know that their competitors also know it, and at the same time they know that other competitors know that they know this, and so on.

One of the most common types of games is static games of complete information, in which players choose their strategy simultaneously, and every player is fully aware of what other players achieve in the game. In static games with complete information, each player chooses his strategy with full awareness of the interests, but not the choices, of the rival player; in other words, players choose their strategy at the same time [32].

The basic assumption of these games is that each side of the game does not know the choice of the other side (opponent) and, in fact, it seems as if each makes their choice at the same time. Another basic assumption in these games is that all consequences of the game are known to all players, i.e. each player knows what he will gain in return for his own choice and his competitor's. Most games in the real world are static games. The equilibrium resulting from this type of games is called Nash equilibrium, which is defined as follow:

$$u_i(\sigma_i, \sigma_{-i}) \geq u_i(\sigma_i', \sigma_{-i}).$$

That is, the player's strategy is the best reaction to the selected act of other competitors [33].

4. Modeling and simulation results

Suppose taxpayers are evenly distributed in the range [0, 1]. After paying his due book tax, a taxpayer located at point on the said interval achieves a surplus of Christou & Vettas [34]:

$$u(w, i) = R - \frac{1}{1+r\theta}(w - T_i)^2 + q_i - E_i. \quad (1)$$

Where R is the reservation value of sale (products or services and etc.), which is assumed to be high enough so that all taxpayers pay taxes; in other words, the market is fully covered.

$$\frac{1}{1+r\theta}$$

is called probability of non-disclosure (violation) and it means that the taxpayer may not disclose all the facts related to his payment. Here, by r, it is meant an assessment performed by the tax assessment groups, such that the higher is r, the less likely will be non-disclosure of violation ($r \geq 0$).

Furthermore, by θ, it is meant dishonesty of the taxpayers such that the higher is θ, the less likely will be non-disclosure of violation ($\theta \geq 0$). w is the taxpayer situation and T_i is the due tax for taxpayer i. q_i is the quality of assessment groups i (it is assumed that the difference in the quality of assessors is unknown to the taxpayers) and E_i is the declared amount by taxpayer i.

This equation (1) shows that the assessment groups are different both horizontally and vertically. In order to obtain the effect of the uncertainty of the quality of the assessment groups on the taxpayers' declared tax, it is assumed that q_i is a random value, which is unknown to the taxpayer at the time of declaration. In this case, the game will be as follows:

1. The difference in the quality of the assessment groups ($q_i - q_j$) is obvious and as common knowledge.

2. The taxpayers simultaneously select their declared tax.

The Tax Administration seeks to maximize its expected revenue, and on the other hand, the taxpayer seeks to maximize its net surplus after tax payment. This idea shows that when the quality of the assessment groups is known to taxpayers, the change in the procedure of the Tax Administration is very costly [35]. It is assumed that the difference in the quality of the assessment groups ($q_i - q_j$), which is random, is uniformly distributed over the interval

$$\left[-\frac{1}{2}, \frac{1}{2}\right].$$

It should be noted that since the quality difference is a random value, the utility assigned to each taxpayer will be random in respect to each declared tax.

Assume that the difference in the quality of two assessment groups ($q_i - q_j$) which is random is in three H_2, S, H_1 states. H_1 means that the difference in quality of two assessment groups is very high and the quality of assessment group 1 is much better than that of assessment group 2. S shows the state in which the difference in quality of two assessment groups is minor and the taxpayers do not clearly prefer the quality of neither assessment groups over the other.

Furthermore, H_2 means that the difference in quality of two assessment groups is very high and the quality of assessment group 2 is much better than that of assessment group 1. In addition, suppose that the difference in quality of two assessment groups is in interval

$$\left[-\frac{1}{2}, -\frac{1}{4}\right],$$

equal to H_1, if the difference in quality of two assessment groups is in interval

$$\left[-\frac{1}{4}, \frac{1}{4}\right],$$

equal to S, and finally if the difference in quality of two assessment groups is in interval

$$\left[\frac{1}{4}, \frac{1}{2}\right],$$

equal to H_2, now, we obtain the equilibrium declared tax through inverse inference.

4.1. Equilibrium declared tax

As far as assessment groups 1 and 2 can have a situation on the line, for simplicity purpose, we assume that the assessment group 1 is in the left side of assessment group 2 ($T_1 \leq T_2$). That means that the due tax of assessment group 1 is less than that of assessment group 2 (assessment group 2 deals with larger taxpayers). Now, knowing the due tax of taxpayers, the location of the indifferent taxpayer should be found out.

The indifferent taxpayer is one who does not care which assessment group sets tax for him, as he has accurately declared its due tax and if it is assessed by either assessment group, the amount of due tax will be the same as his declared tax.

Suppose z is the number of taxpayers assessed by Group 1; therefore, z-1 will be the number of taxpayers assessed by Group 2, ($z \in (0, 1)$). The number of taxpayers assessed by two assessment groups will be obtained by obtaining the position of the indifferent taxpayer in respect to assessment groups 1 and 2. Therefore, concerning equation 1 and as the indifferent taxpayer is located at point z, we have:

$$\begin{aligned} E_1 + \frac{1}{1+r\theta}(z - T_1)^2 = \\ = -q + E_2 + \frac{1}{1+r\theta}(z - T_2)^2. \end{aligned} \quad (2)$$

Where $q = q_2 - q_1$. It is clear that q can be positive, negative or zero depending on the quality of the assessment groups.

The position of the indifferent taxpayer depends on whether it is declared or due tax and on the quality of the assessment groups. Therefore $z = z(E_1, E_2, T_1, T_2, q)$. By solving equation 2 and as per $z \in (0, 1)$, we have:

$$z^* = \frac{T_1 + T_2}{2} + \frac{(r\theta + 1)(E_2 - q - E_1)}{2(T_2 - T_1)}.$$

Thus, the income function of assessment groups will be as:

$$I_1 = E_1 z, \quad I_2 = E_2(1 - z). \tag{3}$$

While:

$$z = \begin{cases} 0 \quad if \quad \frac{T_1 + T_2}{2} + \frac{E_2 - q - E_1}{2(T_2 - T_1)} \le 0 \\ \frac{T_1 + T_2}{2} + \frac{(r\theta + 1)(E_2 - q - E_1)}{2(T_2 - T_1)} \ if \\ if \ \frac{T_1 + T_2}{2} + \frac{E_2 - q - E_1}{2(T_2 - T_1)} \in (0,1) \\ 1 \quad if \quad \frac{T_1 + T_2}{2} + \frac{E_2 - q - E_1}{2(T_2 - T_1)} \ge 1 \end{cases} \tag{4}$$

These equations are obtained concerning uniform distribution of consumers. Now, the equilibrium declared tax will be extracted:

Theorem 1. *The equilibrium declared tax of taxpayers 1 and 2 in respect to* $0 \le T_1 \le T_2 \le 1$ *will be*:

$$E_1^* = \begin{cases} \frac{-q - T_1^2 + 2T_1 + T_2^2 - 2T_2}{(r\theta + 1)} \ if \ q < -\frac{1}{4} \\ \frac{-q(r\theta + 1) - T_1^2 - 2T_1 + T_2^2 + 2T_2}{3(r\theta + 1)} \ if \\ if \ \ q \in \left[-\frac{1}{4}, \frac{1}{4}\right], \ 0 < z < 1 \\ 0 \qquad if \qquad q > \frac{1}{4} \end{cases} \tag{5}$$

$$E_2^* = \begin{cases} 0 \qquad if \qquad q < -\frac{1}{4} \\ \frac{q(r\theta + 1) + T_1^2 - 4T_1 - T_2^2 + 4T_2}{3(r\theta + 1)} \ if \\ if \ q \in [-\frac{1}{4}, \frac{1}{4}] \ , \ 0 < z < 1 \\ q - \frac{T_2^2 - T_1^2}{r\theta + 1} \quad if \quad q > \frac{1}{4} \end{cases} \tag{6}$$

Proof. To prove this theorem, just equation 4 should be inserted in equation 3.

$$q < -\frac{1}{4}$$

shows that the quality of assessment group 1 is high enough; therefore, assessment group 1 will be the only assessment group.

$$q > \frac{1}{4}$$

shows that the quality of assessment group 2 is high enough; therefore, assessment group 2 will be the only assessment group. Other states are for cases where the difference in the assessment quality of two groups is minor and depends on their position.

In addition, it is possible to refer to other important results from this theorem. If the quality difference between two assessment groups is only horizontal, then $q = 0$ and it is possible to simply obtain equilibrium declared taxes, which are:

$$E_1^* = \frac{-T_1^2 - 2T_1 + T_2^2 + 2T_2}{3(r\theta + 1)},$$

$$E_2^* = \frac{T_1^2 - 4T_1 - T_2^2 + 4T_2}{3(r\theta + 1)}.$$

Furthermore, if the quality difference of two assessment groups is only vertical, then $T_1 = T_2$ and the equilibrium declared taxes will be equal to $(q / 3)$. Moreover, concerning the results, the equilibrium declared tax of taxpayers 1 and 2 based on the quality difference of the assessment groups will be equal $(E_1^* = E_2^*)$ where:

$$\begin{cases} q = -T_1^2 + 2T_1 + T_2^2 - 2T_2 \ if \ q < -\frac{1}{4} \\ q = -\frac{T_1^2 - T_1 - T_2^2 + T_2}{r\theta + 1} \ if \\ if \ \ q \in \left[-\frac{1}{4}, \frac{1}{4}\right], \ 0 < z < 1 \\ q = \frac{T_2^2 - T_1^2}{r\theta + 1} \qquad if \qquad q > \frac{1}{4} \end{cases}$$

Theorem 2. *The taxpayers' equilibrium declared tax is increasing relative to the quality of their assessment groups and decreasing relative to the other assessment groups.*

Proof. Before proving this theorem, it should be noted that as mentioned earlier, taxpayers before the indifferent taxpayer are assumed to be less inclined to pay, and taxpayers after the indifferent taxpayer tend to pay higher (larger taxpayers). As previously mentioned, assessment group 1 is the one with lower due tax (as they deal with smaller taxpayers or those with tendency to pay less) and assessment group 2 is the one with higher due tax (as they deal with larger taxpayers or those with tendency to pay more). In this case, concerning equations 5 and 6, we have:

$$\begin{cases} \dfrac{\partial E_1^*}{\partial q_1} = \dfrac{1}{r\theta+1} \quad q < -\dfrac{1}{4}, \\ \dfrac{\partial E_1^*}{\partial q_1} = \dfrac{1}{3} \quad q \in \left[-\dfrac{1}{4}, \dfrac{1}{4}\right] \\ \dfrac{\partial E_1^*}{\partial q_2} = -\dfrac{1}{r\theta+1} \; q < -\dfrac{1}{4}, \\ \dfrac{\partial E_1^*}{\partial q_2} = -\dfrac{1}{3} \; q \in \left[-\dfrac{1}{4}, \dfrac{1}{4}\right] \end{cases}$$

$$\begin{cases} \dfrac{\partial E_2^*}{\partial q_1} = -\dfrac{1}{3} \; q \in \left[-\dfrac{1}{4}, \dfrac{1}{4}\right], \; \dfrac{\partial E_2^*}{\partial q_1} = -1 \; q > \dfrac{1}{4} \\ \dfrac{\partial E_2^*}{\partial q_2} = \dfrac{1}{3} \quad q \in \left[-\dfrac{1}{4}, \dfrac{1}{4}\right], \; \dfrac{\partial E_2^*}{\partial q_1} = 1 \quad q > \dfrac{1}{4} \end{cases}$$

The results clearly show how each group of the taxpayers behave with the assessment groups of their own or others. In other words, the declared tax of taxpayers directly depends on the quality of their assessment groups and has inverse relation with the quality of the other assessment groups.

Theorem 3. *With increase in the number of assessments (r), the declared tax of larger taxpayers will increase and the declared tax of smaller taxpayers will decrease and vice versa.*

Proof. To prove this theorem, it is sufficient to take derivative of equations 5 and 6 with respect to the number of assessments and simplify the results. Therefore, we have:

$$\begin{cases} \dfrac{\partial E_1^*}{\partial r} = \dfrac{\theta(T_1^2 - 2T_1 - T_2^2 + 2T_2 + q)}{(r\theta+1)^2} \quad q < -\dfrac{1}{4}, \\ \dfrac{\partial E_1^*}{\partial r} = \dfrac{\theta(T_1^2 + 2T_1 - T_2^2 - 2T_2)}{3(r\theta+1)^2} \; q \in \left[-\dfrac{1}{4}, \dfrac{1}{4}\right] \\ \dfrac{\partial E_2^*}{\partial r} = -\dfrac{\theta(T_1^2 - 4T_1 - T_2^2 + 4T_2)}{3(r\theta+1)^2} \; q \in \left[-\dfrac{1}{4}, \dfrac{1}{4}\right], \\ \dfrac{\partial E_2^*}{\partial r} = \dfrac{\theta(T_2^2 - T_1^2)}{(r\theta+1)^2} \qquad q > \dfrac{1}{4} \end{cases} \begin{matrix} (a) \\ \\ \\ \\ (b) \end{matrix}$$

As it is clear, concerning Equation 7 and as all values are positive, the whole fraction (given that $T_1 < T_2$) becomes negative. Similarly, in equation B, it is clear that the whole fraction is positive. According to the results of this theorem, the Tax Administration can apply the necessary policies to conduct more assessment for larger taxpayers to reduce the tax costs (through reducing assessment and as a result reducing costs in board assessment stages and etc.) through increasing taxpayers' declared tax (and of course, reducing the difference between declared and due book taxes) and, in the long run, acceptance of the declared tax of taxpayers. It should be noted that these results are consistent with the results of Kiral & Mavruk [22].

Here, it should be pointed out that the results of this theorem are true for the likelihood of taxpayers' dishonesty (θ) in the same way and the result is as follows:

$$\begin{cases} \dfrac{\partial E_1^*}{\partial r} = \dfrac{r(T_1^2 - 2T_1 - T_2^2 + 2T_2 + q)}{(r\theta+1)^2} \quad q < -\dfrac{1}{4}, \\ \dfrac{\partial E_1^*}{\partial r} = \dfrac{r(T_1^2 + 2T_1 - T_2^2 - 2T_2)}{3(r\theta+1)^2} \quad q \in \left[-\dfrac{1}{4}, \dfrac{1}{4}\right] \\ \dfrac{\partial E_2^*}{\partial r} = -\dfrac{r(T_1^2 - 4T_1 - T_2^2 + 4T_2)}{3(r\theta+1)^2} \; q \in \left[-\dfrac{1}{4}, \dfrac{1}{4}\right], \\ \dfrac{\partial E_2^*}{\partial r} = \dfrac{r(T_2^2 - T_1^2)}{(r\theta+1)^2} \qquad q > \dfrac{1}{4} \end{cases}$$

Here, with increase in the likelihood of dishonesty (θ), the declared tax of larger taxpayers will increase and the declared tax of smaller taxpayers will decrease and vice versa. This result can be interpreted as, the higher is the likelihood of the larger taxpayer's dishonesty, (because the larger taxpayer is better known), the more will be the reasons for

assessment and the higher will be the likelihood of detecting corruption.

In follow, the income function (earning) of the Tax Administration will be extracted and the results interpreted.

4.2. Income function (earning) of tax administration

In this part, knowing the equilibrium declared taxes, we seek to find maximum income/revenue of Tax Administration. On the other hand, taxpayers seek to maximize their expected profit. The expected income (earning) of Tax Administration is shown by which is random based on the difference in quality of two assessment groups. In this condition, the expected income function of assessment groups 1 and 2 will be as:

$$EI_1(T_1,T_2) = \\ = \int_{-\frac{1}{2}}^{-\frac{1}{4}} I_1^m(T_1,T_2)dF + \int_{-\frac{1}{4}}^{\frac{1}{4}} I_1^c(T_1,T_2)dF, \quad (7)$$

$$EI_2(T_1,T_2) = \\ = \int_{-\frac{1}{4}}^{\frac{1}{4}} I_2^c(T_1,T_2)dF + \int_{\frac{1}{4}}^{\frac{1}{2}} I_2^m(T_1,T_2)dF. \quad (8)$$

Where

$$F(T) = \frac{2T+1}{2}$$

is cumulative distribution function of parameter q which is evenly distributed in

$$\left[-\frac{1}{2}, \frac{1}{2}\right].$$

It should be noted that depending on the difference in the quality of assessment, both angular and internal solutions may occur. $I_1^m(T_1,T_2)$ show the state, which is only assessed by assessment group 1 and $I_1^c(T_1,T_2)$ shows the expected income of the assessment group 1; while both assessment groups 1 and 2 do assessment. Now, the expected income of two assessment groups can be obtained.

Theorem 4. *The expected income of two assessment groups will be as:*

$$I_1 = -\frac{r\theta+1}{1728(T_1-T_2)} - \\ -\frac{\left(\begin{array}{c} 8T_1^{\,3} + 8T_1^{\,2}(T_2+13) - 8T_1(T_2^{\,2}+14) - \\ -8T_2^{\,3} - 104T_2^{\,2} + 112T_2 - 27 \end{array}\right)}{288(r\theta+1)}, \quad (9)$$

$$I_2 = -\frac{r\theta+1}{1728(T_1-T_2)} - \\ -\frac{\left(\begin{array}{c} 8T_1^{\,3} + 8T_1^{\,2}(T_2-17) + 8T_1(16-T_2^{\,2}) - \\ -8T_2^{\,3} + 136T_2^{\,2} - 128T_2 - 27(r\theta+1) \end{array}\right)}{288(r\theta+1)}. \quad (10)$$

Proof. By inserting the equilibrium declared taxes from equations 5 and 6 in profit function (equation 3) we have:

$$I_1^m(T_1,T_2) = \frac{-q - T_1^{\,2} + 2T_1 + T_2^{\,2} - 2T_2}{(r\theta+1)},$$

$$I_1^c(T_1,T_2) = \\ = \frac{(-q(r\theta+1) - T_1^{\,2} - 2T_1 + T_2(T_2+2))^2}{18(T_2-T_1)(r\theta+1)}.$$

In the same way, the expected income function of assessment group 2 will be as:

$$EI_2(T_1,T_2) = \\ = \int_{-\frac{1}{4}}^{\frac{1}{4}} I_2^c(T_1,T_2)dF + \int_{\frac{1}{4}}^{\frac{1}{2}} I_2^m(T_1,T_2)dF.$$

Where

$$I_2^m(T_1,T_2) = q - \frac{T_2^{\,2} - T_1^{\,2}}{r\theta+1},$$

$$I_2^c(T_1,T_2) = \\ = \frac{(q(r\theta+1) + T_1^{\,2} - 4T_1 - T_2^{\,2} + 4T_2)^2}{18(T_2-T_1)(r\theta+1)}.$$

Therefore, knowing expected income functions of assessment groups 1 and 2 in different intervals and then applying them in equations 7 and 8, the results will be as follow:

$$I_1 = -\frac{r\theta+1}{1728(T_1-T_2)} - \\ -\frac{\left(\begin{array}{c} 8T_1^{\,3} + 8T_1^{\,2}(T_2+13) - 8T_1(T_2^{\,2}+14) - \\ -8T_2^{\,3} - 104T_2^{\,2} + 112T_2 - 27 \end{array}\right)}{288(r\theta+1)},$$

$$I_2 = -\frac{r\theta+1}{1728(T_1-T_2)} - \\ -\frac{\left(\begin{array}{c} 8T_1^{\,3} + 8T_1^{\,2}(T_2-17) + 8T_1(16-T_2^{\,2}) - \\ -8T_2^{\,3} + 136T_2^{\,2} - 128T_2 - 27(r\theta+1) \end{array}\right)}{288(r\theta+1)}.$$

Theorem 5. *The expected income of two investment groups is equal when:*

$$r = -\frac{80(T_1^2 - T_1 - T_2^2 + T_2)}{9\theta}$$

or

$$\theta = -\frac{80(T_1^2 - T_1 - T_2^2 + T_2)}{9r}.$$

Proof. To prove this theorem, just equations 9 and 10 should be put equal and the equation should be obtained in respect to r and θ. In addition, if assuming that $T_2 = \alpha T_1$, where $\alpha > 1$ (since as previously mentioned, the due tax of group 2 is higher than group 1), then, concerning the results, it will be clear that the number of assessments is decreasing in respect to due tax of group 1 and increasing in respect to due tax of group 2.

5. Conclusion

The difference in the declared tax of taxpayers in tax return and the due task determined by tax assessors, is one of the main obstacles in achieving the goals of National Tax Administration, which is tax compliance (at the lowest cost). This underlying challenge leads to increased costs, longer collection process, and certainty of tax files.

Therefore, Tax Administration seeks to achieve a situation in which taxpayers declare and pay their actual tax amount at the stage of declaration (tax return) and in this way prevent the extension of the tax collection process (assessment, objection, reinvestigation and etc.), which is costly for organization in terms of time and money and reduces the value of taxpayers' assets overtime.

This paper has dealt with modeling the game between taxpayers and National Tax Administration. The results showed that the equilibrium declared tax of taxpayers is a function of due tax, the quality of assessment groups, the number of assessments and the parameter of taxpayers' lack of honesty.

The taxpayers' equilibrium declared tax is increasing relative to the quality of their assessment groups and decreasing relative to the other assessment groups. Furthermore, increase in the number of assessments leads to increase in the declared tax of larger taxpayers and decrease in the declared tax of smaller taxpayers and vice versa. On the other hand, the number of assessments is increasing in respect to due tax of group 1 and increasing in respect to group 2.

References

1. Toshmatov S.A., Abdullaev Z.A., Ahrorov Z.O. Influence of Corporate Income Tax to Loan Loss Provision: Evidence from Uzbekistan. *Journal of Tax Reform*. 2022;8(3):236–250. https://doi.org/10.15826/jtr.2022.8.3.119

2. Wang K.Y., Zhang L. Underground economy and GDP growth: Evidence from China's tax reforms. *Journal of Tax Reform*. 2021;7(1):87–107. https://doi.org/10.15826/jtr.2021.7.1.092

3. Gorecki A.M., Letki N. (2021). Social Norms Moderate the Effect of Tax System on Tax Evasion: Evidence from a Large-Scale Survey Experiment. *Journal of Business Ethics*. 2021;172:727–746. https://doi.org/10.1007/s10551-020-04502-8

4. Yeganeh H.Y., Sarveolia, M.H.E., Alasvand F., Delvar A. Importance of Factors Influencing Intention-to-pay Tax from the Perspective of Tax Payers: (Case Study: Taxpayers of Iranian National Tax Admission Organization-Tehran). *Journal of Management Accounting and Auditing Knowledge*. 2019;8(29):203–214. Available at: https://jmaak.srbiau.ac.ir/article_13845.html?lang=en

5. Kakaulina O.M. Projected shortfall in personal income tax revenues of regional governments in Russia due to the COVID-19 pandemic. *Journal of Tax Reform*. 2021;7(1):39–54. https://doi.org/10.15826/jtr.2021.7.1.089

6. Szarowská I. Personal income taxation in a context of a tax structure. *Procedia Economics and Finance*. 2014;12:662–669. https://doi.org/10.1016/S2212-5671(14)00391-8

7. Laura-Liana S., Carmen M.A. The flat Tax Effects – Theoretical and Empirical Evidence in Western and Eastern European countries. *Annals of Faculty of Economics*. 2009;3(1):343–348. Available at: https://ideas.repec.org/a/ora/journl/v3y2009i1p343-348.html

8. Tanchev S. Long-run equilibrium between personal income tax and economic growth in Bulgaria. *Journal of Tax Reform*. 2021;7(1):55–67. https://doi.org/10.15826/jtr.2021.7.1.090

9. Becker G.S. Crime and Punishment: an Economic Approach. In: Fielding N.G., Clarke A., Witt R. (eds). *The Economic Dimensions of Crime*. London: Palgrave Macmillan; 1968. https://doi.org/10.1007/978-1-349-62853-7_2

10. Dyreng S.D., Hanlon M., Maydew E.L. The Effects of executives on corporate tax avoidance. *The Accounting Review*. 2010;85(4):1163–1189. https://doi.org/10.2308/accr.2010.85.4.1163

11. Wenzel M. The Impact of Outcome Orientation and Justice Concerns on Tax Compliance. *Journal of Applied Psychology*. 2002;87(4):629–645. https://doi.org/10.1037/0021-9010.87.4.629

12. Freedman J. Defining Taxpayer Responsibility: In Support of a General Anti-Avoidance Principle. *British Tax Review*. 2004:4:332–357. Available at: https://ssrn.com/abstract=900043

13. Dyreng S.D., Hanlon M., Maydew E.L. Long-Run Corporate Tax Avoidance. *The Accounting Review*. 2008;83(1):61–82. https://doi.org/10.2308/accr.2008.83.1.61

14. Wilson R.J. An Examination of Corporate Tax Shelter Participants. *The Accounting Review*. 2009;84(3):969–999. https://doi.org/10.2308/accr.2009.84.3.969

15. Lisowsky P. Seeking Shelter: Empirically Modeling Tax Shelters Using Financial Statement Information. *The Accounting Review*. 2010;85(5):1693–1720. https://doi.org/10.2308/accr.2010.85.5.1693

16. Vaez S.A., Daresh F., Basirat M., Kaeb Amir A. Evaluating Tax Persistence and Future Tax Risk of Firms by Emphasizing on Ownership Type. *Journal of Tax Research*. 2019;26(40):187–206. Available at: http://taxjournal.ir/article-1-1596-en.html

17. Alm J., McKee M. Tax compliance as a coordination game. *Journal of Economic Behavior & Organization*. 2004;54(3):297–312. https://doi.org/10.1016/j.jebo.2003.02.003

18. Kumacheva S.S. A Game Theoretical Model of Interaction Between Taxpayers and the Tax Authority. *Contributions to Game Theory and Management*. 2010;3:257–266. Available at: https://www.mathnet.ru/links/ffaa0acdc6d8880e0a60e118b0c20d5e/cgtm89.pdf

19. Wrede M., Abraham M., Lorek K., Richter F. *Collusive Tax Evasion and Social Norms*. CESifo Working Paper, No. 5167, 2015. Available at: http://hdl.handle.net/10419/112859

20. Cerqueti R., Copier R. Corruption, Evasion and Environmental Policy: A Game Theory Approach. *IMA Journal of Management Mathematics*. 2016;27(2):235–253. https://doi.org/10.1093/imaman/dpu019

21. Sokolovskyi D. *Game-theoretic model of tax evasion: analysis of agents' interaction and optimization of tax burden*. MPRA Paper, 2018. Available at: https://mpra.ub.uni-muenchen.de/id/eprint/86415

22. Kiral E., Mavruk C. Corporate Tax Payoff in A Game Theory Approach. *Ege Academic Review*. 2018;18(2):195–215. https://doi.org/10.21121/eab.2018237350

23. Gubar E., Carrera E.J., Kumacheva S., Zhitkova E., Tomilina G. Games and network structures on corruption, income inequality, and tax control. *Contributions to Game Theory and Management*. 2020;13:152–172. https://doi.org/10.21638/11701/spbu31.2020.09

24. Chica M., Hernandez J., Manrique-de-Lara-Penate C., Chiong R. An Evolutionary Game Model for Understanding Fraud in Consumption Taxes. *IEEE Computational Intelligence Magazine*. 2021;16(2):62–76. https://doi.org/10.1109/MCI.2021.3061878

25. Owen G. Game Theory. In: Chadwick R. (ed.) *Encyclopedia of Applied Ethics (Second Edition)*. Elsevier; 2012, pp. 391–398. https://doi.org/10.1016/B978-0-12-373932-2.00178-2

26. Shahbazi K., Salimian S. The Expansion of Location Theories of Firms and Products' Consistency Using Triangular Distribution Approach. *Iranian Economic Review*. 2017;21(3):497–518. https://doi.org/10.22059/ier.2017.62937

27. Varoufakis Y. Can it Unify the Social Sciences? *Organization Studies*. 2008;29(8-9):1255–1277. https://doi.org/10.1177/0170840608094779

28. Shy O. *Industrial organization: theory and applications*. Cambridge: MIT Press; 1995. Available at: https://mitpress.mit.edu/9780262691796/industrial-organization/

29. Gibbons R. An Introduction to Applicable Game Theory. *Journal of Economic Perspective*. 1997;11(1):127-149. https://doi.org/10.1257/jep.11.1.127

30. Maskin E. *Recent Developments in Game Theory*. Edward Elgar Pub.; 1999. 490 p.

31. Khalilzade S.Z., Salimian S., Shahriyari I., Pishani Y.H., Salimian S. Economic analysis of tax installment forgiveness using game theory approach: The case of Iran. *Journal of Sustainable Business, Economics and Finance*. 2022;1(3):1–15. https://doi.org/10.31039/josbef.2022.1.3.24

32. Osborne M.J., Rubinstein A. *A course in game theory*. MIT press; 1994. Available at: https://arielrubinstein.tau.ac.il/books/GT.pdf

33. Mas-Colell A., Whinston M.D., Green J.R. *Microeconomic Theory*. London: New York: Oxford University Press; 1995. 977 p. Available at: http://englishonlineclub.com/pdf/Microeconomic%20Theory%20[EnglishOnlineClub.com].pdf

34. Christou Ch., Vettas N. Location choices under quality uncertainty. *Mathematical Social Sciences*. 2005;50(3):268–278. https://doi.org/10.1016/j.mathsocsci.2005.05.002

35. Salimian S., Shahbazi K., Khodadad Kashi F. (2017). Localization of firms in conditions of triangular distribution of consumers and uncertain quality of firms. *Iranian Industrial Economic Studies*. 2017;1(1):13–20. https://doi.org/10.30466/iies.2018.20529

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Does Religiosity Moderate Personal Tax Compliance? A Study Involving In-House Tax Professionals of Malaysian Businesses

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ABSTRACT
This study limns the moderating impact of religiosity made on the in-house tax professionals who deal with tax affairs in the corporate sectors in Malaysia. Therefore, we intend to produce a seminal article, wherein religiosity is tested for its moderating effect between the determinants such as peers' tax compliance, tax audit, service quality of tax authority, satisfaction with government spending, and the level of tax compliance among the tax affairs officers. Purposive and snowball sampling techniques have been chosen to collect data from the tax professionals of the Malaysian businesses. A total of 392 respondents have managed to participate in this survey questionnaire to disclose their opinion. "SmartPLS' is used to analyse the data. The finding reveals that religiosity does not moderate the relationship between the determinants and the level of tax compliance among the Malaysian tax professionals. The interpretation of the relationship between the "Factors of Personal tax compliance' (Independent variables) among the tax affairs officers of the Malaysian businesses and the "Personal tax compliance behaviour' (Dependent variable) can be explained by 83.9 percent by the variance studied. To produce an extensive and expeditious report of exploration on the said nexus of personal tax compliance and the taxpayers' decision on the corporate tax compliance, the selection of one type of data collection approach is not sufficient. Therefore, the future researchers are advised to make research with the collection of supplementary data, such as interviews, as their primary data collection so that the robustness of their findings could be strengthened.

KEYWORDS
religiosity, personal tax compliance, structural equation modelling, tax professionals

JEL H24, H25, H26

УДК 336.228

Влияет ли религиозность на персонифицированное соблюдение налогового законодательства? Исследование с участием штатных налоговых специалистов малайзийских предприятий

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АННОТАЦИЯ
В данном исследовании показано сдерживающее влияние религиозности на деятельность профессиональных налоговых специалистов, которые занимаются налоговыми делами в корпоративном секторе Малайзии. Религиозность про-

верялась в разрезе ее сдерживающего эффекта по таким детерминантам как соблюдение налоговых требований коллегами, налоговый аудит, качество услуг налоговых органов, удовлетворенность государственными расходами и уровень соблюдения налоговых требований среди налоговых инспекторов. Сбор данных от налоговых специалистов малайзийских предприятий производился посредством целенаправленной выборки и методом «снежного кома». В общей сложности 392 респондента смогли принять участие в этом опросе-анкете, чтобы выразить свое мнение. Анализ данных производился методом «SmartPLS». Результаты исследования показывают, что религиозность не смягчает взаимосвязь между детерминантами и уровнем соблюдения налоговых требований малазийскими налоговыми специалистами. Интерпретация взаимосвязи между «Факторами соблюдения налоговых требований физическими лицами» (независимые переменные) среди налоговых инспекторов малайзийских предприятий и «Поведением соблюдения налоговых требований физическими лицами» (зависимая переменная) может быть объяснено на 83,9% изученной дисперсией. Для подготовки обширного и оперативного отчета об изучении указанной взаимосвязи соблюдения налоговых требований физических лиц и решения налогоплательщиков о соблюдении налоговых требований корпораций выбора одного типа подхода к сбору данных недостаточно. Поэтому будущим исследователям рекомендуется проводить исследования со сбором дополнительных данных, таких как интервью, в качестве сбора первичных данных, чтобы можно было повысить надежность их выводов.

КЛЮЧЕВЫЕ СЛОВА
религиозность, соблюдение налогового законодательства, моделирование структурными уравнениями, налоговые специалисты

1. Introduction

Taxation is a mechanism established as a mandatory law by the constitution of a country [1]. Malaysia's financial sustainability is primarily derived from the collection of direct tax revenue from the corporate taxes, individual taxes, real estate taxes, petroleum taxes, and stamp duties, all of which account for nearly 65 percent of the national cumulative economy as stated in the annual Budget 2020 [2]. The Malaysian government plays a vital role in raising money from the above-mentioned sources to provide socio-economic benefits to the nation by means of the statutory income tax act (Tax Act No. 47 of 1967, and amended Act No. 53 of 1971, section 103) of its constitution [3].

Failure to comply with any of the taxes causes societal devastation, jeopardising and weakening the stability of Malaysia's national revenue and its economy by encouraging cheating and fraud to take place in the country [4; 5]. This study is concerned with the system of taxation practiced in Malaysia.

The International Monetary Fund [6] alerts that severe tax gaps may lead to the prevalence of a shadow economy in the country. According to the Malaysian Inland Revenue Board, a tax gap of RM13 billion has been noted in 2018 [7]. The non-compliance behaviour of taxpayers is one of the primary reasons for the tax gap. Even though the corporate income tax remains the most significant source of contribution of income to the Government of Malaysia, of all the other sources of income, the tax planning of a corporate business is done by an individual on behalf of the business or a firm [8]. It is noted that when an individual has a proclivity not to comply with the said tax system, a corporate business also follows suit [9; 10].

The basis of the tax gap, resident non-compliance, resists the government's commitments to the people such as completing developments, providing services, etc. to the people of the country, thereby forcing the government to borrow more and more money from other sources [11]. As a result, a need to study the link between the personal tax compliance and the corporate tax compliance has arisen [12].

When looking at the literature that is related to tax compliance, it is clearly

highlighted that the studies have mostly looked at the economic factors that impact on the tax compliance behaviour of taxpayers. Religiosity is one of the non-economic factors, which is always neglected by researchers when closely analysing the personal tax compliance behaviour. Religiosity means the degree of strongest believe and practice in their respective religions. Generally, religious beliefs strongly moderate the relationship between the factors that motivate tax compliance and the level of tax compliance, especially in the western part of the world, the Occident. Being the very earliest case, it is recorded in the United States in 1965 that the United States Congress allowed an Amish[1] to be exempt from taxes after hearing his case and claim that the income collected from taxes is used for activities that are disastrous and are against the wellbeing of humanity, violating their religious beliefs[2].

However, the assumption that religiosity moderates the Malaysian personal tax compliance behaviour is still unknown. The moderation effect of religiosity is hardly learned in Malaysia, where a significant level of non-compliance is prevailing. Malaysia is an important nation to consider religiosity as a variable since the religious tolerance in the country is practiced well and significantly across the nation[3].

Other studies considered religiosity mainly as another independent variable. The review of literature on tax compliance emphasises that peer influence, role of tax authority, satisfaction with government spending, and the probability of audit by the tax authority are the strongest determinants that impact on the personal income tax compliance [13].

[1] A group of Christian Anabaptist church followship.

[2] Cornel Law School. 26 U.S. Code § 3127 - Exemption for employers and their employees where both are members of religious faiths opposed to participation in Social Security Act programs. Legal Information Institute; 1992. Available at: https://www.law.cornell.edu/uscode/text/26/3127

[3] BBC News. Malaysia's harmonious approach to life. BBC News; 2021. Available at: https://www.bbc.com/travel/article/20210308-malaysias-harmonious-approach-to-life

However, the studies related to tax compliance still lack conclusive evidence, the cause of which might be due to the influence exerted by the taxpayer's individual factors, like their religious beliefs that twists their decision-making towards taxation. This study completes the need for the study and finds the overall impact that the above-mentioned variables bring forth on the tax compliance behaviour.

Purpose of the study (1) is to examine the impacts of the "factors of tax compliance" on the "level of personal tax compliance" among officers of tax affairs; (2) investigate the moderating impact of "religiosity" on the "factors of tax compliance" and the "level of personal tax compliance" among officers of tax affairs.

Research hypotheses:

H1: There is a positive association between the factors of personal tax compliance and the level of personal tax compliance.

H2: Religiosity moderates the relationship between the factors and the personal tax compliance.

2. Literature Review

2.1. Theories

Kelman proposed that an individuals' attitude, action, beliefs, and subsequent behavioural reactions are influenced by the referral of other people associated with the individual at three stages: "Compliance", "Identification", and "Internalization" [14]. Compliance occurs when an individual starts to accept external influences and accommodates to those influences. The external social factors such as the government, peer groups, or relevant authorities heavily determine an individual's decision-making [15]. Kelman explained that the different environments where the individual operates, in the long run, lead to enforce tax compliance, voluntary tax cooperation, and committed to tax cooperation [16].

The theory of Planned Behaviour is a cognitive theory developed by Azjen [17], which explains that an individual's action towards a specific behaviour, such as engaging in compliance, is determined by

the intention of the individual. The compliance behaviour of an individual is determined by the factors that motivate the individual to behave in a manner to be accommodative to the determining factors. The said theory is much fitting for the tax compliance behaviour of an individual since the individual's intention of complying with the tax system is determined by the said factors and is moderated by the individual's personal religious beliefs (Figure 1).

2.2. Factors impact upon personal tax compliance

2.2.1. Peer Tax Compliance

In taxation, the term "Peers" refers to the people who are in association with an individual taxpayer, especially those who are the taxpayer's relatives, friends, co-workers, and colleagues [18]. The study claims that if an individual comes to know that the behaviour of tax compliance is widespread among the individual's peer group, accepted and practiced by the peer group wholeheartedly, then the individual tends to be fully compliant with the tax system.

The individual taxpayer's behaviour is impacted by the behaviour of the individual's neighbours, or by the behaviour of those with whom the individual frequently interacts [19; 20]. This study has employed an experimental method to test the role of the peers on the tax compliance behaviour, and it has been found that there is a positive relationship between the neighbours' tax compliance behaviour and the individual's tax compliance behaviour. However, the study further concludes that this information, regarding the neighbours' compliance behaviour, does not always improve an individual's tax compliance behaviour. In addition, it is also expressed that the tax compliance behaviour is so wide that it cannot be narrowed down and condensed into a piece of mere information about neighbours' behaviour [19].

Another study conducted by utilising a laboratory experimental setting, named "Quasi-Experimental Design", claims that the peer reporting behaviour may promote decisions to comply with the tax system [21].

A study made by Ho [22] has found that the taxpayers in China adopt a relationship-based reasoning to make judgements on tax compliance issues. The study further highlights that people are always ready to react to the social norms and behaviour of their neighbours and their peers.

The study made by Alshira'h [23] claims that the Peers' influence does not make any significant effect on tax compliance behaviour among the Jordanian taxpayers. Further, the outcome of their claims has been justified as such that the influence exercised by an individual's peers does not always promote tax compliance behaviour in individuals.

As far as an individual's decision-making on tax compliance is concerned, the influence exerted on the individual by the individual's peers who are near the individual in a community is more effective than the influence exerted by the individual's peers who live remotely in the community [24]. Referring to the decision-making of an individual on tax com-

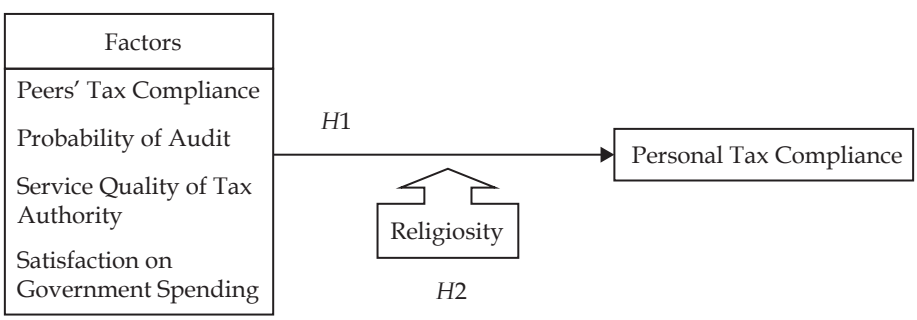

Figure 1. **Conceptual Framework**

pliance [23], it has been discovered that the influence exerted by the individual's peers may be the determinant of tax compliance in different regions, except Jordan where the culture of Jordanians is highly individualism-oriented, being resistant to social interaction among the people of the country and indicating the reason for the insignificance of their relationship.

Interestingly, another study made by Obaid [25] from the same study setting, made in the Middle East, has found that the influence of peers strongly determines the tax compliance behaviour of an individual in Yemeni. This finding highlights the relationship between social grouping and an individual in the decision-making. A similar outcome has been briefed up by a study made in Indonesia that explains that the referral group has the most significant influence on the tax non-compliance behaviour among the Small and Medium Enterprises [20].

The purpose of this paper is to investigate the factors that impact on the tax compliance behaviour of Small and Medium Enterprises. A mixed conclusion made by researchers has failed to provide a clear understanding of the relationship between the "Peer tax compliance behaviour" and the "Individual tax compliance behaviour". Also, the studies that focus on the tax compliance behaviour of individuals, impacted by the referral of the individual's peers in the developing countries, are lacking.

Lutfi [26] suggest that "Peer tax Compliance" is abstract, not an easily observable variable, as it is involved with social pressure; an anonymous way of data collection, in this regard, should be employed to get the true and honest reflection of the perception from the individual concerned.

2.2.2. Probability of Tax Audit

According to Allinghan & Sandmo [27], taxpayers comply more with the tax system if they feel that the probability of their being caught or detected is high. According to the Malaysian "Self-Assessment System" (SAS), a tax audit is set as a critical task for the tax authority [6; 28].

Some studies have found that there is a positive relationship between tax audits and tax compliance [29; 30]. Supplemental analysis carried out by Ayers [29] shares the fact that the probability of audit alters the expectation and intention of the managers on future tax submissions. Previous studies have mixed results on the association between the "Probability of Audit" and the "Tax Compliance level".

For example, the study made by DeBacker [31], using the US Revenue authority's data and the financial statement data, explains that legal enforcement, like the audit, may cause the increase of subsequent misbehaviours in the businesses.

A recent study made by D'Agosto [32] has found that a positive relationship exists between tax audit and the tax compliance behaviour, in terms of deterrence theory. The study has collected data from the tax return registry and from the audit database of the Italian Revenue Agency for a period of five years, commencing from 2004 to 2009, and focused on the self-employed and the sole proprietors of businesses. The study further found that the rate of Italian tax compliance had been increased relatively by three types of audits. They are as follows: "On-Site Audit" (soft audit), "Desk Audit" (deep audit), and the "Mixed-Audit" (mixture of "On-Site" and "Desk-Audit"). However, this study suggests that those data had been collected for study a decade earlier; at present, a need has arisen for the data to be studied again within the current time frame, with a wider geographical setting, or in a different region.

2.2.3. Service Quality of Tax Authority

The study made by Supriyono [33] collected data from various business entrepreneurs and learned that the individuals in businesses in Indonesia are motivated to report their income to the tax authority, being influenced by the authority with its service quality.

If the tax policies adopted by the government seem to be unfair to the people, they will form a negative perception of the tax system and the role played by the tax authority in collecting tax for the country; the reason for the formation of such a per-

ception among the people of the country is that the "Tax Socialization" theory (arousal of awareness on tax compliance) is not applied to the people [34].

The lessening of the complexities in the tax system and maintaining leniency in the administration of tax collection by the tax authority could make the taxpayers become more tax compliant [35].

Nevertheless, the adoption of mixed tax system of "Self-Assessment System" (e-filing) and the "Official Assessment System" (manual submission) around the world has given no standard finding to discover the relationship between the service quality of tax authority and the taxpayer's compliance behaviour [36].

Further, the tax compliance performed by small and medium-sized businesses and their perception towards the tax authority are remaining unclear to be understood. Also, Supriyono [33] suggest testing this variable on a large-scale respondent's rate, for example, by conducting survey and direct interviews since this outcome has been solely made out from a qualitative approach. In view of the above fact, this study further explores the service quality of the Malaysian tax authority that adopts the "Self-Assessment System" in taxation.

Kasipillai [37] have found that better interactions between the Inland Revenue Board of Malaysia (IRBM) and the taxpayers boost better tax compliance. It is also suggested that the Malaysian tax compliance level may increase if the tax collection authority upgrades the relevant technology for the sake of the taxpayers [38].

Experiments reveal that the people who are treated well with good acknowledgment by the authorities tend to comply more with the tax system [39; 40].

The OECD [41] explains that among the three types of fairness in taxation, two of them, the "Procedural fairness" (the perception that the tax authority is just and fair in dealing with clients) and the "Retributive fairness" (the perception that the tax authority is fair in applying penalties), relate to how the tax authority deals with taxpayers.

Murphy [42] has emphasized that among the taxpayers, the level of tax non-compliance could rise if the taxpayers lose their trust, by chance, in the administration of the authority.

Reeson [43] and Alm [35] stated that the taxpayers' perception of fairness in taxation is felt to be good and positive to the taxpayers, and that their unwavering trust in the tax authority is considered to be the important element and tool for lessening the level of tax noncompliance.

The NEF [44] further supported this fact by explaining that the likelihood for the taxpayers to comply with the tax system would be high if the taxpayers are treated respectfully by the authority.

If this study finds a significant connection between the tax authority and the tax compliance behaviour among the individuals, then a modern risk treatment model, called "Right from the Start", which is adopted by the Swedish Tax Agency, could be recommended to the Inland Revenue Board of Malaysia for adoption as well. The "Right from the Start" model investigates the issues in taxation that cause tax noncompliance, it analyses the root cause of the issues, and nips the issues in the bud before they become problematic to the tax authority. To prevent further errors from emerging in tax compliance, and to promote tax compliance among taxpayers, the "Right from The Start", a rectifying method, has been introduced by the Swedish Tax Agency [45], based on the principle that the tax authority has a role to play in creating a favourable environment for the advancement of tax compliance among taxpayers.

The tax authorities in most countries across the globe, including the Inland Revenue Board of Malaysia (IRBM), focus on their scheduled work only at the time when problems in taxation have occurred. For example, the tax authority of Malaysia begins to find ways and means to narrow down the tax gap only after recognizing a gap of a few billion Ringgit taxes. If the "Right from the Start" model is adopted at the right time, no other post measures are needed to rectify the aftereffects of the issues and to recover the losses incurred.

2.2.4. Satisfaction on government spending

The research focusing on the relationship between the government's expenditure and the tax compliance behaviour of the people in the developing countries are very scarce.

Due to the unavailability of empirical evidence to explain the relationship between the government's expenditure and tax compliance, it is assumed that the taxpayers are concerned about their contribution of income to the government, prying to know whether the expenditure made by the government is just and reasonable as per the duties and obligations of the Government to its residents as mentioned in its constitution [36].

Doerrenberg [46] explains that the collection of taxes goes to the federal treasury and that the people, especially those who pay additional taxes to the government, watch the government diligently to ascertain that their contribution of income is handled properly, reasonably, and justly by the government as per the needs and wants of the people and other requirements of the government [47].

Similar findings have been studied by Alasfour [48], where it is stated that non-compliance with tax system in Jordan is morally acceptable since the people of Jordan have formed a negative impression of the government due to its engagement in corruption and in the misuse of the taxpayers' money, in guise of expenditure.

The purpose of the study, using a questionnaire survey with a multivariate test procedure, is to investigate how the individuals in Jordan determine the level of their tax morale and their tax compliance. The findings further reveal that the worthwhile and reasonable expenditure made by the Government paves the way for smooth and unresisting tax compliance, devoid of any adverse impacts made on it. It is also assumed that if the taxpayers predict that the expenditures made by the government are not so fruitful and worthwhile as they expected, they have the tendency to avoid paying tax to the tax authority [39].

In the developed countries of the Occident, a tax-paying method, called "Pay as You Earn', is adopted by the employers of organizations, institutions, and businesses of the countries. Through PAYE method, the taxes due to be paid to the government by the employed individuals are deducted from their salaries by their employers, and the collected taxes are sent to the tax authority, reducing the impact on the individuals, relieving them of their burden of paying their tax to the authority themselves and making them give up their idea of evading tax. Because of the adoption of the "PAYE" ("Pay, as You Earn") system in the business entities, the taxpayers who are employed in the business entities are deprived of opportunities to form their own concepts in their minds about the government spending and to take their own decision on tax compliance [49]. Very narrowed studies have focused their attention on the people's perception of the government spending.

2.2.5. Religiosity

Religiosity is defined by Johnson [50] as the "Extent of the religion of an individual, to which the individual remains committed, upholding and professing the teaching of the particular religion of the individual"; the individual's commitment reflects inexplicably on the individual's behavioural aspects, such as attitude, personality, etc.

Religiosity is also referred to as the religious commitment of a person, which is further defined as "The degree of a person's religious beliefs and religious practices, to which the person adheres deeply and uses them in daily life" [51]. The commitment of religiosity is divided into two categories: (1) "Intrapersonal religious commitment" that originates from the beliefs and attitudes of an individual. (2) "Interpersonal religious commitment" that derives from the involvement of an individual in religious activities with a religious community, or an organization.

Earlier studies had been carried out in the developed countries, such as Austria [52], Australia [53], Canada [54], the Netherlands [55], and some European countries [56], where the people with

strong and extreme religious beliefs seem highly tax compliant.

The study by Sawyer [57], and Raihana [58] reveal that religiosity is considered one of the concepts of tax morale, and one of the strongest determinants of tax compliance. The religious values, held by most individuals, are generally expected to effectively prevent the individuals from having negative attitudes, and thereby encourage the individuals to keep positive attitudes in their daily life. Hence religiosity is presumed to be positively motivating taxpayers to voluntarily comply with tax systems. It has been observed that religiosity might provide a possible explanation for the strong positive compliance attitudes found in most taxpayers as apparent in the prior literature.

However, it has been taken into account that to gain knowledge of tax compliance, the researches made on religiosity are lacking so much that the future researchers are suggested to explore the concept that religious norms can also be the possible factors to raise tax morale among the taxpayers and for the better understanding of the concept, in addition to the current tax compliance theory [59].

Based on a recent study by Raihana [60], religiosity appears to moderate the effect that is between the determinants of individual tax compliance and the voluntary tax compliance level.

It is believed that religion paves the way for the economic development of a country in varying degrees. The measurements of religiosity are the amount of attendance of individuals at religious functions and at religious services, the degree of religious beliefs held by the individuals, and the decline of the above attendance and services when the per capita Gross Domestic Product (GDP) increases [61].

Further, religion also serves to instil certain qualities such as sense of responsibilities, work ethics, honesty, dependability, obedience, etc. into the behaviour of individuals, conducive to the economic prosperity of the individuals' country; all the above facts indicate that the economic growth of a country corresponds positively to such qualities of religion.

A study of a laboratory experiment made by Puspitasari [21] suggests the inclusion of religiosity in the future studies, making it compulsory for all the students since a clear conclusion of the study has not yet been made so far.

2.3. Hypothesis Development

According to Alm [19], the tax compliance behaviour of an individual is strongly affected by the tax compliance behaviour of the individual's neighbours or the people with whom the individual frequently interacts. There are situations, wherein individuals become more likely to disclose and report their income to the IRBM when they come to know or believe that the other people who are around them and are in association with them also do the same action. This scenario may occur vice versa: when the neighbours of an individual dodge taxes, there will be a higher degree of possibility for the individual to do the same, that is, to dodge taxes. According to an experiment conducted in a study, a "Two-Treatment Setting" had been set up for the participation for two groups of respondents. In one treatment setting, one of the two groups of participants was informed that their neighbours had complied with the tax system; in the other setting, the other group of respondents was informed that their neighbours had been audited and that they had paid their taxes with penalties. In conclusion, the above experiment reveals that the behaviour of an individual is subjected to change significantly, highly, and differently by the behaviour of other people, especially in tax compliance.

Obaid [25] discuss that there are individuals who do not associate with other people to be influenced by them on tax compliance, and for such people, the theory of "Peer Influence" cannot be a factor to determine their tax compliance behaviour.

According to Ayers [29], in business entities, the managers' decision to comply with tax system is determined by the probability of audit. The study by DeBacker [31] placed a different opinion, claiming that legal enforcement increases tax aggressiveness among the corporate

taxpayers, leading them to reduce tax payment after an audit and then to increase it sharply afterwards. Businessmen comply with tax system more when they have the probability of their businesses being audited by the tax authority; soon after the audit, they become noncompliant with the tax system. Such a pattern of behaviour that prevails among the businessmen is called "U-Shaped Impact".

In the meantime, D'Agosto [32] state that there is a positive and significant relationship between tax audit and tax compliance. In Italy, different types of audits are carried out by the tax authority as per the type of cases of non-compliance they handle, improving the level of tax compliance significantly in the country. However, the adoption of "On-Site" and "Desk-Audit" has been found to be forceful and effective in tax compliance.

Tax socialization is the service quality of the tax authority, with which the tax authority exerts influence on the taxpayers to achieve tax compliance [33]. The service quality of the tax authority is to be upheld by the tax authority to help the taxpayers achieve tax compliance as the taxpayers frequently face difficulties in calculating the amount of tax to be paid to the authority when reporting income to the authority. The tax authority is obliged to improve its service quality in terms of knowledge, skills, and other factors and facilities needed by the taxpayers to fulfil the process of their tax compliance, especially at times when they have difficulties in calculating the amount to be paid to the tax authority, reporting their income. The Indonesian taxpayers reveal that they fail to comply with the tax system since they cannot acquire the required information of the rules and regulations that they are looking for from the tax authority as they cannot understand what the tax authority wants and expects from them to do in respect of the tax system.

A similar argument has been presented by Alm [19] that the "Service paradigm for tax administration", where the tax officers act as facilitators and share their services with taxpayers, could increase the level of tax compliance among the taxpayers.

The collected tax is directed to the treasury of the federal government, and the flow of cash is expected to be transparent to the public [46]. Further, being taxpayers, the citizens of the country take note of the money that is handled and spent by the government.

If the taxpayers perceive that the expenditures made by the government are not worthwhile and fruitful, contrary to their wish and expectation, their negative perception makes an impact adversely on their tax compliance behaviour, altering it in some manner [39].

With a similar argument, Mohani [47] rationalizes that the people who pay an additional tax to the government monitor the government diligently when it handles the taxpayers' money.

An empirical study by Alasfour [48] reveals that the people of Jordan have the tendency not to comply with the tax system in the country due to the negative perception that they have formed in their minds about the government, which has been hit heavily by corruption.

Having estimated the corruption perception index, the Transparency International[4] has highlighted that Jordan is remaining 59th corrupt country out of the 180 countries.

Meanwhile, the Transparency International[5] has ranked Malaysia as the 57th corrupt country out of the 180 countries, letting the variable "Satisfaction with the government spending" to be an important determinant for the personal tax compliance.

Therefore, *H1*: There is a positive association between the factors of personal tax compliance and the level of personal tax compliance. (IV: Factors of personal tax compliance, DV: Level of Personal Tax Compliance).

According to Johnson [50], religiosity is the commitment of an individual

[4] Transparency International. 2017 Corruption Perceptions Index – Explore the results. Transparency.Org; 2017. Available at: https://www.transparency.org/en/cpi/2017

[5] Transparency International. Malaysia. Transparency.Org;2021. Available at: https://www.transparency.org/en/countries/malaysia

towards the individual's religion, and according to Worthington [51], religiosity is the degree of the values of the religion, to which an individual adheres.

In some countries, strong and extreme religious beliefs encourage tax compliance [56; 62]. It means to say that the individuals who practice religion feel guilty highly when they avoid taxes. Further, it highlights that the practicing of religion wards off evil thoughts formed in the minds of the individuals, negates them even if they are formed, and inculcates a sense of religious belief and obligation in the minds of the individual taxpayers.

According to Raihana [60], religiosity moderates the effects between determinants and tax compliance. It is believed that at times, when the taxpayers become reluctant or hesitant to comply with the tax system, their conscience is alerted by their religious beliefs to act truthfully, and sincerely as a result the taxpayers are exhorted and influenced by their religious beliefs to act conscientiously with a sense of ethics in the fulfilment of their obligation to the government.

Therefore, *H2*: Religiosity moderates the relationship between the factors and the personal tax compliance. (IV: Factors of personal tax compliance, DV: Personal Tax Compliance).

3. Methodology

This study has been intended to be conducted in Malaysia because of the rising tax gap in the tax system of the country. The tax gap is caused by the noncompliance behaviour of the taxpayers. About the amount of income contributed to the government, the income derived from the corporate tax is more in amount than the amount derived from the personal tax.

However, the decision on corporate tax compliance of a particular business is made by a tax professional of the business. Therefore, when investigating tax professionals' personal tax compliance behaviour, it is assumed that their personal tax compliance behaviour impacts on their corporate tax compliance behaviour. There is no precise statistical report to disclose specifically the population of tax professionals in Malaysia.

The Government and the Non-Governmental organizations' websites such as Companylist.org, SMEMalaysia.org, Small and Medium Enterprise Association (SAMENTA), Investpenang.gov.my, Saveoursmes.org, and businesslist.my have been used to retrieve email addresses of the particular companies. They are of immense help to the researcher for the distribution of questionnaire, via email, to the individuals concerned for tax affairs in the Malaysian business entities.

This study chooses the purposive and snowball sampling techniques; it is the appropriate sampling method to get the "Feel" of the phenomenon, or the variable interest of the said responding individuals [65]. Sample size is 400 [65].

The "Smart PLS" is used to analyse the data and to test all the hypotheses (Figure 2).

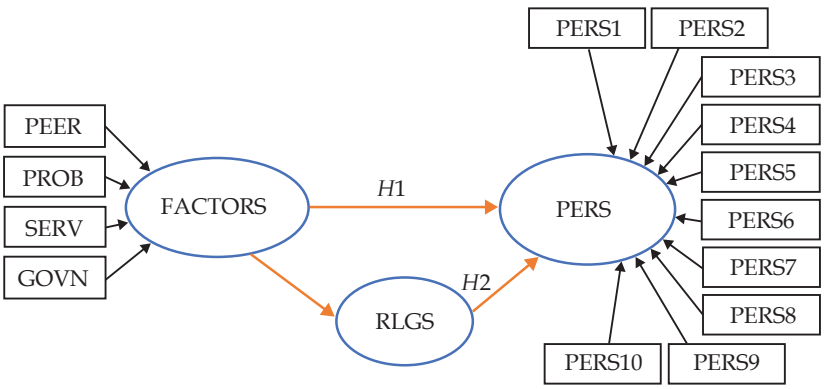

Figure 2. **Research Model**

Tax compliance is a behaviour of the taxpayers, and it changes depending on the perception of the tax system in the taxpayers' minds. Tax compliance is measured by two dimensions, namely "Voluntary compliance", and "Enforced compliance". Likewise, Non-compliance has two measurements, "Tax avoidance", and "Tax evasion" [64], all of which have been modified to suit the context of the study.

The items under each dimension are anchored on a seven-point Likert scale, ranging from completely disagree=1 to completely agree=7. The list of indicators is presented in Table 1.

Table 1

List of research indicators

Code	Indicator	Code	Indicator
PTAX1	I would feel guilty if I under-report my actual income in my annual tax return.	PEER1	Most taxpayers expect me to report all my income on the annual tax return.
PTAX2	To feel guilty for under-reporting income tax is good.	PEER2	Generally, I would do what most taxpayers expect me to do.
PTAX3	Under-reporting my income tax makes me better off.	PEER3	Most people who are important to me (e.g. family, friends, and business partners) expect me to report all my income on the annual tax return.
PTAX4	There are a number of government services, infrastructures and facilities for which I am thankful.	PEER4	Generally, I would do what people who are important to me would expect me to do.
PTAX5	Under-reporting income is acceptable if any portion of the money collected is wasted by government.	PEER5	Most taxpayers under-report their actual income on their annual tax returns.
PTAX6	Paying as little tax as possible is important.	PEER6	Generally, I would do what most other taxpayers do.
PTAX7	Government has spent the money collected from tax efficiently.	PEER7	The people who are important to me (e.g. family, friends, and business partners) under-report their actual income on their annual tax return.
PTAX8	Under-reporting my income will not hurt the society as a whole.	PEER8	Generally, I would do what people who are important to me do.
PTAX9	I feel that I have made a positive contribution to my country by fully reporting all of my income.	SATS1	I believe the government utilizes a realistic amount of tax revenue to achieve social goals.
PTAX10	Scenario question.	SATS2	I think the government spends too much tax revenue on unnecessary welfare assistance.
SERV1	The revenue authority has extensive means to force corporations to be honest about income tax.	SATS3	We receive fair value of services from the government in return for our corporate tax paid.
SERV2	Income tax compliance is much higher when the tax authority has the capacity to match tax returns and third-party reports in a systematic way.	SATS4	We pay high corporate taxes when compared to the services we get from the government.
SERV3	If we evaded taxes and got caught, the penalties would be very high for my company.	PROB1	If there was a discrepancy in the annual tax return, how likely is that it would be audited?

End of Table 1

Code	Indicator	Code	Indicator
SERV4	Inland revenue board treats me fairly in my dealings with them.	PROB2	If my company were to be chosen for a compulsory audit, how likely would a discrepancy be identified?
SERV5	Inland revenue board treats us respectfully in our dealings with them.	PROB3	The penalties are severe if my discrepancy were discovered in audit.
SERV6	We trust IRMB and government when dealing with them on corporate tax matters.	PROB4	The chances of being audited are so low that it is worthwhile trying to economize a little on corporate income taxes for various reasons.
RLG	Apart from special occasions such as wedding and etc, about how often do you attend religious services?		

The actual population of this study is the tax professionals of the Malaysian businesses. A tax affairs officer in Malaysia may be the owner of a business entity, or an appointed qualified officer, depending on the size and the nature of the businesses.

A total of 392 respondents have managed to participate in this survey questionnaire to disclose their opinion. Among the respondents who participated in the survey, 72.2 % of them are males and 27.3% are females. Most of the respondents are the tax affairs officers of businesses in Malaysia: The majority of the respondents are Chinese (47%), followed by Malays, Indians and other Bumiputras, representing 33.16%, 16.07%, and 3.06%, respectively; among those who represented, 62.24% are between the ages of 31 and 40; 45.66% of the respondents work for food and beverage industry; 18.62% and 11.99 of the respondents work for retail, and manufacturing industry, respectively. It is mandatory for the researcher to check and ensure that the survey questionnaire is free from Common Method Bias.

This "Common Method Bias" usually occurs in researches where the independent and the dependent variables are gathered from the same respondents for measurement [65]. The researcher follows the steps suggested by Huang [66] by ensuring anonymity and keeping in mind that the responses delivered by the respondents are based solely on their own perception. Also, the questionnaire includes a reversal measurement for certain constructs. The next section examines the validity and the reliability of the constructs.

4. Results

Kock [67] made a study on the Common Method Bias in "PLS-SEM', highlighting that a full collinearity test is much sufficient to identify the issues relating to the bias. According to the Table 2, the VIF values indicate the collinearity level between items, shown below, all the benchmark values of 3.3. If the value is above 3.3, it highly indicates the contamination of Common Method Bias. Therefore, if all the VIF in the inner models shows a full collinearity test, equal to or below 3.3, it is an indication that it is free from the Common Method Bias. Confirmatory factor analysis is a superior method to Expletory Factor Analysis (EFA) [68]. Although there are various methods to test the reliability of the construct, this study used Cronbach's alpha (α) coefficients by composite reliability (CR) when evaluating the measurement model for Confirmatory factor analysis (CFA).

The analytical outcome explains the strength of the measurement model (Table 2–7). Table 2 exhibits the outer loading of the reflective constructs, and Table 3 explains the outer weight of the formative constructs.

Table 2

Collinearity Test (VIF)

Indicators	VIF	Indicators	VIF
PEER1	1.176	PERT1	1.904
PEER2	1.097	PERT10	1.470
PEER3	1.030	PERT2	1.680
PEER4	1.094	PERT3	2.281
PEER5	2.163	PERT4	1.688
PEER6	1.124	PERT5	1.939
PEER7	1.087	PERT6	1.722
PEER8	1.283	PERT7	1.901
PROB1	2.089	PERT8	1.153
PROB2	1.088	PERT9	1.880
PROB3	1.007	SATS1	1.011
PROB4	2.005	SATS2	1.012
SERV1	1.865	SATS3	1.013
SERV2	1.988	SATS4	1.014
SERV3	1.548	SERV5	1.951
SERV4	1.246	SERV6	1.049

The resulting outcome of the analysis of the above mentioned reflective and formative constructs is higher than the benchmark level 0.6, except the indicators PEER2, PEER6, PERT3, PERT6, and PERT9. In the meantime, Table 4 explains the composite reliability (CR), which shows the indication of the indicators on the latent variables, ranging between 0.816 and 0.922, and highlighting the value above the benchmark level of 0.7. The average variance extracted (AVE) of the factors is reported to be between the range of 0.596 and 0.747, exceeding the recommended benchmark level of 0.5.

Finally, the researcher is required to assess the discriminant validity. Discriminant validity is examined by looking at the correlation between constructs and square root of the variance extracted for a construct. It is the extent, to which a construct is empirically distinct from other constructs in the structural model [69]. The top values presented in Table 6 show the square root of construct's average, variance extracted, and the rest of the values show the correlation between constructs and are less than the square root of average variance extracted.

Table 3

Outer Loading

Indicators	Satisfaction on Government Spending	Service Quality of Tax Authority
SATS1	0.745	
SATS2	0.871	
SATS3	0.702	
SATS4	0.762	
SERV1		0.661
SERV2		0.731
SERV3		0.712
SERV4		0.705
SERV5		0.664
SERV6		0.656

Table 4

Outer Weights

	Individual Tax Compliance	Peer's Tax Compliance	Probability of Audit	Religiosity
PEER1		0.616		
PEER2		0.512		
PEER3		0.645		
PEER4		0.629		
PEER5		0.618		
PEER6		0.525		
PEER7		0.621		
PEER8		0.617		
PERT1	0.628			
PERT10	0.627			
PERT2	0.623			
PERT3	0.523			
PERT4	0.638			
PERT5	0.615			
PERT6	0.515			
PERT7	0.615			
PERT8	0.619			
PERT9	0.512			
PROB1			0.793	
PROB2			0.849	
PROB3			0.867	
PROB4			0.848	
RELG				1

Table 5

Internal consistency (Composite reliability)

	Cronbach's Alpha	rhea	Composite Reliability
Satisfaction on Government spending	0.814	0.829	0.854
Individual Tax compliance	0.849	0.85	0.816
Peer's tax compliance	0.846	0.843	0.817
Probability of Audit	0.918	0.919	0.922
Service quality of Tax Authority	0.825	0.898	0.843

Table 6

Convergent validity (AVE)

	Average Variance Extracted (AVE)
Satisfaction on Government spending	0.596
Individual Tax compliance	0.680
Peer's tax compliance	0.719
Probability of Audit	0.747
Service quality of Tax Authority	0.711

Table 7

Discriminant Validity (HTMT Ratio)

	Personal Tax Compliance	Satisfaction on government
Satisfaction on government spending	0.772	
Service Quality of Authority	0.347	**0.843**

The tables presented below (Table 8–10) explain the strength of the structural model. Based on the analysis, the R^2 value for the relationship between the independent variables, (factors for the tax compliance), and the dependent variable (the tax compliance level) is 0.839. Thus, it can be summarised that 83.9 percent of the variance in the tax compliance level among tax affairs officers of Malaysian businesses are explained by the selected variables, with the F-Size of 0.530.

The interpretation of the relationship between the "Factors of Personal tax compliance" (Independent variables) and the "Personal tax compliance behaviour" among the tax affairs officers of the Malaysian businesses (Dependent variable) can be explained by 83.9 percent by the variance studied. Moreover, the effect size (f-square) results in more than 0.2, which is the indication of a significance effect on the construct and validity of the model.

Table 8

R-Squares

	R Square	R Square Adjusted
Personal Tax Compliance	0.839	0.831
Religiosity	0.004	–0.006

Table 9

F-Squares

Variables	Personal Tax Compliance	Religiosity
Factors	0.530	0.004
Moderating Effect 1	0.004	
Religiosity	0.054	

Table 10

Path Coefficient

	Original Sample (O)	Standard Deviation	T Statistics	P Values
Factors → Personal Tax Compliance	0.117	0.055	2.128	0.024**
Moderating Effect 1 → Personal Tax Compliance	0.006	0.031	0.193	0.731

5. Discussion

Interpretation of hypothesis test, path coefficient, clearly articulates that there is a positive association between the peer tax compliance and the personal tax compliance. This outcome correlates with the previous studies made by Alm [19], and Obaid [25] by confirming that the impact is on the personal tax compliance decision making by peers. The decision making of an individual is impacted by those who are around the individual and are in association with the individual, persuading the individual to apply the same decision that they apply on tax compliance.

This fact clarifies that every individual taxpayer should understand their responsibilities and obligation towards the nation, and they should always have the best interest in the national economy. According to Kelman's Social Influencing theory [14; 16], with these facts the individuals could be influenced in a positive way by the individual's peers.

This analysis further reveals that there is a positive association between the probability of tax audit and the personal tax compliance. This outcome parallels with the finding of Ayers [29] and D'Agosto [32] but contradicts with that of DeBacker [31].

As an example, this evidence could be followed by the IRBM to amend and extend its audit procedures. Generally, the IRBM conducts two types of audits, known as "Tax audits" and "Tax investigations". From this empirical evidence, the IRBM could increase its average audit rates for the individual and the corporate taxpayers. This action may make the taxpayers comply with the tax system, in fear of the tax authority and the penalty imposed on the taxpayers, in the following tax assessment.

Further assessment showcases that there is a positive association existing between the service quality of the tax authority and the personal tax compliance. Previous studies have no mixed conclusion on this finding, especially those of Alm [19]; Supriyono [70] state the same in their conclusion, justifying that the "Service paradigm for tax administration", where the tax officers act as facilitators and share their services, could increase the level of tax compliance.

This fact implies that the IRBM should continue measuring its services and take initiative to review the comments and complaints made by the taxpayers. Also, the IRBM may engage in online facilities fully to curtail the in-person visits of the public to their branch offices. This curtailment of visits of individuals to the IRBM may allow the other taxpayers to visit the branch offices, while the regular taxpayers could complete their tasks online.

Meanwhile, analysis reveal that there is a positive association between satisfaction on the government spending and the personal tax compliance. The studies made by Alasfour [48], Braithwaite [39], and Mohani [47] had similar findings. It was shared that residents of a country are mindful of how the government handles and spends their tax money. The findings demand that the funds collected from the income tax of the public should be spent carefully on developments and other beneficial projects for the people rather than on luxurious activities and projects. Also, the government should take note that every allocation of money to new programs and projects is carefully monitored by the public of the country.

Therefore, hypothesis *H1*: There is a positive association between the factors of personal tax compliance and the level of personal tax compliance is supported, where ($\propto = 0.117$, $p < 0.05$). The findings strongly acknowledge the Kelman's Social Influencing Theory [14; 16] that emphasises that the factors such as peers' tax compliance, probability of audit, service quality of the tax authority, and satisfaction on government spending are the external influencing factors that determine the tax affairs officers' personal tax compliance behaviour. Referring to the said theory, the above "Influencing Factors", strongly motivates the taxpayers to comply with the tax system.

However, the path analysis results show that the moderation test does not signify $p > 0.05$. Therefore, *H2*: Religiosi-

ty moderates the relationship between the factors of compliance and the personal tax compliance is not supported. The study by Khalil [71] also reveals that religiosity is not a major variable to influence or moderate the tax compliance behaviour, especially when looking at tax evasion. The study made in Lebanon, a Muslim nation, reveals a similar outcome of the study made in Malaysia.

One more similar outcome was learned by Budiarto [72] and Atmoko [73] elaborating that religiosity has no direct influence on the decision making on tax compliance. In the year 2014, the Supreme Court of Indiana, United States refused to allow another case from Rodney Tyms, and ruled out that religious freedom could not be a valid defensive factor to perform tax evasion[6].

Though certain taxpayers are protected by "Religious Freedom Restoration Act" (RFRA), the court has highlighted that using religious freedom may cause destruction to the economic stability of the nation and pointed out that collection of taxes is transferred to federal treasury[7]. However, this evidence may not be serious in other part of the world, especially in Malaysia.

A study by Abu Bakar [74] highlights that the practicing of religious tolerance among the people of Malaysia is one of the factors to maintain the economic sustainability of the country. According to Office of International Freedom[8], 61.3 percent of the Malaysian population follow Islam. Meanwhile, Buddhist, Christian, Hindus and others are 19.8 percent, 9.2 percent, 6.3 percent, and 1.7 percent, respectively. Being contrary to the western part of the world, Malaysian religious institutions are preaching the adherents the national harmony, tolerance and moderation to support the national economic and social growth.

It's clearly emphasized in the article that religious practices in Malaysia cannot be a moderator towards tax compliance but may be a mediator encouraging the taxpayers to comply with the tax system. Even though Malaysia is a Muslim nation, it may be different from other Muslim's nations in the world. To support this statement, a study conducted by Benk [75] finalized, "Muslims who live in Western Europe, North America or Australia might have views that are significantly different from Muslims who live in the Middle East and Southeast Asia". In the Malaysian context, religiosity and its impact may not be playing a major role in its citizens' tax compliance behaviour.

This suggestion is paralleling with the study of Mohdali [76], which explains further that though religiosity seems an important factor in Malaysia and Turkey in motivating the taxpayers for voluntary tax compliance, certain circumstances appear irrelevant to the Malaysian context. Muslim countries (wherein more than 50 percent of the population are Muslims) are showing pretty and fairly much treatment for tax compliance.

The overall outcome of this study strongly adheres to the Theory of Planned Behaviour, supporting the idea that the action taken by an individual to comply with another particular action is influenced by the individual's intention. With regards to religiosity, the intention of the people of Malaysia to comply with the tax system is not moderated by their religious beliefs.

6. Conclusion

This study investigated the influencing factors upon the personal tax compliance behaviour among tax affairs officers in Malaysian businesses. According to This study investigated the factors that exert their influence on the personal tax compliance behaviour of the tax affairs officers in the businesses of Malaysia.

[6] Man accused of tax evasion says Indiana's religious freedom law exempts him from paying. The Washington Post; 2016. Available at: https://www.washingtonpost.com/news/acts-of-faith/wp/2016/11/23/man-accused-of-tax-evasion-says-he-doesnt-have-to-pay-under-indianas-religious-freedom-law/

[7] CNN News. Strange tax evasion schemes. CNN News; 2017. Available at: https://money.cnn.com/galleries/2012/pf/taxes/1204/gallery.tax-evasion-schemes/5.html

[8] Malaysian Office of International Freedom. 2020 Report on International Religious Freedom: Malaysia. U.S Department of State. 2020. Available at: https://www.state.gov/reports/2020-report-on-international-religious-freedom/malaysia/

As referred to in the earlier section, an assumption is presumed that there is a tendency for a personal tax non-compliant taxpayer not to comply with the corporate tax system as well. Since this study predicted that the most important four variables: (1) Peers' tax compliance, (2) Probability of audit, (3) Service quality of tax authority, and (4) "Satisfaction on government spending", exert their influence on the personal tax compliance behaviour of the tax affairs officers in the Malaysian business entities, the future researchers should also measure the taxpayers' intention in complying with the corporate tax system, investigating further to make sure that the taxpayers apply the same decision-making to their corporate tax system as well.

To produce an extensive and expeditious report of the exploration on the said nexus of personal tax compliance and the taxpayers' decision on the corporate tax compliance, the selection of one type of data collection approach is not sufficient.

Therefore, the future researchers are advised to make researches with the collection of supplementary data, such as interviews as their primary data collection so that the robustness of their findings could be strengthened.

Also, this study does not support the claim that religiosity plays a role as a moderator of an influential determinant for the tax compliance behaviour among the tax affairs officers in the Malaysian businesses.

Previous studies outline the approaches of religiosity by two ways. One way is the religious affiliation, whereby a religious person upholds religious beliefs and practices, becoming associated with it. The other way is the religious commitment, whereby a religious person gets involved in commitments, adhering to the religious beliefs, practices, etc. in line with the individual's perception of religion.

This study only measured the level of religiosity based on the participation of religious persons in religious activities, rather than their involvement in their respective religious activities, practices, beliefs, etc. Future researchers may investigate the degree of religious involvement by individuals and may also examine its effect on tax compliance behaviour.

References

1. Sritharan N., Sahari S., Sharon C.C.S. A Systematic Literature Review on Tax Evasion: Insights and Future Research Agenda. *International Journal of Academic Research in Accounting Finance and Management Sciences*. 2022;12(2): 84–105. https://doi.org/10.6007/IJARAFMS/v12-i2/13089

2. Ministry of Finance Malaysia. *Budget 2019*. The Budget Speech Text; 2019. Available at: https://www.mof.gov.my/portal/arkib/budget/2019/bs19.pdf

3. Salawati S., Sritharan N., Sheung S.C.C., Mohamed A.S. Does Tax Knowledge Motivate Tax Compliance in Malaysia? *Research in World Economy*. 2021;12(1):238–251. https://doi.org/10.5430/rwe.v12n1p238

4. Sritharan N., Salawati S. Examining the Moderating Effect of Tax Knowledge on the Relationship between Individual Factors and Income Tax Compliance Behaviour in Malaysia. *International Journal of Academic Research in Accounting, Finance and Management Sciences*. 2019;9(3):160–172. https://doi.org/10.6007/ijarafms/v9-i3/6355

5. Sritharan N., Salawati S., Cheuk S.C.-S. How Social Factor Determine Individual Taxpayers' Tax Compliance Behaviour in Malaysia? *International Journal of Business and Society*. 2020;21(3):1444–1463. https://doi.org/10.33736/ijbs.3363.2020

6. Schneider F., Enste D. Hiding in the Shadows: The Growth of the Underground Economy. *Economic Issues. 2002. No. 30* International Monetary Fund. Available at: https://www.imf.org/external/pubs/ft/issues/issues30/#:%7E:text=the%20official%20economy.-,What%20Is%20the%20Shadow%20Economy%3F,from%20monetary%20or%20barter%20transactions

7. Ministry of Finance Malaysia. *Budget 2020*. Government of Malaysia; 2019. Available at: https://phl.hasil.gov.my/pdf/pdfam/Budget_2020.pdf

8. Sritharan N., Salawati S., Sharon C.C.S., Syubaili M.A. Corporate Tax Avoidance: A Systematic Literature Review and Research Agenda. *International Journal of Academic Research in Business and Social Sciences*.2022;12(8):1160–1180. https://doi.org/10.6007/IJARBSS/v12-i8/14683

9. Sritharan N., Salawat S. Economic Factors Impact on Individual Taxpayers' Tax Compliance Behaviour in Malaysia. *International Journal of Academic Research in Accounting, Finance and Management Sciences*. 2019;9(2):172–182. https://doi.org/10.6007/IJARAFMS/v9-i2/6166

10. Manrejo S., Yulaeli T. Tax Compliance Model Based on Taxpayers Planned Behavior in Indonesia. *Journal of Tax Reform*. 2022;8(3):298–311. https://doi.org/10.15826/jtr.2022.8.3.123

11. Sritharan N., Sahari S., Sharon C.C.S., Syubaili M.A. Examining the Moderating Effect of Financial Constraint on Tax Compliance: A Sequential Explanatory Design Study on Malaysian Tax Professionals. *International Business Education Journal*. 2022;15(2):29–48. https://doi.org/10.37134/ibej.Vol15.2.3.2022

12. Bagdad M.A., Noor R.M., Hamid N.A., Aziz R.A. Factors Affecting Tax Gap: Evidence from Tax Audit Cases. *Governance and Sustainability of Global Business Economics*. 2017;17(1):149–156. https://doi.org/10.33369/gsgbe.11.1.33-52

13. Sritharan N., Sahari S., Sharon C.C.S., Syubaili M.A. Identifying the factors impacting upon personal tax compliance: a study involving tax affairs officers of Malaysian businesses. *eJournal of Tax Research*. 2022;20(1):48–71. Available at: https://www.unsw.edu.au/content/dam/pdfs/unsw-adobe-websites/business-school/faculty/research/ejournal-of-tax-research/2022-volume-20-number-1/2022-11-Volume20-No1-P48.pdf

14. Kelman H.C. Compliance, identification, and internalization three processes of attitude change. *Journal of Conflict Resolution*. 1985;2(1). https://doi.org/10.1177/002200275800200106

15. Kogler C., Muehlbacher S., Kirchler E. Testing the "slippery slope framework" among self-employed taxpayers. *Economics of Governance*. 2015;16(2):125–142. https://doi.org/10.1007/s10101-015-0158-9

16. Kelman H.C. Interests, relationships, identities: Three central issues for individuals and groups in negotiating their social environment. *Annual Review of Psychology*. 2006;57(1):1–26. https://doi.org/10.1146/annurev.psych.57.102904.190156

17. Ajzen I. From Intentions to Actions: A Theory of Planned Behavior. Action Control. In: Kuhl J., Beckmann J. (eds) *Action Control*. SSSP Springer Series in Social Psychology. Berlin, Heidelberg: Springer; 1985. https://doi.org/10.1007/978-3-642-69746-3_2

18. Lefebvre M., Pestieau P., Riedl A., Villeval M.C. Tax evasion and social information: an experiment in Belgium, France, and the Netherlands. *International Tax and Public Finance*. 2015;22(3):401–425. https://doi.org/10.1007/s10797-014-9318-z

19. Alm J., Bloomquist K.M., McKee M. When You Know Your Neighbour Pays Taxes: Information, Peer Effects and Tax Compliance. *Fiscal Studies*. 2017;38(4):587–613. https://doi.org/10.1111/1475-5890.12111

20. Inasius F. Factors Influencing SME Tax Compliance: Evidence from Indonesia. *International Journal of Public Administration*. 2018;42(5):367–379. https://doi.org/10.1080/01900692.2018.1464578

21. Puspitasari E., Susilowati Y., Meiranto W. Experimental Study on Individual Taxpayer: Motivational Posture and Peer Reporting Behavior. *Jurnal Dinamika Manajemen*. 2017;8(1):59–67. https://doi.org/10.15294/jdm.v8i1.10411

22. Ho J.K., Loo E.C., Lim K.P. Perspective of non-taxpayers' perceptions on issues of ethics and equity in tax compliance. *Malaysian Accounting Review*.2006;5(2):47–59. https://ir.uitm.edu.my/id/eprint/278/

23. Alshirah A.F., Jabbar H.A., Samsudin R.S. The Effect of Tax Moral on Sales Tax Compliance among Jordanian SME. *International Journal of Academic Research in Accounting, Finance and Management Sciences*. 2019;9(1):30–41. https://doi.org/10.6007/ijarafms/v9-i1/5722

24. BIT. *Applying Behavioural Insights to Reduce Fraud, Error and Debt*. London: Cabinet Office, UK; 2012. Available at: https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/60539/BIT_FraudErrorDebt_accessible.pdf

25. Obaid A., Mahdi M., Ibrahim I., Udin M.N. An Investigation of the Determinants of Tax Compliance Among Yemeni Manufacturing SMEs Using the Fisher Model. *International Journal of Psychosocial Rehabilitation*. 2020;24(04):1809–1824. https://doi.org/10.37200/ijpr/v24i4/pr201289

26. Lutfi A.A., Idris K.M., Mohamad R. AIS usage factors and impact among Jordanian SMEs: The moderating effect of environmental uncertainty. *Journal of Advanced Research in Business and Management Studies*. 2017;6(1):24–38. Available at: http://repo.uum.edu.my/id/eprint/21825/

27. Allingham M.G., Sandmo A. Income tax evasion: a theoretical analysis. *Journal of Public Economics*. 1972;1(3/4):323–338. https://doi.org/10.1016/0047-2727(72)90010-2

28. Zandi G.R., Elwahi A.S.M. Tax Compliance Audit: The Perspectives of Tax Auditors in Malaysia. *Asian Development Policy Review*. 2016;4(4):143–149. https://doi.org/10.18488/journal.107/2016.4.4/107.4.143.149

29. Ayers B.C., Seidman J.K., Towery E.M. Tax Reporting Behavior Under Audit Certainty. *Contemporary Accounting Research*. 2018;36(1):326–358. https://doi.org/10.1111/1911-3846.12439

30. Modugu K.P., Anyaduba J.O. Impact of tax audit on tax compliance in Nigeria. *International Journal of Business and Social Science*.2014;5(9):207–215. Available at: https://ijbssnet.com/journals/Vol_5_No_9_August_2014/25.pdf

31. DeBacker J, Heim B.T, Tran A., Yuskavage A. Legal enforcement and corporate behavior: An analysis of tax aggressiveness after an audit. *The Journal of Law and Economics*. 2015;58(2):291–324. https://doi.org/10.1086/684037

32. D'Agosto E., Manzo M., Pisani S., D'Arcangelo F. M. The Effect of Audit Activity on Tax Declaration. *Public Finance Review*. 2017;46(1):29–57. https://doi.org/10.1177/1091142117698035

33. Supriyono A., Utami I., Muktiyanto A. Exploration of Tax Compliance Determination on Micro, Small and Medium Enterprise. *Jurnal Akuntansi*. 2021;11(1):1–20. https://doi.org/10.33369/j.akuntansi.11.1.33-52

34. Chong K.-R., Arunachalam M. Determinants of Enforced Tax Compliance: Empirical Evidence from Malaysia. *Advances in Taxation*. 2018;25(1):147–172. https://doi.org/10.1108/s1058-749720180000025007

35. Alm J., Cherry T., Jones M., McKee M. Taxpayer information assistance services and tax compliance behavior. *Journal of Economic Psychology*. 2010;31(4):577–586. https://doi.org/10.1016/j.joep.2010.03.018

36. Palil M.R, Hamid M.A., Hanafiah M.H. Taxpayers compliance behaviour: Economic factors approach. *Jurnal Pengurusan*. 2013;38(1);75–85. Available at: http://journalarticle.ukm.my/6972/1/4614-10795-1-SM.pdf

37. Kasipillai J., Baldry J. What do Malaysian taxpayers know? *Malaysian Accountant*. 1998;3(2):145–161. Available at: https://www.micpa.com.my/news-media/malaysian-accountant-journal/

38. Pope J., Abdul-Jabbar H. Small and Medium-Sized Enterprises and Tax Compliance Burden in Malaysia: Issues and Challenges for Tax Administration. *Small Enterprise Research*. 2011;16(1):47–60. https://doi.org/10.5172/ser.16.1.47

39. Braithwaite V. Defiance in Taxation and Governance: Resisting and Dismissing Authority in a Democracy. *Books, Edward Elgar Publishing, No 12542*; 2009. Available at: https://static1.squarespace.com/static/5c05f8595cfd7901fc57139d/t/5c130f0eaa4a99798c7c813f/1544752928514/defiance+in+taxation+book.pdf

40. Bobek D.D., Radtke R.R. An Experiential Investigation of Tax Professionals' Ethical Environments. *Journal of the American Taxation Association*.2007;29(2):63–84. https://doi.org/10.2308/jata.2007.29.2.63

41. OECD. (2010). *Understanding and Influencing Taxpayers' Compliance Behaviour*. Organisation for Economic Cooperation and Development, France; 2010. Available at: https://www.oecd.org/tax/forum-on-tax-administration/publications-and-products/46274793.pdf

42. Murphy K. The Role of Trust in Nurturing Compliance: A Study of Accused Tax Avoiders. *Law and Human Behavior*. 2004;28(2):187–209. https://doi.org/10.1023/B:LAHU.0000022322.94776.ca

43. Reeson A., Dunstall S. *Behavioural Economics and Complex Decision-Making: Implications for the Australian Tax and Transfer System*. Australia: CSIRO Mathematical and Information Sciences. 2009; 09/110. Available at: https://www.researchgate.net/publication/242762186_Behavioural_Economics_and_Complex_Decision-Making_Implications_for_the_Australian_Tax_and_Transfer_System

44. NEF. *Behavioural Economics: Seven Principles for Policy-Makers*. New Economics Foundation, UK; 2005. Available at: https://neweconomics.org/uploads/files/cd98c5923342487571_v8m6b3g15.pdf

45. Swedish Tax Agency (STA). *Right from The Start – Research and Strategies*. Swedish Tax Agency. 2005. Available at: https://sweden.se/society/why-swedes-are-okay-with-paying-taxes/

46. Doerrenberg P. Does the use of tax revenue matter for tax compliance behavior? *Economics Letters*. 2015;128:30–34. https://doi.org/10.1016/j.econlet.2015.01.005

47. Mohani A. *Personal income tax noncompliance in Malaysia*, PhD thesis, Victoria University, Melbourne. 2001. Available at: https://vuir.vu.edu.au/15760/1/Abdul_2001compressed.pdf

48. Alasfour F., Samy M., Bampton R. The determinants of tax morale and tax compliance: Evidence from Jordan. *Advances in Taxation*. 2016;23(1):125–171. https://doi.org/10.1108/S1058-749720160000023005

49. Roberts M.L., Hite P.A. Progressive taxation, fairness, and compliance. *Law and Policy*. 1994;16(1):27–48. https://doi.org/10.1111/j.1467-9930.1994.tb00115.x

50. Johnson B.R., Jang S.J., Larson D.B., Deli S. Does adolescent's religious commitment matter? a re-examination of the effects of religiosity on delinquency. *Journal of Research in Crime and Delinquency*. 2001;38(1):22–44. https://doi.org/10.1177/0022427801038001002

51. Worthington E.L., Nathaniel G.W., Terry L.H., Jennifer S.R., Michael E.M., Jack W.B., Michelle M.S., James T.B., Kevin H.B., Lynn O. The Religious Commitment Inventory-10: Development, Refinement, and Validation of a Brief Scale for Research and Counselling. *Journal of Counseling Psychology*. 2003;50(1):84–96. https://doi.org/10.1037/0022-0167.50.1.84

52. Torgler B. Tax Morale and Direct Democracy. *European Journal of Political Economy*. 2005;21(2):525–531. https://doi.org/10.1016/j.ejpoleco.2004.08.002

53. Torgler B. Moral Suasion: An Alternative Tax Policy Strategy? Evidence from A Controlled Field Experiment in Switzerland. *Economics of Governance*. 2004;5(3):235–253. https://doi.org/10.1007/s10101-004-0077-7

54. Torgler B. *Tax Moral and Institutions*. Centre for Research in Economics. Crema Working Papers No. 2003-09. https://doi.org/10.2139/ssrn.663686

55. Ross M.A., McGee R.W. Attitudes toward Tax Evasion: A Demographic Study of Malaysia. *Asian Journal of Law and Economics*. 2011;2(3):6–14. https://doi.org/10.2202/2154-4611.1028

56. Torgler B. The Importance of Faith: Tax Morale and Religiosity. *Journal of Economic Behaviour & Organization*. 2006;61(1):81–109. https://doi.org/10.1016/j.jebo.2004.10.007

57. Sawyer A.J. Enhancing taxpayers' rights in New Zealand – an opportunity missed? *eJournal of Tax Research*. 2020;18(2):441–465. Available at: https://hdl.handle.net/10092/101559

58. Mohdali R., Pope J. The influence of religiosity on taxpayers' compliance attitudes. *Accounting Research Journal*. 2014;27(1):71–91. https://doi.org/10.1108/arj-08-2013-0061

59. Riahi-Belkaoui A. Relationship between tax compliance internationally and selected determinants of tax morale. *Journal of International Accounting, Auditing and Taxation*. 2004;13(2):135–143. https://doi.org/10.1016/j.intaccaudtax.2004.09.001

60. Ali M., Raihana N. *The influence of religiosity on tax compliance in Malaysia*. Curtain University. 2017. Available at: http://hdl.handle.net/20.500.11937/2069

61. Barro R., McCleary R. *Religion and Economic Growth*. NBER Working Paper No. 9682;2003. https://doi.org/10.3386/w9682

62. Nurunnabi M. Tax evasion and religiosity in the Muslim world: the significance of Shariah regulation. *Quality and Quantity*. 2017;52:371–394. https://doi.org/10.1007/s11135-017-0471-1

63. Sekaran U. *Cram 101 textbook outlines to accompany*. 4th ed., Moorpark, CA: Academic Internet Publ., 2005. Available at: https://archive.org/details/cram101textbooko0000unse_i6m9

64. Kirchler E., Hoelzl E., Wahl I. Enforced versus voluntary tax compliance: The "'slippery slope'' framework. *Journal of Economic Psychology*. 2008;29(2):210–225. https://doi.org/10.1016/j.joep.2007.05.004

65. Berbekova A., Uysal M., Assaf A.G. A thematic analysis of crisis management in tourism: A theoretical perspective. *Tourism Management*. 2021;86:104342. https://doi.org/10.1016/j.tourman.2021.104342

66. Huang Y.-C., Chang L.L., Backman K.F. Detecting common method bias in predicting creative tourists' behavioural intention with an illustration of theory of planned behaviour. *Current Issues in Tourism*. 2018;22(3):307–329. https://doi.org/10.1080/13683500.2018.1424809

67. Kock N. Common Method Bias in PLS-SEM. *International Journal of E-Collaboration*. 2015;11(4):1–10. https://doi.org/10.4018/ijec.2015100101

68. Khreisat M.N., Mugableh A.I. Multidimensionality of EFL Recreational Reading Attitudes: An EFA and CFA Approach. *Journal of Research in Applied Linguistics*. 2020;11(2):57–69. https://doi.org/10.22055/RALS.2020.15946

69. Hair J.F., Risher J.J., Sarstedt M., Ringle C.M. When to use and how to report the results of PLS-SEM. *European Business Review*. 2019;31(1):2–24. https://doi.org/10.1108/ebr-11-2018-0203

70. Supriyono A., Utami I., Muktiyanto A. Exploration of Tax Compliance Determination on Micro, Small and Medium Enterprise. *Jurnal Akuntansi*. 2021;11(1):1–20. https://doi.org/10.33369/j.akuntansi.11.1.33-52

71. Khalil S., Sidani Y. The influence of religiosity on tax evasion attitudes in Lebanon. *Journal of International Accounting, Auditing and Taxation*. 2020;40:100335. https://doi.org/10.1016/j.intaccaudtax.2020.100335

72. Budiarto D.S., Pramudiati N. Does Technology Improve SMEs Business Success? Empirical Research on Indonesian SMEs. *Journal of Economics and Management Sciences*. 2018;1(2):546–553. https://doi.org/10.30560/jems.v1n2p115

73. Atmoko A.D. Does intrinsic religiosity moderate between the self-assessment system and tax evasion? a research-based on gender. *Jurnal Akuntansi Dan Pendidikan*. 2021;10(2):113–123. https://doi.org/10.25273/jap.v10i2.5105

74. Abu Bakar R., Melan M. Information Quality Impact toward Continuous Intention of Using Tax E-Filing System. *International Journal of Scientific and Research Publications*. 2018;8(8):416–421. https://doi.org/10.29322/ijsrp.8.8.2018.p8050

75. Benk S., McGee R.W., Yüzbaşı B. How Religions Affect Attitudes Toward Ethics of Tax Evasion? A Comperative and Demographic Analysis. *Journal for the Study of Religions and Ideologies*. 2015;14(41):202–223. Available at: https://www.academia.edu/33558578/HOW_RELIGIONS_AFFECT_ATTITUDES_TOWARD_ETHICS_OF_TAX_EVASION_A_COMPARATIVE_AND_DEMOGRAPHIC_ANALYSIS

76. Mohdali R., Benk S., Budak T., MohdIsa K., Yussof S.H. A cross-cultural study of religiosity and tax compliance attitudes in Malaysia and Turkey. *eJournal of Tax Research*. 2017;15(3):490–505. Available at: http://classic.austlii.edu.au/au/journals/eJlTaxR/2017/22.pdf

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The influence of foreign ownership on tax avoidance in Thailand: A study from an emerging economy

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ABSTRACT

Tax avoidance is an effort to avoid paying more taxes lawfully, but it results in a tax revenue loss for the government. Even though the nominal avoided tax is enormous in advanced economies, the impact of tax avoidance is more severe in emerging economies. Thailand is a developing country whose government has been actively putting action to tackle aggressive tax avoidance. Like other similar economies, Thailand invites more foreign investors to invest in its local businesses. However, literature has said that ownership level can influence tax avoidance, and ownership by foreign shareholders in emerging countries can increase tax avoidance. Thus, examining whether foreign ownership increases tax avoidance in a developing country is crucial and interesting. By owning shares in the company, foreign investors have the power to influence the firm's decision-making process, including the decision for tax avoidance. This paper is the pioneer in discussing foreign ownership and tax avoidance in a Thai setting in its 100 most profitable companies. The observation is based on the five-year observations during 2015–2019. We measured tax avoidance using effective tax rate (ETR) and cash-flow ETR and manually collected foreign ownership data from the 500 annual reports. The statistical test verified that foreign ownership has a positive relationship with tax avoidance, which means that greater foreign ownership leads to a greater level of tax avoidance. This study recommends policymakers monitor the level of foreign ownership/control to limit aggressive tax avoidance that could be practised in the country.

KEYWORDS

foreign ownership, tax avoidance, effective tax rate, cash-flow ETR, Thailand

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Влияние иностранного владения на избежание налогов в Таиланде: исследование из развивающейся экономики

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АННОТАЦИЯ

Избежание налогов – это попытка избежать уплаты большего количества налогов на законных основаниях, но это приводит к потере налоговых поступлений для правительства. Несмотря на то, что номинальное избежание налогов огромно в странах с развитой экономикой, его последствия более серьезны в странах с развивающейся экономикой. Таиланд является развивающейся страной, правительство которой активно борется с агрессивным уклонением от уплаты налогов. Как и другие страны с похожей экономикой, Таиланд приглашает больше

иностранных инвесторов вкладывать средства в местный бизнес. В литературе говорится, что уровень собственности может влиять на избежание налогов, а владение иностранными акционерами в развивающихся странах может его увеличить. Таким образом, изучение того, увеличивает ли иностранная собственность избежание налогов в развивающейся стране, имеет решающее значение и представляет интерес. Владея акциями компании, иностранные инвесторы имеют возможность влиять на процесс принятия фирмой решений, включая решение об избежании налогов. Эта статья является пионером в обсуждении иностранного владения и избежании налогов в 100 самых прибыльных зарегистрированных на бирже компаниях в Таиланде. Наблюдение основано на пятилетних значениях за 2015–2019 гг. Мы измерили избежание налогов, используя два показателя: эффективную налоговую ставку (ETR) и ETR с денежными потоками, а также вручную собрали данные о собственности на имущество из 500 годовых отчетов. Статистический тест подтвердил, что иностранная собственность имеет положительную связь с избежанием налогов, что означает, что увеличение числа иностранных владельцев приводит к более высокому уровню избежания налогов. Это исследование рекомендует директивным органам контролировалить уровень иностранной собственности/контроля с целью ограничения агрессивного избежания налогов, которое может практиковаться в стране.

КЛЮЧЕВЫЕ СЛОВА
иностранная собственность, уклонение от уплаты налогов. ETR, ETR с денежными потоками

1. Introduction

Tax avoidance is a situation or activity that attempts to reduce tax payments on several taxes imposed on a business, where the income tax contributes the most to the government. Governments use the collected taxes to operate their programs and activities. Even though it is legal, tax avoidance has become a concern for the government as tax collectors. Tax avoidance reduces the potential income for the government that could be used to develop the country, such as public physical facilities, research and development, and officers' salaries. While governments expect to collect more taxes, shareholders, on the other hand, avoid the potential taxes to increase the value of shareholders' wealth.

Tax avoidance is a common practice, and the amount is significantly higher in developed markets since firms in developed markets have more flexibility than those in emerging economies. Even so, people in lower-income countries will experience a significant economic impact because the potential avoided tax is 50% of their national health budget. In contrast, it is only 8% in higher-income countries.

According to a Tax Justice Network [1] report, Thailand has the lowest tax avoidance level among developing Asian countries. Table 1 shows the potential tax loss experienced by Thailand and its neighbouring countries.

Tax avoidance is the practice of keeping cash resources within a company that

Table 1

Corporate tax avoidance level: Thailand and its neighbouring countries

Countries	Tax revenue loss (USD million)	Due to corporates (USD million)	Due to corporates (%)
Thailand	1,165	425	36.5
Malaysia	1,227	903	73.6
Vietnam	421	367	87.2
Philippines	2,135	1,878	88.0
Indonesia	4,865	4,786	98.4

Source: Tax Justice Network

would otherwise go to the government. At the same time, these resources may contribute to enhancing firm and shareholder value. Therefore, tax avoidance is often considered unethical because it only benefits the shareholders instead of the whole society [2]. Shareholders' interest is the profit after tax as it will higher the profit distributed to shareholders as dividends or retained by the company. Thus, the company's operations are influenced by its ownership structure, such as foreign ownership level [3].

Foreign investors have become an increasingly important source of financing. As a result of the rapid expansion of international investment, the roles of foreign investors in the companies have received significant attention. Recent research found that foreign investors significantly influence the corporate decisions of their investee firms through direct or indirect supply-demand threats [4]. They are also found to greatly impact minimizing taxes by proposing new tax strategies, intervening companies in determining intrinsic values, and requiring other mandatory interventions [5]. Reportedly, there is a rapidly increasing number of studies examining how shareholders influence tax avoidance from the traditional agency theory perspective [6].

Foreign-owned corporations, especially multinational corporations, are known to have greater advantages from different worldwide tax rates, specific accounting standards, and tax treatment in other countries [7] These characteristics provide firms with greater foreign influence, additional tax advantages, and tax planning opportunities. Furthermore, foreign influence also represents the objectives of the company's foreign head office [8]. Companies with foreign influence face greater complexity in corporate taxation due to the separation of ownership and control. As a result, they may take advantage of this opportunity to transfer income elsewhere.

Foreign investors with long-term investment prospects typically prefer to invest in countries with high tax morality, such as Indonesia and Singapore [5]. Foreign shareholders are negatively associated with tax avoidance in these countries and are involved in establishing corporate tax avoidance policies. Several recent studies have also found a negative correlation between foreign ownership and tax management in developed countries such as the United States, Japan, and Singapore [9].

However, Shi et al. [10] discovered a positive correlation between foreign ownership and tax avoidance in the Philippines. As a result of the Philippines' high tax rates and narrow tax base, tax avoidance schemes have evolved and become more complex over time. These plans may result in imperfections in implementing mechanisms and preventing the government from providing high-quality public services. The Philippines and Thailand have similar tax avoidance situations because they are both developing countries with low tax morality.

In Thailand, foreign shareholders and tax avoidance are common in developing countries, so the relationship between the two variables might also be found. These findings should be interesting in evaluating whether foreign shareholders on the boards of Thailand's publicly traded companies can cause tax avoidance because revenue losses due to tax avoidance are found to be an especially acute problem in low-income countries [11].

According to Tax Justice Network [1], Thailand has the lowest rate of tax avoidance among Asian countries. But Thailand is also a developing country with low tax morality, where international investors see it as a destination to perform their tax avoidance strategy [5].

This research aims to examine the impact of foreign ownership on tax avoidance in Thailand. By considering the context of Thailand, *this study hypothesizes* that foreign ownership can increase tax avoidance.

This paper provides an overview of foreign ownership and tax avoidance activities in Thailand, which may be useful for other Asian countries that have similar

taxation contexts to Thailand. The results of this paper contribute to both academicians and policymakers. The academicians may refer to this paper for further study since this paper focuses on one of Asia's emerging economies, whereas most previous studies have focused on developed markets [12–14]. This paper completes the literature gap on emerging markets, such as Thailand. The findings of this paper also provide some recommendations and suggestions for policymakers, who can use the paper's findings to monitor the level of foreign ownership permissible in Thailand to limit tax avoidance practices.

The rest of the paper is arranged as follows: section 2 reviews the literature and develops hypotheses, section 3 explains the methodology, section 4 presents statistical results and discusses findings, and section 5 presents the conclusion.

2. Literature review

2.1. Tax and tax avoidance

Tax is the contribution of society that enables governments to perform their programs and functions to benefit society [15]. Companies treat tax expenses similarly to other expenses in order to achieve the highest possible after-tax income. If it is done legally and without affecting one's consumption, the effort to reduce tax liability is known as tax avoidance [16]. Tax avoidance is the practice of reducing a tax firm's burden through investments and business structuring by planning tax allowable under tax law that is not punishable [17; 18].

Even though it is legal, tax evasion is critical because it undermines the state's ability to collect revenue and implement policies since taxpayers aim to minimize their taxable income. It is a concern for governments and society because it has the potential to prevent national programs for social and infrastructure development in the country. Tax avoidance could be an ordinary issue in developed countries, but it is a serious suffering for emerging economies country [1].

As the lowest corporate tax rate compared to Singapore and Brunei Darussalam, with each 17% and 18.5%, respectively, Thailand provides an interesting institutional setting to examine tax avoidance. When compared to other ASEAN countries like the Philippines (30%), Indonesia and Myanmar (25%), and Malaysia and Laos (24%), Thailand's tax rate percentage is just 20%. Thailand leads the ASEAN-5 by having a total tax avoidance of USD 25.8 billion, followed by Indonesia, Philippines, and Malaysia with total tax avoidance of USD 17.8 billion, USD 11.7 billion and USD 11.2 billion, respectively [19].

There are several definitions of tax avoidance. From an ethics perspective, tax avoidance is considered unfair as it exclusively benefits the shareholders (and others but less) [20]. From a legal perspective, Napitupulu et al. [21] mention that tax avoidance is an effort by taxpayers to avoid taxes legally, as it is not contrary to the taxation law.

Lipatov [22] defines tax avoidance as a lawful underreporting of tax liabilities. Meanwhile, Hanlon & Heitzman [23] have said that tax avoidance is a continuum of perfectly legal tax-cutting strategies. In conclusion, tax avoidance is legal and unpunishable, but it can limit governments' budgets to run national programs. Thus, tax avoidance is a concern.

2.2. Agency Theory

The agency theory describes the relationship and conflicts between agents (the firm's management) and stakeholders such as shareholders and creditors. Management needs to implement the goals and objectives established by the shareholders [24]. Shareholders expect management to separate ownership and control in order to avoid conflicts of interest [25]. According to Hanlon & Heitzman [23], a company's tax decisions may reflect the perspectives of both management and shareholders. Consequently, tax avoidance behaviour is influenced by both management and shareholder concerns, which are acknowledged by contrast interests [26; 27].

Moreover, corporate tax avoidance can lead to agency problems [28; 29].

According to Frank et al. [28], it is critical to limit the risk of agency conflict caused by tax evasion by employing a third party, such as the ownership structure, to supervise managers' decisions that maximize shareholder wealth. Furthermore, according to Tang et al. [30], the ownership structure in enterprises should highlight the split between management and shareholders by identifying the features of agency problems. Finally, ownership structure tends to establish policies that mitigate the relatively significant impact of tax avoidance on a company's market position [23].

2.3. Foreign shareholders and tax avoidance

In the context of ownership, foreign contribution is an attractive funding source that has the potential to improve firm performance [31]. The presence of international shareholders can result in better business strategies, such as asset maximization and tax avoidance [32]. South Korean researchers discovered that greater foreign ownership significantly reduces corporate tax avoidance in publicly traded firms [33]. Supporting the previous finding, Hasan et al. [5] also discovered that foreign ownership has a negative relationship with (decreases) corporate tax avoidance.

However, many researchers have discovered that foreign ownership in a company leads to a higher level of tax avoidance in an emerging economy like Thailand. According to relatively old but extensive literature by Demirgüç-Kunt & Huizinga [34], tax management is commonly practised in developing countries. They came to this conclusion after researching foreign-owned banks that pay lower taxes in eighty countries. Tax management is popular when foreigners own most shares [35].

Salihu et al. [8] conclude that a higher level of foreign ownership is directly proportional to the level of corporate tax avoidance, especially in developing countries. Foreign investors have the skills of tax planning and income maximization strategies available to apply [10]. Foreign investors are respected in smaller countries [36], but this situation can open opportunities to seek rents. Due to all of these reasons, this research hypothesizes that foreign ownership increases tax avoidance.

3. Methodology

3.1. Samples and Data

This research takes Thai-listed companies as the contextual observations. The sample includes the 100 most profitable companies as we believe profitable companies are important in economies and significant for rule makers. However, we exclude financial companies as they are highly regulated [37] and real estate investment trusts (REITs) as they are flow-through entities [38]. As a result, all of our samples come from various industries since we recognize that the correlation between ownership structure and tax avoidance is not restricted only to a single industry [12; 38].

The data is from five years (2015–2019) of observation, covering accounting and non-accounting data. Accounting data, such as income tax expense and debt level, is downloaded from the subscribed database.

Income tax expense can be found in income statements for researchers who do not have access to financial markets databases, while cash tax paid can be found in cash flow statements. The non-accounting data, such as foreign ownership level, are manually extracted from the annual report for this study.

3.2. Variable operationalization

Dyreng et al. [39] adapted GAAP ETR to measure tax avoidance. There are other measures of tax avoidance, such as book-tax gap (BTG), both raw BTG and residual BTG [40], and book-tax differences (BTD) [41]. However, those BTGs and BTDs are usually used to measure tax aggressiveness. ETR modifications (ETRs), like cash-flow ETR (CFETR) or GAAP ETR, are often used for tax avoidance. CFETR represents cash tax paid over pre-tax income, whereas GAAP ETR represents total tax expense over pre-tax income.

An ETR is simply a tax rate applied by the taxpayer. Therefore, ETRs might not directly refer to tax avoidance, but the lower the ETR implies a lower rate applied by the company, which indirectly reflects a higher tax avoidance level [39]. An ETR is able to capture any form of tax reduction (legal or illegal) implied by tax shelters and loopholes in taxlaws [42; 44; 45].

Considering the advantages and drawbacks of several options of measurements for tax avoidance, we decide to measure tax avoidance using ETR and CFETR. ETR contains the total income tax expense, which includes deferred taxes and pre-tax income for the year [43]. Whereas CFETR, the data can be obtained from the cash flow statements and eliminate the impact of earnings management [41].

Foreign ownership is the independent variable in this study. It is measured by the percentage of foreign equity ownership in the company.

We include some variables in this study that we believe can influence tax avoidance. The control variables are firm size (measured by natural logarithms of total assets), leverage (long-term debt scaled by total assets), and capital intensity (net property, plant, and equipment scaled by total assets). Firm size is intended to seize and ease the effects of variation in firm investment, especially the tax-favoured assets.

Additionally, leverage is able to reduce tax payments for high-class businesses since loan interest is tax-deductible. By the accelerated depreciation method, usually using a proportional lifespan of the assets, capital intensity is able to reduce the effect on firms' effective tax rates (boosting tax avoidance) [8].

3.3. Model

This study tests whether foreign ownership can increase tax avoidance. We also consider other variables as controls that can influence tax avoidance levels. Thus, we withdraw our model as follows (Figure 1).

We employ two measurements of tax avoidance: ETR and CFETR, to ensure the strength of our model, as well as the ownership level (in decimals) by foreign investors as the measurement of foreign ownership level. The control variables: company size, leverage, and capital intensity, are also added to the model. Mathematically, the model looks like this:

$$TaxAvoid_{i,t} = a + B_1 Foreign_{i,t} + \\ + B_2 Size_{i,t} + B_3 Leverage_{i,t} + B_4 CapInt_{i,t},$$

where *TaxAvoid* is the tax avoidance measured by ETR and CFETR. *Foreign* is the foreign ownership measured by ownership level (in decimals) by foreign investors. *Size* is the company size (the natural logarithm of total assets), *Leverage* is the debt level (long-term debt scaled by total assets), and *CapInt* is the capital intensity (net property, plant, and equipment scaled by total assets).

4. Results

4.1. Descriptive statistics

Table 2 shows the descriptive statistics for all employed variables (dependent, independent, and control variables) in this research. In this paper, tax avoidance is measured by ETR and CFETR. The lower ETR represents a higher tax avoidance level. In the observation, we find that the minimum ETR (CFETR) is 0.01% (0.00%), which means that among these 100 most profitable companies,

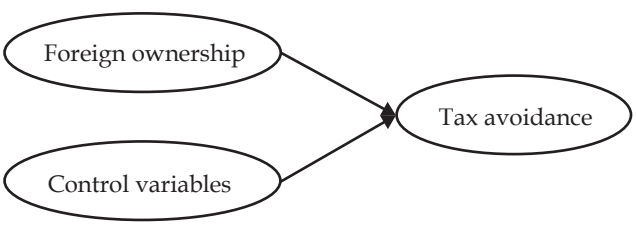

Figure 1. **Schematic of the model**

Table 2

Descriptive statistics

Indicators	N	Minimum	Maximum	Mean	Std. Deviation
ETR	500	0.001	0.590	0.150	0.090
CFETR	500	0.000	0.690	0.158	0.113
Foreign%	500	0.000	0.783	0.119	0.158
LNsize	500	10.190	21.440	14.380	1.452
PPE	500	0.002	0.791	0.330	0.238
Leverage	500	0.010	0.750	0.228	0.157
Valid N (listwise)	500				

some are paying almost no tax. On the other hand, the maximum ETR (CFETR) is 0.59% (0.69), which means that some of the companies apply tax rates more than the statutory tax rate. However, Thai companies' average effective tax rate is around 15%, which is still lower than the statutory tax rate of 20%.

Based on Table 2, the average ownership by foreign investors is 11.9%. Meanwhile, the minimum foreign percentage of the sample is 0%, and the maximum is 78.3%. It means that at least one sample has no foreign shareholders, and at least one company has 78.3% ownership by foreign investors. In Thailand, foreign shareholders can own up to 100% ownership of some companies under the Board of Investment (BOI).

The mean of assets growth (LNsize) is about 14.38 %, the minimum level of LNsize is 10.19 %, and the maximum level of LNsize is 21.44%. The mean of PPE is about 33%, the minimum level of PPE is 0.2 %, and the maximum level of PPE is 79.10%. On the other hand, the average leverage is about 22.80%, the minimum level of leverage is 1%, and the maximum level is 75%.

4.2. Regression Analysis

This subsection reports the regression analysis results for the relationships between tax avoidance with foreign ownership, company size, capital intensity, and leverage among Thailand's 100 most profitable companies. In Table 3, Foreign shares percentages show a negative and significant relationship with the ETR and CFETR at a 99% confidence level.

Moreover, LNsize shows a positive and significant relationship with the ETR and CFETR at 99% confidence levels, respectively. PPE shows a negative and significant relationship with the ETR and CFETR at 99% and 95% confidence levels, respectively. Leverage shows a negative and significant relationship with the ETR and CFETR at 95% confidence levels.

Table 3

Regression

Indicators	ETR	CFETR
Foreign%	–0.217**	–0.156**
LNsize	0.131**	0.155**
PPE	–0.160**	–0.113*
Leverage	–0.105*	–.092*

Note: * 95% confidence level; ** 99% confidence level

5. Discussion

In this paper, foreign shareholders own 11.86% on average within the samples, with the highest level reaching 78.26%, which is more than half of the ownership structure. It is also discovered that (at least) one company has no foreign shareholders, shown by the minimum value of 0.000. This result approves that foreign investor have considered Thailand an interesting country to invest in. This interest is influenced by Thailand's status as a developing country with low tax morality and tax rate, which is the lowest rate compared to other developing countries, which is 20%. Investors believe they will

be able to receive higher dividends with a low tax rate as the tax burden is comparatively lower. The insufficiency of the Thai government in tax regulations has also attracted the attention of foreign investors, who can easily submit tax planning to maximize their profits.

The result of this paper also provides adequate evidence to accept the hypothesis that foreign ownership increases tax avoidance in Thailand. The effective tax rate has a negative correlation with tax avoidance (a higher ETR implies less tax avoidance). Thus, the negative sign between foreign ownership and ETR (CFETR) implies that a higher level of foreign ownership causes a greater level of tax avoidance.

This finding is consistent with prior studies, which have revealed a positive relationship between foreign investors and tax avoidance [8; 10; 31]. In this case, foreign shareholders use their influence to expropriate benefits from domestic companies. This type of shareholders are mostly short-term investors and do not pay attention to the long-term performance and image of the investees.

Alkurdi & Mardini [31] have also proved that tax avoidance increases in foreign-owned Jordanian companies. Foreign owners effectively monitor the company, thus leading to higher opportunities for the firm to use tax avoidance. Foreign investors choose companies that are in countries that are in favour in terms of tax rates and tax planning.

Research from Salihu et al. [8] also has seen indications of tax avoidance in parent and host countries from multinational companies that utilize their international scale of operations. In developing countries, foreign direct investment is highly welcomed, but policymakers must be careful in assessing such investments as there is potential for income shifting.

However, some research has found that foreign shareholders tend to avoid risky decisions [5; 9]. Tax avoidance is considered a risky activity that could damage the image of the companies in the public eye. Therefore, strict foreign shareholders provide more control over this activity, and the higher concentrated companies have a more risk-averse manager that would be less likely to perform aggressive tax planning. Foreign shareholders who are strategic investors (making long-term investments) would not be interested in tax avoidance as they are concerned about the bad and long-term consequences of such activity. Hasan et al. [5] also approve that the higher the foreign ownership, the less tax avoidance occurs.

The need for foreign financing is very supportive of business development in a developing country. Investor interest in Thailand's tax characteristics is unavoidable, while local businesses urgently require supporting financing. As a result, the government's role in resolving and managing this problem is critical. Foreign involvement in a company should be considered by policymakers and regulators because foreign shareholders may be aggressive in tax avoidance.

6. Conclusion

This study examines the relationship between foreign shareholders and tax avoidance in the Thailand context. Thailand is not experiencing a severe corporate tax avoidance practice compared to its neighbouring countries. However, it is an interesting context as it has so much lower tax avoidance level, with a developing economy and a moderate level of protection towards minority shareholders. The observation data in this research is collected from the annual reports of the 100 most profitable companies in Thailand from 2015 to 2019.

This study confirms the acceptance of the hypothesis that foreign ownership can increase tax avoidance. It provides statistical evidence that foreign shareholders and tax avoidance have a positive relationship. This means that the higher level of foreign ownership, the higher level of tax avoidance. This finding is significant for understanding the tax behaviour of foreign shareholders within our samples. Our finding helps firms understand that foreign shareholders could motivate tax avoidance. This study also provides helpful information to the government, firms, and policymakers

who look to identify the determinants of tax avoidance and could assist readers in understanding the influence of foreign shareholders on tax avoidance.

This research has two limitations. First, it employs ETR and CFETR as tools to measure tax avoidance. Second, we only investigate the 100 most profitable listed companies in Thailand. Even though we have clear rationales for our sampling, we are aware that the findings of our paper might differ from future studies due to different techniques in drawing samples. We suggest two suggestions for future researchers interested in the same topic ideas.

First, future researchers might use other measurements or employ other measurements of tax avoidance. Second, the future researcher can expand their research into more samples, not only the profitable companies, or study other industries as some specific industries potentially are more tax avoidant than others.

Research on tax avoidance in Thailand's contexts could be considered novel. We are aware that the tax avoidance level in Thailand might not be as high as its neighbours. However, this phenomenon gets our attention since Thailand is a unique setting. So, we conclude that a higher foreign ownership level could increase tax avoidance in Thailand. Governments in the region might work together to minimize tax avoidance in foreign-influenced companies.

References

1. Cobham A., Garcia-Bernardo J., Palansky M., Mansour M.B. *The State of Tax Justice 2020: Tax Justice in the time of COVID-19*. Tax Justice Network; 2020. Available at: https://www.taxjustice.net/reports/the-state-of-tax-justice-2020/

2. West A. Multinational Tax Avoidance: Virtue Ethics and the Role of Accountants. *Journal of Business Ethics*. 2018;153(4):1143–1156. https://doi.org/10.1007/s10551-016-3428-8

3. International Finance Corporation. *Indonesia Corporate Governance Manual*, Second ed. Washington, D.C: World Bank Group; 2018. https://doi.org/10.1596/30122

4. Fang V.W., Maffett M., Zhang B. Foreign Institutional Ownership and the Global Convergence of Financial Reporting Practices. *Journal of Accounting Research*. 2015;53(3):593–631. https://doi.org/10.1111/1475-679X.12076

5. Hasan I., Kim I., Teng H., Wu Q. *The Effect of Foreign Institutional Ownership on Corporate Tax Avoidance: International Evidence*. Bank of Finland Research Discussion Paper No. 26/2016 https://doi.org/10.2139/ssrn.2829327

6. McGuire S.T., Wang D., Wilson R.J. Dual class ownership and tax avoidance. *Accounting Review*. 2014;89(4):1487–1516. https://doi.org/10.2308/accr-50718

7. Egger P., Eggert W., Winner H. Saving taxes through foreign plant ownership. *Journal of International Economics*. 2010;81(1):99–108. https://doi.org/10.1016/j.jinteco.2009.12.004

8. Salihu I.A., Annuar H.A., Obid S.N.S. Foreign investors' interests and corporate tax avoidance: Evidence from an emerging economy. *Journal of Contemporary Accounting and Economics*. 2015;11(2):138–147. https://doi.org/10.1016/j.jcae.2015.03.001

9. Badertscher B.A., Katz S.P., Rego S.O. The separation of ownership and control and corporate tax avoidance. *Journal of Accounting and Economics*. 2013;56(2–3):228–250. https://doi.org/10.1016/j.jacceco.2013.08.005

10. Shi A.A., Concepcion F.R., Laguinday C.M.R., Ong Hian Huy T.A.T., Unite A.A. An analysis of the effects of foreign ownership on the level of tax avoidance across Philippine publicly listed firms. *DLSU Business and Economics Review*. 2020;30(1):1–14. Available at: https://www.dlsu.edu.ph/wp-content/uploads/2020/08/1SHI-new.pdf

11. Cobham A., Janský P. Global distribution of revenue loss from corporate tax avoidance: re-estimation and country results. *Journal of International Development.* 2018;30(2):206–232. https://doi.org/10.1002/jid.3348

12. Fernández-Rodríguez E., García-Fernández R., Martínez-Arias A. Influence of ownership structure on the determinants of effective tax rates of Spanish Companies. *Sustainability*. 2019;11(5):1441. https://doi.org/10.3390/su11051441

13. Khan M., Srinivasan S., Tan L. Institutional ownership and corporate tax avoidance: new evidence. *Accounting Review*. 2017;92(2):101–122. https://doi.org/10.2308/accr-51529

14. Mindzak J., Zeng T. Pyramid ownership structure and tax avoidance among Canadian firms. *Accounting Research Journal*. 2019;33(1):16–33. https://doi.org/10.1108/ARJ-02-2017-0036

15. Sonia S., Suparmun H. Factors Influencing Tax Avoidance. In: *5th Annual International Conference on Accounting Research (AICAR 2018)*. 2019:238-243. https://dx.doi.org/10.2991/aicar-18.2019.52

16. Slemrod J., Yitzhaki S. Tax avoidance, evasion, and administration. In: *Handbook of Public Economics*. 2002;3:1423-1470. https://doi.org/10.1016/S1573-4420(02)80026-X

17. Wang F., Xu S., Sun J., Cullinan C.P. Corporate Tax Avoidance: A Literature Review and Research Agenda. *Journal of Economic Survey*. 2020;34(4):793–811. https://doi.org/10.1111/joes.12347

18. Mohamad A., Zakaria M.H., Hamid Z. Cash economy: Tax evasion amongst SMEs in Malaysia. *Journal of Financial Crime*. 2016;23(4):974–986. https://doi.org/10.1108/JFC-05-2015-0025

19. Marzuki M.M., Syukur M. The effect of audit fees, audit quality and board ownership on tax aggressiveness: evidence from Thailand. *Asian Review of Accounting*. 2021;29(5):617–636. https://doi.org/10.1108/ARA-11-2020-0179

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

21. Napitupulu I.H., Situngkir A., Edelia A. Triggers of Tax Avoidance Practices in Indonesia. *International Journal of Economics, Business and Management Research*. 2019;3(11):185–191. Available at: https://ijebmr.com/uploads/pdf/archivepdf/2020/IJEBMR_472.pdf

22. Lipatov V. Corporate tax evasion: The case for specialists. *Journal of Economic Behavior & Organization*. 2012;81(1):185–206. https://doi.org/10.1016/j.jebo.2011.09.015

23. Hanlon M., Heitzman S. A review of tax research. *Journal of Accounting and Economics*. 2010;50(2–3):127–178. https://doi.org/10.1016/j.jacceco.2010.09.002

24. De Andres P., Azofra V., Lopez F. Corporate Boards in OECD Countries: size, composition, functioning and effectiveness. *Corporate Governance*: *An International Review*. 2005;13(2):197–210. https://doi.org/10.1111/j.1467-8683.2005.00418.x

25. Bauer T., Kourouxous T., Krenn P. Taxation and agency conflicts between firm owners and managers: a review. *Business Research*. 2018;11(1):33–76. https://doi.org/10.1007/s40685-017-0054-y

26. Evana E. The Effect of State Ownership Structure, Investment Decision, and Fiscal Tax Loss Compensation Toward Tax Avoidance on Manufacturing Companies Listed on IDX in 2015. *Review of Integrative Business and Economics Research*. 2019;8(Suppl. 1):202–126. Available at: http://buscompress.com/uploads/3/4/9/8/34980536/riber_8-s1_17_k18-022_202-216.pdf

27. Zemzem A., Ftouhi K. Moderating Effects of Board of Directors on the Relationship between Tax Planning and Bank Performance: Evidence from Tunisia. *European Journal of Business and Management*. 2013;5(32):148–154. Available at: https://core.ac.uk/download/pdf/234625178.pdf

28. Frank M.M., Lynch L.J., Rego S.O. Tax Reporting Aggressiveness and Its Relation to Aggressive Financial Reporting. *The Accounting Review*. 2009;84(2):467–496. https://doi.org/10.2308/accr.2009.84.2.467

29. Tang T., Firth M. Can book–tax differences capture earnings management and tax Management? Empirical evidence from China. *The International Journal of Accounting*. 2011;46(2):175–204. https://doi.org/10.1016/j.intacc.2011.04.005

30. Tang T., Mo P.L.L., Chan K.H. Tax Collector or Tax Avoider? An Investigation of Intergovernmental Agency Conflicts. *The Accounting Review*. 2017;92(2):247–270. https://doi.org/10.2308/accr-51526

31. Alkurdi A., Mardini G.H. The impact of ownership structure and the board of directors' composition on tax avoidance strategies: empirical evidence from Jordan. *Journal of Financial Reporting and Accounting*. 2020;18(4):795–812. https://doi.org/10.1108/JFRA-01-2020-0001

32. Barros V., Sarmento J. M. Board meeting attendance and corporate tax avoidance: Evidence from the UK. *Business Perspectives and Research*. 2020;8(1):51–66. https://doi.org/10.1177/2278533719860021

33. Yoo T., Koh Y. Agent or structure for principal–principal conflicts? Audit firms versus foreign ownership in the Asian context. *Asian Business & Management*. 2014;13(4):309–332. https://doi.org/10.1057/abm.2014.11

34. Demirgüç-Kunt A., Huizinga H. The taxation of domestic and foreign banking. *Journal of Public Economics*. 2001;79(3):429–453. https://doi.org/10.1016/S0047-2727(00)00071-2

35. Bradshaw M., Liao G., Ma M.S. Agency costs and tax planning when the government is a major shareholder. *Journal of Accounting and Economics*. 2019;67(2–3):255–277. https://doi.org/10.1016/j.jacceco.2018.10.002

36. Huizinga H., Nicodème G. Foreign ownership and corporate income taxation: An empirical evaluation. *European Economic Review*. 2006;50(5):1223–1244. https://doi.org/10.1016/j.euroecorev.2005.02.004

37. Wen W., Cui H., Ke Y. Directors with foreign experience and corporate tax avoidance. *Journal of Corporate Finance*. 2020;62:101624. https://doi.org/10.1016/j.jcorpfin.2020.101624

38. Chen S., Huang Y., Li N., Shevlin, T. How does quasi-indexer ownership affect corporate tax planning? *Journal of Accounting and Economics*. 2019;67(2–3):278–296. https://doi.org/10.1016/j.jacceco.2018.01.001

39. Dyreng S.D., Hanlon M., Maydew E.L. Long-run corporate tax avoidance. *The Accounting Review*. 2008;83(1):61–82. https://doi.org/10.2308/accr.2008.83.1.61

40. Richardson G., Taylor G., Lanis R. The impact of board of director oversight characteristics on corporate tax aggressiveness: An empirical analysis. *Journal of Accounting and Public Policy*. 2013;32(3):68–88. https://doi.org/10.1016/j.jaccpubpol.2013.02.004

41. Chen X., Hu N., Wang X., Tang X. Tax avoidance and firm value: evidence from China. *Nankai Business Review International*. 2014;5(1):25–42. https://doi.org/10.1108/NBRI-10-2013-0037

42. Dyreng S.D., Hanlon M., Maydew E.L., Thornock J.R. Changes in corporate effective tax rates over the past 25 years. *Journal of financial economics*. 2017;124(3):441–463. https://doi.org/10.1016/j.jfineco.2017.04.001

43. Frey L. Tax certified individual auditors and effective tax rates. *Business Research*. 2018;11(1):77–114. https://doi.org/10.1007/s40685-017-0057-8

44. Landry S., Deslandes M., Fortin A. Tax Aggressiveness, Corporate Social Responsibility, and Ownership Structure. *Journal of Accounting, Ethics & Public Policy*. 2013:14(3):611–645. https://doi.org/10.2139/ssrn.2304653

45. Lanis R., Richardson G. The effect of board of director composition on corporate tax aggressiveness. *Journal of Accounting and Public Policy*. 2011:30(1):50–70. https://doi.org/10.1016/j.jaccpubpol.2010.09.003

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Rationality of the Tax and Economic Behavior of Enterprises in the Russian Forestry Sector

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ABSTRACT
The study focuses on the problem of rationality of economic entities, in particular the rationality of their tax and economic behavior in a given period. The data on enterprises in the Russian foreign sector are used to examine the relationship between the levels of rationality observed in their economic and tax behavior. The representative sample includes 1,206 micro-, small and medium-sized enterprises that specialize in logging, wood processing and wholesale timber trade and have forest lease agreements. The study covers the period from 2017 to 2021. Rationality of corporate behavior is understood as profit maximizing behavior or, in other words, as companies' pursuit of maximum utility. Our theoretical review of the research on rationality in economic and tax behavior has led us to formulate the following assumptions. In economic behavior, rationality manifests itself primarily in companies' efforts to improve the efficiency of resource use (labor, finance, and tangible assets). Rationality in tax behavior is associated with companies' efforts to minimize their tax expenditures. Therefore, to assess the rationality of economic behavior, we used such indicators as labor productivity, return on own capital, return on borrowed capital, return on fixed assets, return on operating assets, business profitability, the stage of the lifecycle, and tax risk management. To assess rationality of tax behavior, we estimated the level of audit risk, that is, each company's chances of being audited. Our study has confirmed the hypothesis that the rationality of tax and economic behavior has an inverse relationship. In other words, the more rational is the economic behavior of a firm, the less rational is its tax behavior. The strength of this relationship is impacted by three main factors: 1) the size of a business; 2) the level of opportunism; and 3) the type of activity. For the enterprises in the forestry sector covered by our analysis, we found that a change in the level of rationality of their tax behavior in 72.9% of cases leads to a change in the level of rationality of their economic behavior.

KEYWORDS
tax behavior, economic behavior, rationality of behavior, economic entity, forestry sector, correlation, size of business, type of activity, opportunism

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Рациональность налогового и экономического поведения предприятий лесопромышленного комплекса России

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АННОТАЦИЯ
Исследование посвящено изучению основных положений концепции рациональности, когда деятельность хозяйствующего субъекта за определенный период времени исследуется одновременно с позиций проявления его нало-

гового и экономического поведений. Цель исследования – провести оценку рациональности налогового и экономического поведения предприятий лесопромышленного комплекса России, а также определить наличие взаимосвязи между уровнями рациональности двух видов поведения. Репрезентативная выборка исследования составила 1206 микро, малых и средних предприятий, занятых в лесозаготовке, распиловке и оптовой торговли древесиной. Выборка формировалась из предприятий, у которых заключены договоры аренды лесных участков. Период исследования 2017–2021 гг. Под рациональностью корпоративного поведения понималась деятельность предприятий, направленная на максимизацию выгод. При этом максимизация выгод определялась как максимальная полезность для предприятия. По результатам теоретического обзора сущности понятия рациональности экономического и налогового поведения принято допущение, что в экономическом поведении рациональность проявляется в стремлении максимально использовать имеющиеся трудовые, финансовые и материальные ресурсы, а в налоговом поведении рациональность выражается в минимизации издержек. Соответственно, для оценки рациональности экономического поведения применялись такие показатели, как производительность труда, рентабельность собственного капитала, рентабельность заемного капитала, фондоотдача, рентабельность оборотных активов, рентабельность экономической деятельности, уровень развития предприятия, саморегулирование налоговых рисков. Рациональность налогового поведения оценивалась уровнем налогового риска. По результатам исследования подтверждена гипотеза, что рациональность налогового и экономического поведений имеет обратную взаимосвязь: чем выше рациональность экономического поведения, тем ниже рациональность налогового поведения. При этом на величину корреляции в данную взаимосвязи оказывают влияние три основных фактора: (1) масштаб предпринимательской деятельности; (2) уровень оппортунизма; (3) вид деятельности. По трем исследуемым видам деятельности изменение значения уровня рациональности налогового поведения в 72,9% случаев приводит к изменению значения уровня рациональности их экономического поведения.

КЛЮЧЕВЫЕ СЛОВА

налоговое поведение, экономическое поведение, рациональность поведения, хозяйствующий субъект, лесной сектор, взаимосвязь, масштаб бизнеса, вид деятельности, оппортунизм

1. Introduction

Rationality is an abstract philosophical concept that underlies the majority of approaches to the study of human behavior in different disciplines.

The rationality principle is often seen as crucial to modern economic theory. The evolution and expansion of this concept reflects major trends in the development of economics and its specific areas of study. Nowadays, a vast body of research provides evidence that there are in fact different degrees of agent rationality, ranging from relatively rational to completely irrational behavior. Most of the modern studies dealing with this problem are focused on the two key questions: what motivates economic entities to act rationally? and can an economic entity behave rationally?

The assumption of perfect rationality in decision-making was challenged by behavioral economists, which led to a major revision in the concept of rationality, although it still remains one of the cornerstones of the theoretical models of tax behavior and economic behavior.

The common points shared by the theories of tax and economic behavior are mostly centred around the concept of rationality, which defines the evolution and relationship of these research areas. It should be noted, however, that in both of these behavior models, rationality as the maximization of the objective function is characterized by different resource constraints, different goals, and different mechanisms of justification.

The relevance of this study stems from the fact that it seeks to bring together

the main concepts of rationality for the analysis of the interrelation between the manifestations of rationality in tax and economic behaviour of firms.

To this end, we are going to examine the rationality of the tax and economic behavior of micro-, small and medium-sized enterprises in Russia specializing in logging, wood processing and wholesale timber trade. The period covered by the study is from 2017 to 2021. We intend to examine rationality for the whole forestry sector and for specific types of economic activity.

The *research questions* are as follows:

1. Can the behavior of an economic entity be considered rational when viewed simultaneously from the perspective of its economic performance and its tax-related decisions?

2. Is there a connection between the rationality of tax behavior and the rationality of economic behavior of a firm?

The purpose of the study is to assess the rationality of tax and economic behavior of enterprises in the Russian forestry sector and to examine the relationship between the levels of rationality these companies exhibit in these two types of behavior.

We are going to test the *following hypotheses*:

H1. The behavior of economic entities can be described as rational both in terms of their economic behavior (profit maximization) and at the same time as irrational in their tax-related decision-making.

H2. There is an inverse relationship between the rationality of tax behavior and the rationality of economic behavior of firms.

2. Literature review

In this section, we are going to survey four groups of writings: first, studies dealing with the problem of rationality in economic behavior; second, studies dealing with rationality in the economic behavior of firms; third, studies devoted to rationality in the tax behavior of firms; and, finally, studies discussing the relationship between rationality in the economic and tax behavior of firms.

2.1. Rationality of economic behavior

Smith [1] put forward the concept of a rational economic man – *homo economicus*, which is one of the core concepts of the classical school: not only is homo economicus completely rational but he also has access to complete information and unlimited resources when making his decisions [1].

Walras [2] used mathematical methods (including modeling) to substantiate the concept of a rational economic man. Walras [2] and Marshall [3], who are among the founding fathers of neoclassical economic theory, expanded the concept of homo economicus. From the neoclassical perspective, the egoistic motivations guiding the choices of homo economicus are affected by various factors of production (personification).

Neumann & Morgenstern [4] formulated the expected utility theory and showed that in a situation when an individual agent is faced with several options (lotteries), their behavior can be described as rational if they choose the optimal option, that is, the one that maximizes the expected utility. The expected utility as a concept and measurable indicator includes two main components: probability and utility amount. The expected utility theory also takes into account the decision-maker's attitude to risk. Probabilities are assumed to be "objective" (random events of exogenous nature) and are the same for all economic actors.

Savage [5] formulated the theory of risk attitudes, differentiating between two types of behavior – risk-averse and risk-seeking.

The theoretical analysis conducted by Harstad and Selten [6] led them to the conclusion that all neoclassical models are based on the premise that economic decision-making can be reduced to the (rational) maximization of profit or utility.

Simon [7] proposed the concept of bounded rationality to describe the process of decision-making based on limited information. He argues that a person who makes a choice in everyday life and is faced with a variety of alternatives will not rationally analyze and compare each

of the proposed alternatives, but will establish a criterion (the level of aspiration) that the alternative must meet in order to be acceptable (or "good enough") rather than optimal.

Simon's [8; 9] bounded rationality theory comprises the following theoretical provisions:

Multiple goals theory. Since it is difficult to find an absolutely best goal in real economic activity, the possibility of finding an absolutely optimal solution in the real world is extremely small [8].

Cognitive limits theory. Since people need to take into account not only quantifiable economic benefits, but also non-quantifiable factors such as social and environmental benefits, they often cannot make accurate decisions and forecasts [9].

Theory of resource scarcity. Being "bounded" by limitations, e.g. time constraints, people often make suboptimal decisions [9].

Lichtenstein & Slovic [10] used the methods of experimental economics to demonstrate the drawbacks of classical economics in dealing with the problem of rational economic behavior. They were the first to describe the phenomenon of reversals of preference.

Kahneman & Tversky [11], the fathers of behavioral economics, formulated the theory of prospects and put forward the principle of limited rationality, which takes into account subjective probabilities, thus contradicting the axioms presented by von Neumann & Morgenstern [4].

Hayek [12] formulated the evolutionary theory of rationality. He distinguishes between two kinds of rationalism – evolutionary (or critical) and constructivist. These types of rationalism correspond to two distinct schools of thought – the French rationalist and the British evolutionary traditions – and the two different approaches to the understanding of human reason. While constructivist rationalism is characterized by a profound regard for the constructive powers of reason and attributes social order to rational design, evolutionary rationalism, on the contrary, emphasizes the limits to the constructive powers of reason and sees social order as an unintended outcome of the long process of social evolution. According to Hayek [13], society should be understood as an organism that contains a multiplicity of interconnected elements but due to the limitations of the human mind, people are incapable of fully understanding what is going on within this extremely complex "organism".

Becker [14] laid the foundations for the theory of rational households by putting forward two fundamental ideas: first, that economic decisions are taken by the family and not by individuals; and, second, that the family is economically rational.

Zouboulakis [15] traced back the historical evolution of the rationality concept and identified 12 main ways of approaching it. He divides these interpretations (or varieties) of economic rationality into two groups: the initial concept (Adam Smith's concept of homo economicus) and the more complicated visions co-existing in contemporary economics (the common knowledge theory, theory of rational expectations, theory of rational households, and the theory of standard rationality).

Jones [17] confirmed that the rationality assumption in economics, including the above-described interpretations, in fact, stems from Adam Smith's rational choice theory. From this perspective, bounded rationality may be seen as an attempt to redefine the concept of economic rationality and to make the classical models of rationality somewhat more realistic.

It should be noted that the concept of a rational economic man (economic actors are "economically rational") underlies much of the contemporary research in this field. Economic rationality is seen primarily in terms of optimization: consumers seek to maximize utility while manufacturers maximize their profit and minimize their costs.

The multitude of approaches to the key concepts such as utility, risk, uncertainty, and probability is reflected in the diversity of extensions and applications resulting from the evolution of the homo economicus concept.

2.2. Rationality of the economic behavior of firms

Smith [1], the founder of the traditional (economic) theory of the firm, saw it as a production (technological) unit whose activity is described by the production function and whose goal is to maximize profits.

Cyert & March [18] formulated the behavioral theory of the firm that views it as a coalition of key stakeholders – individuals and groups. They believed that a firm may pursue multiple goals and most of firms' strategic goals fall into one of the five key categories: production; inventory; market share; sales and profits.

Nelson & Winter [19] developed the evolutionary theory of the firm, according to which firms evolve while being subjected to the pressure of internal and external selection. Due to incomplete information and their limited information-processing capacity, firms cannot rationally choose optimal alternatives. To survive, however, firms need to choose the right strategies (the choice is determined by their corporate philosophy) in order to adapt to the surrounding economic environment but sometimes their survival is merely a matter of luck and chance.

Veblen [20] proposed the institutional theory of the firm, which defines the firm as a system of internal and external contracts. He argued that the firm's performance reflects the key characteristics of society's organization.

Knight [21] examined categories of risk and uncertainty in entrepreneurial activity and found that a rational reaction to uncertainty would be to reduce it to 'measurable' uncertainty (or risk) or, if it is impossible, to avoid investing altogether. Knight believed that rational decisions are only possible under risk, which implies the need to compute expected values and determine whether the situation provides adequate compensation for the capital placed at risk.

Knight [21] also proposed a theory of rational entrepreneurship, positing that entrepreneurs have the ability to convert situations of uncertainty into situations of risk. Rational entrepreneurs accrue profits because their decision-making is based on probabilistic estimates that are clearer and more attractive than what others perceive.

The studies of the relationship between risk and rational economic behavior can be roughly divided into three groups depending on their understanding of what lies at the core of entrepreneurial activity: 1) opportunities recognition; 2) opportunities discovery; and 3) opportunities creation. Let us look at each of them in more detail.

1. *Entrepreneurial process as opportunities recognition*

Norton & Moore [22] in their discussion of the difference between entrepreneurial and non-entrepreneurial decision-making argue that entrepreneurs can use disparate information and estimate probabilities that differ in their values and accuracy. This concept of risk agrees with the notion of rationality as the maximization of subjective utility of a possible outcome weighted according to the probability that the act will lead to that outcome. The risk stems from our inability to predict the changes in the environment (there is more than one state with a non-zero probability of occurrence). Rational entrepreneurs seek to control or hedge unforeseen circumstances affecting their companies' performance.

Wiklund & Shepherd [23] associate rationality in entrepreneurship with prior knowledge and experience.

Chitsaz et al. [24] interpret the concept of rationality in relation to the knowledge, skills, and abilities of entrepreneurs. The rational behavior of entrepreneurs enables them to make predictions and manage their expectations about future entrepreneurial projects.

Pokrovskaya [25] argues that the rationality of economic behavior should be defined as a function of effectiveness determined as a ratio of goals to resources. She relies on the principle of resource constraints and trade-offs and shows that when seen in the short term, rationality is mostly understood from the perspective of the classical economic approach, while in the long term, it corresponds to the institutional and sociological approach. The

achievement of rationality in the mid- or long-term is possible only by regulating economic behavior through the implementation of common reference frameworks and agreements.

Yeşilyurt & Türker [26] contend that economic rationality defined as the achievement of a certain outcome with minimum spending is important in ensuring economic sustainability.

2. *Entrepreneurial process as opportunities discovery*

Gavetti & Levinthal [27] found that the search for opportunities in entrepreneurship can be cognitive and experiential. Experiential-based logic of choice is described as "backward-looking" wisdom, accumulated as a result of "positive and negative reinforcement of prior choices" The cognitive (or forward-looking) approach includes thought experiments and modeling of action-outcome linkages.

Huber [28] found that the search for opportunities may also happen when an entrepreneur is learning by observing the experience of other firms.

Gavetti et al. [29] in their study of analogical reasoning in managerial decision-making found that the personal experience of a firm's owner or top manager stimulates rational decision-making and reduces the risks inherent in the entrepreneurial search for opportunities.

Miller [30] conducted a theoretical review of the academic literature on rationality and risk in the entrepreneurial search for opportunities and found that this process is usually aimed at finding a satisfactory, rather than an optimal, result. He found that although the dimensions in which the goals for the owners and managers of enterprises are defined are exogenously given, their aspirations adapt based on their own experience as well as the experiences of others in a relevant reference group.

Aldrich & Zimmer [31] studied rationality in entrepreneurship in the light of the social network's theory. A social network is seen as a potential source of human capital for an entrepreneur: the more access an entrepreneur has to human capital, the more expertise he or she has, the more rational is his or her behavior.

Jia et al. [32] propose a new concept of CEO reflective capacity as a behavior-oriented cognitive capability. This concept is particularly relevant to dynamic and complex environments where the cognitive capacity of the top management can provide the company with a significant competitive advantage, thus ensuring its long-term resilience and viability.

Hogarth & Karelaia [33] apply the modeling method to show that entrepreneurs may demonstrate rational as well as irrational (or "boundedly rational") behavior. Rational behavior is understood here as a process of decision-making in the situation of a trade-off that involves enhanced information processing according to established rules but takes more time than intuitive choices.

3. *Entrepreneurial process as opportunities creation*

Littlechild [34] connected rationality in entrepreneurial activities with the creation of entrepreneurial opportunities. He compared three types of market processes – neoclassical, Austrian and radical subjectivist. The neoclassical model characterizes future prospects in terms of a probability distribution over known possible states. The Austrian model allows for present ignorance and the discovery of new possibilities in the future. The radical subjectivist model emphasizes the role of human imagination in creating future possibilities that would otherwise not exist. In Littlechild's words, "the future is not so much unknown as it is non-existent or indeterminate at the time of the decision. The agent's task is not to estimate or discover, but to create" [34].

Alvarez & Barney [35] argue that entrepreneurial opportunities do not exist before an entrepreneur starts to take action.

Hatchuel [36] defines opportunities formation as a creative process involving unconventional thinking and the ability to see new opportunities in vague or ill-defined problems.

Agarwal et al. [37] argue that in socio-economic systems, creativity is bound

to engender risk, only a certain part of which is borne by the enterpreneur who has started a new venture. What one person or firm considers an act of creative construction, others may see as creative destruction.

Sarasvathy [38] found that rationality in the economic behavior of a firm engaging in opportunity creation is determined by causal reasoning, which requires setting clearly defined goals and examining the particular set of means or causes available to realize these goals. She believes that rational entrepreneurship starts with identifying accessible resources and choosing one of the possible goals. Preferences and more specific goals in entrepreneurial activity are formed only in the process of realization. Formation of preferences is a continuous learning process in which the entrepreneur's choices matter along with other social and situational factors.

Miller [30] showed that entrepreneurship stems not only from foresight (valuations of probabilistic payoffs) but also from hindsight (learning from past experiences) as well as from insights resulting from the entrepreneur's self-awareness.

Troise et al. [39] used statistical analysis to show that the prevalence of intuition-related and rationality-related factors in entrepreneurship depends on the specific national and cultural contexts as well as on specific time periods.

Thus, it should be noted that the above-described variety of co-existing theories of entrepreneurship and behavioral theories reflects the complexity of the entrepreneurial process. The latter, in its turn, is considered in the light of three key aspects: a) opportunity recognition; b) opportunity discovery; and c) opportunity creation. These aspects correspond to different understandings of rational economic behavior. While the idea of opportunity recognition is more in line with the expected utility theory, the idea of opportunity discovery and creation fits well into the theory of bounded rationality.

The prevailing view is that in their rational decision-making, firms seek to maximize their expected utility. It should be noted, however, that the three above-mentioned aspects of entrepreneurship are inextricably connected with each other and that it is precisely this interrelationship that is essential for the existence of entrepreneurial activity as such. Thus, a firm's rational economic behavior implies not only profit maximization but also the efficient use of limited resources and ensuring its stable development in the long term.

2.3. Rationality of the tax behavior of firms

Allingham & Sandmo [40] put forward the classical model of tax behavior based on the rational choice of a taxpayer to evade taxes or not under uncertain conditions.

Neumann & Morgenstern [4] demonstrated that in their choices to comply with tax requirements or not, taxpayers seek to maximize their expected utility. In relation to tax behavior, the expected utility theory makes the following assumption: an economic entity will continue evading taxes until the point when the government decides to tighten the screws by imposing a rigorous penal policy.

Coricelli et al. [41] examined the relationships between emotions, deception, and rational decision-making by means of an experiment on tax evasion. They found that the intensity of anticipated and anticipatory emotions before reporting income positively correlates with both the decision to cheat and the proportion of evaded income. The risk of being subjected to a tax audit, which strengthens the emotional dimension of cheating, favours tax compliance and makes tax behavior less rational.

It can be said that the fundamental model of tax behavior relies on the classical concept of the rationality of homo economicus. The rationality of tax behavior is usually defined as the desire to maximize benefits and minimize tax expenditures. The "red flags" indicating non-compliance of firms are usually determined by each country's own tax laws and regulations. The significant constraints that may shape tax behavior include the chances of being audited, tax penalties, and tax rates.

2.4. Relationship between rationality in the economic and tax behavior of firms

Dabla-Norris et al. [42] investigated the causal impact of the productivity of firms operating within the same industry in developing countries on their tax evasion and found that productivity improvements can lead to lower tax evasion.

Bachas et al. [43] showed the impact of taxation on firms' performance depending on the size of the firm in different countries.

Blackburn et al. [44] revealed a link between firms' financial development and tax evasion.

Labunets & Mayburov [45] showed a strong direct relationship between audit risk and opportunism in the tax behavior of economic actors by analyzing the behavior of firms in the Russian forestry sector. The indicator "Return on fixed assets" was used to detect the relationship between audit risk and the level of opportunism in tax behavior. They found that firms' propensity for non-compliance has a negative influence on the development of their material and technical potential.

Alm et al. [46] argue that companies facing financial constraints are more likely to evade taxes, mostly because evasion helps them deal with the issues created by financial constraints. The effects of financial constraints are heterogeneous across firm ownership, firm age, and firm size.

Fajnzylber et al. [47] in their review of research literature on this topic show that the firms that opt for operating formally show higher levels of productivity.

Gordon & Li [48] reveal the positive impact of the use of the financial sector by manufacturing firms on tax compliance because the economic benefits these firms gain are inseparable from the resulting tax liabilities. In other words, getting loans and other services from banks automatically puts companies in the spotlight of tax authorities because this way they can get access to these companies' records and information about their transactions.

Sarte [49] found that tax evasion and informal activities are associated with lower aggregate income levels and lower productivity.

La Porta & Shleifer [50] showed a cross-country correlation between the productivity of firms and the propensity to go formal and comply with tax requirements.

Thus, the up-to-date research evidence points to the connection between the financial, material, and technological development of a firm and the level of tax evasion in its behavior. These findings underpin the hypotheses that are tested in this study and determine the avenues for further research on rational economic and tax behavior.

3. Methodology and data

3.1. Sampling of enterprises

For our study, we built a sample of micro-, small, and medium-sized enterprises in different segments of the forestry sector. In total, the sample comprises 1,206 units. The sample included enterprises in the Russian forestry sector, specializing in logging, wood processing, and wholesale timber trade.

For our sample, we selected only the firms that were registered until 01.01.2017 and that had forest lease agreements. The latter condition is necessary to make sure that the companies included in our sample are not shell companies but are actually engaged in business operations or have significant assets.

The study covers the period from 2017 to 2021.

The key characteristics of the enterprises in our sample (size, type of activity, etc.) are shown in Table 1.

The sample and general population are statistically homogeneous. The representative sample makes up 20.3% of the general population of all enterprises in the forestry sector in Russia.

3.2. Assessment of the rationality of tax behavior

The rationality of tax behavior was assessed by looking at the level of audit risk, that is, companies' chances of being audited. The level of audit risk for each firm in the sample was determined for each year of the given period. This indica-

Table 1

Sample of enterprises of the Russian forestry sector by size, units

No.	Type of activity	Number of enterprises by size			Total	Number of enterprises by size			Total
		Medium-sized	Small	Micro		Medium-sized	Small	Micro	
1	Logging	13	245	496	754	24	328	975	1327
2	Wood processing and manufacture of products of wood and cork	10	156	195	361	31	755	2883	3669
3	Wholesale timber trade	2	25	86	113	5	95	957	1057
Total		25	426	777	1228	60	1178	4815	6053

Table 2

Relationship between audit risk and the rationality of tax behavior

No.	Level of audit risk	Degree of minimization of tax expenditures	Level of rationality
1	Low audit risk (higher than normal audit risk results in 0-1 criterion)	low	high
2	Medium audit risk (higher than normal audit risk results in 2-3 criteria)	medium	medium
3	High audit risk (higher than normal audit risk results in 4 or more criteria)	high	low

tor is defined as the accumulated indicator of misstatements that were detected by comparing the calculated values in the criteria described in the Conceptual Framework for the On-Site Tax Audit Planning System with their normative values. This method of assessing audit risk levels was tested in our previous studies [45].

The highest level of rationality is achieved if companies manage to minimize their tax expenditures through tax avoidance and evasion. Table 2 shows the relationship between the level of audit risk and the rationality of tax behavior.

3.3. Assessment of the rationality of economic behavior

To assess the rationality of economic behavior, we examined how efficiently companies use their economic resources: labor, capital, land, entrepreneurial activity, and information.

The indicators reflecting the efficiency of resource use by each enterprise in our sample are described in Table 3.

The efficiency of resource use was calculated for each enterprise in our sample for each year of the given period. The calculations were performed according to the following procedure.

1. *Labor productivity*. This indicator was calculated as a ratio of specific output to the average number of employees engaged in its production.

Output in monetary terms is understood here as the revenue received by a given company. This indicator was calculated for all the enterprises – small and medium-sized. For micro-enterprises, we calculated labor productivity only for those companies that had at least 10 employees. This staff size is the required minimum for companies in the Russian forestry sector[1].

[1] The Decree of the Ministry of Labor of the Russian Federation of 21.04.1993 No. 90 "Intersectoral Output Standards, Standards of Time and Staff Number for the Preparatory and Auxiliary Activities in the Logging Industry".

Since each enterprise had a forest lease contract, we assume that all enterprises in the sample could engage in logging. This assumption was confirmed by the analysis of the enterprises' reports on the volume of timber output. These data are available from the federal accounting data system of the forestry industry (LesEGAIS).

Thus, we did not calculate labor productivity for enterprises with less than 10 employees. These enterprises were automatically classified as enterprises failing to use labor efficiently.

2. *Return on own capital*. This indicator was calculated as the ratio of a company's net profit to its average equity capital. "Own capital" is understood as all the assets owned by the enterprise, including registered capital, surplus capital, reserve funds, and retained earnings. The amount of a company's own capital was determined by looking at line 1300 ("Total Equity") in the balance sheet report.

3. *Return on borrowed capital*. This indicator was calculated as the ratio of net profit to the average amount of borrowed funds. The amount of borrowed funds was understood as the sum of short-term and long-term borrowed funds and was calculated as the sum of the figures cited in lines 1400 and 1500 in the balance sheet report.

4. *Return on fixed assets*. This indicator was calculated as the ratio of the company's revenue to the amount of fixed assets for each year of the given period.

5. *Return on operating assets*. This indicator was calculated as the ratio of net profit to the enterprise's operating assets. Operating assets are cited in line 1200 of the balance sheet report.

6. *Business profitability (profitability of production)*. This indicator was calculated as the ratio of profit to production costs.

7. *Stage of the enterprise's life cycle*. The life cycle stage of a business was determined by applying the methodology described in our previous study (see [45]).

Table 3

Indicators characterizing the efficiency of resource use

No.	Economic resource	Efficiency of resource use	Description
1	Labour	Labor productivity	This indicator measures the efficiency of the workforce and shows output per one employed worker.
2	Capital	Return on own capital	This indicator determines the return on the invested funds of the owners and on borrowed funds, respectively.
		Return on borrowed capital	This indicator characterizes the efficiency of the use of borrowed funds.
3	Land, tangible assets and technological potential	Return on fixed assets	This indicator shows the efficiency of the use of fixed assets.
		Return on operating assets	This indicator shows the efficiency of the use of operating assets.
4	Entrepreneurial activity	Business profitability (profitability of production)	This indicator characterizes the overall performance of the given enterprise.
		Stage of life cycle	This indicator shows which phase of the life cycle the given enterprise is currently in.
5	Access to information	Tax risk management	This indicator reflects the company management's ability to use the available information effectively to avoid unnecessary tax costs, whilst ensuring compliance with legislative requirements.

8. *Tax risk management*. This indicator reflects the effectiveness of managerial decision-making regarding the company's compliance with the criteria described in the Conceptual Framework for the On-Site Tax Audit Planning System.

The former six indicators are quantitative. The latter two indicators (the stage of the company's life cycle and tax risk management) are qualitative and were not included in our calculations but were used as auxiliary parameters to reveal the connection between the rationality of tax behavior and the rationality of economic behavior.

The procedure for determining the level of rationality of economic behavior is shown in Figure 1.

If the calculated value in a specific indicator corresponded to the normative value, then in this indicator the company was assigned 0, otherwise, it was assigned 1.

The normative values for each indicator are shown in Table 4.

For each enterprise, we have measured the rationality of their economic behavior in a given year by looking at six quantitative indicators. As a result, the following levels of rationality were identified:

1) *high level of rationality*: the results in all the indicators correspond to the normative values or only one indicator does not correspond to the normative value;

2) *medium level of rationality*: the results in 2–3 indicators do not correspond to the normative values;

3) *low level of rationality*: the results in 4 or more indicators do not correspond to the normative values.

The rationality of the economic and tax behavior of enterprises in the given period was analyzed by looking at the whole sector as well as specific types of economic activity within the sector.

3.4. Assessment of the relationship between levels of rationality of economic and tax behavior

To find the relationship between the rationality of economic and tax behavior, we applied the method of correlation regression analysis. This relationship was evaluated at the final stage following the evaluation of the rationality of tax behavior and the rationality of economic behavior. We examined the whole sample as well as specific types of activity within the forestry sector.

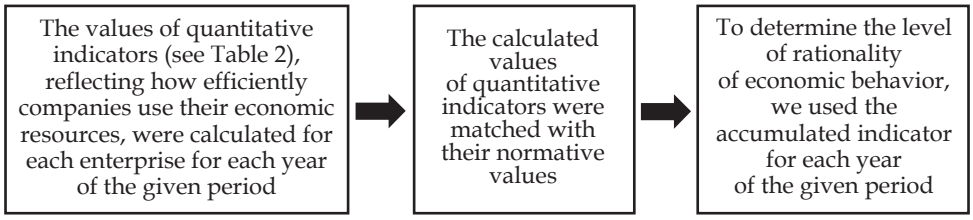

Figure 1. **Procedure for assessing the level of rationality of economic behavior**

Table 4

Indicators characterizing the efficiency of resource use

No.	Efficiency of resource use	Normative value
1	Labor productivity, rbs per person	Positive dynamics in this indicator signifies the efficient use of labor.
2	Return on own capital, %	from 20% and above
3	Return on borrowed capital, rbs/rbs	from 0.2 to 0.5
4	Return on fixed assets, rbs/rbs	Positive dynamics in this indicator signifies the efficient use of fixed assets.
5	Return on operating assets, rbs/rbs	from 1 to 3
6	Business profitability (profitability of production), %	5% and above

4. Results

4.1. Identification of rationality levels

For the given period, we have identified the following rationality levels (see Table 5). To reveal the relationship between rationality levels of economic and tax behavior, comparable value ranges were introduced.

In total, we have identified six levels of rationality of economic and tax behavior. The upper and lower bounds of the ranges correspond to the minimum and maximum values denoting rationality levels in the behavior of each enterprise in our sample.

It should be noted that out of all the values given in Table 5, the level of rationality ranging from low to high has the highest instability of behavioral characteristics. This means that the behavior of a firm is difficult to predict and, therefore, hard to control; such firms are usually extremely vulnerable to the impact of internal and external factors.

4.2. Assessment of the rationality of tax behavior

Figure 2 illustrates the distribution of rationality levels across the sample.

As Figure 2 shows, firms in our sample are facing a high chance of being audited. Therefore, we can conclude that the prevalent levels of rationality in these companies' tax behavior are medium and high. These enterprises resort to similar strategies of tax evasion to obtain certain benefits at all the stages: before, during

Table 5

Rationality levels of economic and tax behavior

No.	Level of rationality	Dynamics of rationality levels	Behavior description
1	Consistently low	The level of rationality did not change over the entire period from 2017 to 2021	The same behavior patterns and responses to different pressures and factors were reproduced
2	Consistently medium		
3	Consistently high		
4	Low-to-medium	The level of rationality in different years of the given period ranged from low to medium	
5	Medium-to-high	The level of rationality in different years of the given period ranged from medium to high	
6	Low-to-high	The level of rationality in different years of the given period ranged from low to high	The firm's behavior is highly irrational; the firm is extremely vulnerable to the impact of various external and internal factors; no clearly defined patterns in the firm's behavior were detected

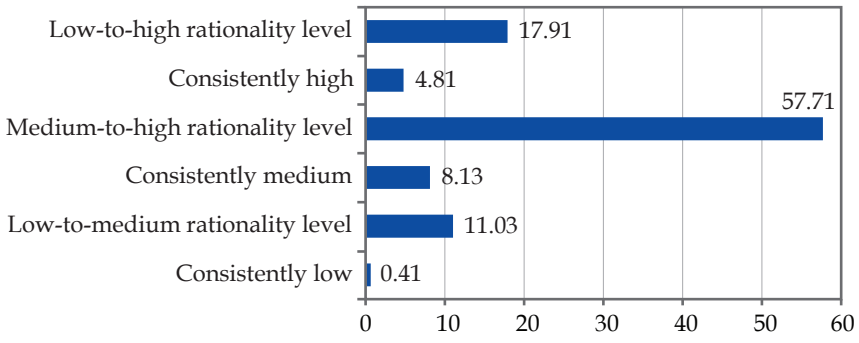

Figure 2. **Percentage of forestry enterprises by rationality level (%)**

and after an on-site tax audit [45]. These enterprises seek to minimize their tax expenditures by evading taxes. In other words, we are dealing here with the increased level of rationality of tax behavior.

It should be noted that a large proportion of the firms demonstrate the low-to-high level of rationality.

Figure 3 illustrates the distribution of rationality levels by type of activity.

Regardless of their specialization, over 57% of the firms in our sample exhibit a medium-to-high or consistently high level of rationality. Among the firms that specialize in wood processing, the share of firms with a low-to-high rationality level is the largest – 23.3%. This figure is the smallest among the enterprises in wholesale timber trade – 15.1%.

4.3. Assessment of the rationality of economic behavior

Figure 4 shows the distribution of rationality levels across the sample.

The economic behavior of firms is mostly characterized by a low level of rationality or the level of rationality ranging from low to medium – 55.5%. The majority of enterprises in our sample, regardless of their size, use their economic resources inefficiently. Most of them are still in their growth phase, even though they have been in business for a long time.

A large proportion of enterprises (22.7%) demonstrate the low-to-high level of rationality of their economic behavior.

The distribution of rationality levels across different types of activity is shown in Figure 5.

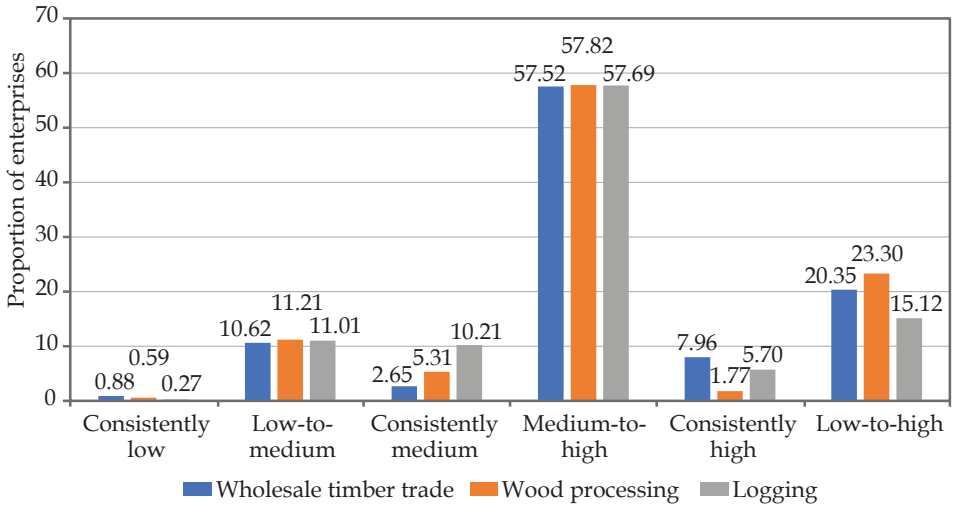

Figure 3. **Distribution of rationality levels among forestry enterprises by type of activity (%)**

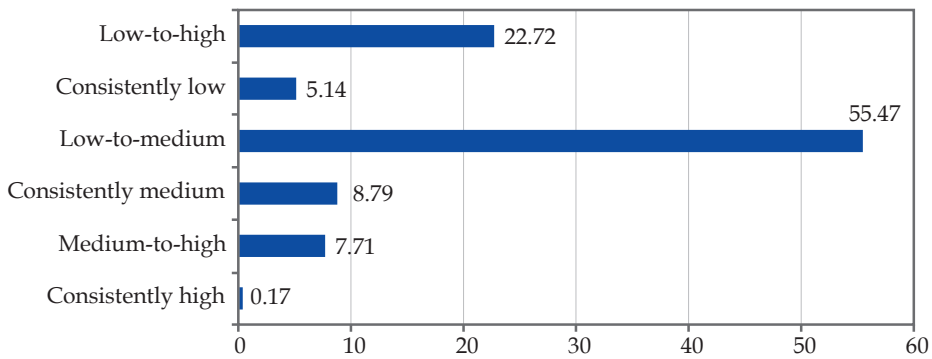

Figure 4. **Percentage of forestry enterprises by rationality level (%)**

We found that a large proportion of enterprises of all specializations in the forestry sector (over 54%) demonstrate the level of rationality ranging from low to medium.

Similarly, the proportion of companies of all sizes with the low-to-high level of rationality is quite substantial. Among the firms that specialize in wood processing, the share of firms with low-to-high rationality levels is the largest – 28.3%. This figure is the smallest for the enterprises specializing in logging – 20.4%.

4.4. Assessment of the relationship between the rationality of tax and economic behavior

Our study has confirmed the relationship between the rationality of tax and economic behavior. It should be noted that within the given value ranges, the rationality of economic and tax behavior can take similar values. This is mostly true of the low-to-high and consistently medium ranges.

For the low-to-medium, medium-to-high, consistently high and consistently low rationality levels, we found a strong inverse relationship between economic and tax behavior (Table 6).

The inverse relationship is the strongest for firms specializing in wood processing and the weakest, for firms in wholesale timber trade.

Considering the whole forestry sector, it can be said that a change in the level of rationality of tax behavior in 72.9% of cases leads to a change in the level of rationality of economic behavior.

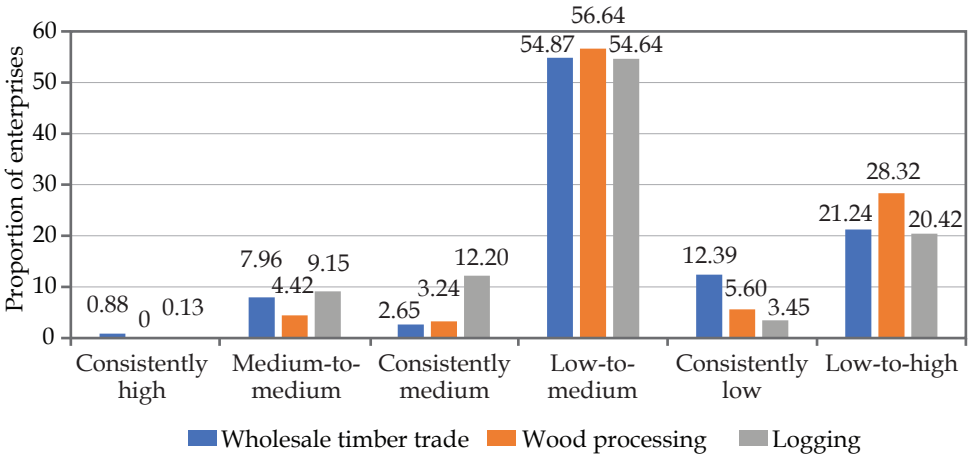

Figure 5. **Distribution of rationality levels among forestry enterprises by type of activity (%)**

Table 6

Relationship between the level of rationality of economic and tax behavior

Type of activity	Equation for the relationship between the level of rationality of tax behavior and economic behavior	Indicators of relationship
Logging	$y = -0.0121x^2 + 5.5663x - 56.404$	$R = 0.8068$ $R^2 = 0.651$
Wood processing	$y = -0.0332x^2 + 6.6544x - 13.308$	$R = 0.977$ $R^2 = 0.9546$
Wholesale timber trade	$y = -0.0885x^2 + 5.9906x - 10.35$	$R = 0.6926$ $R^2 = 0.4798$
In total for all types of activity	$y = -0.0082x^2 + 6.008x - 91.019$	$R = 0.8538$ $R^2 = 0.729$

5. Discussion

In this study, we sought to evaluate the level of rationality of tax and economic behavior and to shed light on the relationship between rationality levels in these two types of behavior.

We found that the rational economic behavior of firms can go hand in hand with some irrational compliance decisions.

Thus, hypothesis *H1* is confirmed. The results of our research do not contradict previous studies on the rationality of tax and economic behavior [1; 4; 18–41].

Correlation and regression analysis revealed a strong inverse relationship between the rationality of tax behavior and the rationality of economic behavior of the same firms.

Hypothesis *H2* is confirmed for the enterprises in our sample. Our findings agree with the previous research on the relationship between economic and tax behavior [42–50].

The focus on the Russian forestry sector, characterized by the prevalence of small-sized businesses, determined some peculiarities of our sample. In our further research, we intend to use longer periods to study the distribution patterns of values within each range and examine the concentrations of values of a certain level of rationality.

In addition, in order to gain a more in-depth understanding of the relationship between the rationality of economic and tax behavior under different economic conditions, it would make sense to extend the observation period. It would also be productive to conduct similar research for other sectors of economy.

6. Conclusion

In our study, we focused on the relationship between the rationality of economic and tax behavior of micro-, small and medium-sized enterprises in the Russian forestry sector.

Both of our hypotheses were confirmed: we found that enterprises may simultaneously demonstrate rational economic behavior and irrational tax behavior; there is also a strong inverse relationship between the rationality of tax behavior and the rationality of economic behavior in the same economic entities.

On the practical level, our findings may be of interest to policymakers in the sphere of state regulation and entrepreneurship support. Our research results may also contribute to the development of behavioral economics in taxation and the classical theory of rational choice.

References

1. Smith A. *An Inquiry into the Nature and Causes of the Wealth of Nations*. London: W. Strahan; 1776. Available at: https://books.google.ru/books?id=KpWg1DYxRTwC&q=editions:hdVgPAzxgfcC&pg=PP5&redir_esc=y#v=onepage&q=editions%3AhdVgPAzxgfcC&f=false

2. Walras L. Étude *d'économie Politique Appliquée*. Paris: chez Pichon; 1898. Available at: https://gallica.bnf.fr/ark:/12148/bpt6k113200v.texteImage

3. Marshall A. *Industry and Trade: A Study of Industrial Technique and Business Organization; and of their Influences on the Conditions of Various Classes and Nations. Industry and Trade*. London: Macmillan and Co., Limited; 1919. Available at: https://onlinebooks.library.upenn.edu/webbin/book/lookupid?key=ha100330930

4. von Neumann J., Morgenstern O. *Theory of Games and Economic Behavior. 60th Anniversary Commemorative Edition*. Princeton University Press; 2004. Available at: https://press.princeton.edu/books/paperback/9780691130613/theory-of-games-and-economic-behavior

5. Savage L.J. *The Foundations of Statistics*. New York: Dover Publications; 1954. Available at: https://gwern.net/doc/statistics/decision/1972-savage-foundationsofstatistics.pdf

6. Harstad R.M., Selten R. Bounded-Rationality Models: Tasks to Become Intellectually Competitive. *Journal of Economic Literature*. 2013;51(2):496–511. https://doi.org/10.1257/jel.51.2.496

7. Simon H.A. A Behavioral Model of Rational Choice. *The Quarterly Journal of Economics*. 1955;69(1):99–118. https://doi.org/10.2307/1884852

8. Simon H.A. *The New Science of Management Decision, Revised*. New York: Harper & Brothers Publishers; 1817. Available at: https://ipwna.ir/wp-content/uploads/2018/08/THE-NEW-SCIENCE-OF-MANAGEMENT-DECISION-irpublicpolicy.pdf

9. Simon H.A. An Information Processing Theory of Intellectual Development. *Monographs of the Society for Research in Child Development*. 1962;27(2):150–161. https://doi.org/10.2307/1165536

10. Lichtenstein S., Slovic P. Reversals of Preference between Bids and Choices in Gambling Decisions. *Journal of Experimental Psychology*. 1971;89(1):46–55. https://doi.org/10.1037/h0031207

11. Kahneman D., Tversky A. Prospect Theory: An Analysis of Decision Under Risk. *Econometrica*. 1979;47(2):263–292. https://doi.org/10.2307/1914185

12. Hayek F. *The Fatal Conceit. The Errors of Socialism*. Chicago: The University of Chicago Press; 1988. Available at: https://www.mises.at/static/literatur/Buch/hayek-the-fatal-conceit.pdf

13. Hayek F. *The Road to Serfdom*. London: Routledge; 2008. https://doi.org/10.4324/9781315728124

14. Becker G.S. *A Treatise on the Family*. Cambridge (Mass.); London: Harvard University Press; 1991. Available at: https://brunofvieira.files.wordpress.com/2012/12/gary-becker-a-treatise-on-the-family.pdf

15. Zouboulakis M.S. On the social nature of rationality in Adam Smith and John Stuart Mill. *Cahiers D'économie Politique*. 2005;2(49):51–63. https://doi.org/10.3917/cep.049.0051

16. Zouboulakis M.S. *The Varieties of Economic Rationality: from Adam Smith to Contemporary Behavioural and Evolutionary Economics*. London: Routledge Tayler & Francis Group; 2014. https://doi.org/10.4324/9781315818641

17. Jones M.K. The Concept of Rationality in Introductory Economics Textbooks. *Citizenship, Social and Economic Education*. 2021;20(1):37–47. https://doi.org/10.1177/2047173421994333

18. Cyert R.M., March J.G. *A Behavioral Theory of the Firm*. Prentice-Hall: Englewood Cliffs, NJ; 1963. Available at: https://oa.mg/work/2028436159

19. Nelson R.R., Winter S.G. *An Evolutionary Theory of Economic Change*. Cambridge: Harvard University Press; 1982. Available at: http://inctpped.ie.ufrj.br/spiderweb/pdf_2/Dosi_1_An_evolutionary-theory-of_economic_change..pdf

20. Veblen T. The *Theory of the Leisure Class: An econ. study of institutions*. London: Unwin books; 1970. Available at: http://moglen.law.columbia.edu/LCS/theoryleisureclass.pdf

21. Knight F.H. *Risk, Uncertainty and Profit*. New York: Houghton Mifflin Company; 1921. Available at: https://fraser.stlouisfed.org/files/docs/publications/books/risk/riskuncertaintyprofit.pdf

22. Norton W.Jr., Moore W.T. Entrepreneurial Risk: Have We Been Asking the Wrong Question? *Small Business Economics*. 2002;18:281–287. https://doi.org/10.1023/A:1015231318265

23. Wiklund J., Shepherd D.A. Portfolio Entrepreneurship: Habitual and Novice Founders, New Entry, and Mode of Organizing. *Entrepreneurship Theory and Practice*. 2008;32(4):701–725. https://doi.org/10.1111/j.1540-6520.2008.00249.x

24. Chitsaz E., Tajpour M., Hosseini E., Khorram H., Zorrieh S. The efect of human and social capital on entrepreneurial activities: A case study of Iran and implications. *Entrepreneurship and Sustainability Issues*, 2019;6(3):1393–1403. https://doi.org/10.9770/jesi.2019.6.3(24)

25. Pokrovskaya N. Rationality of Economic Behaviour. *Izvestia: Herzen University Journal of Humanities & Sciences*. 2007;9(46):128–136. (In Russ.) Available at: https://lib.herzen.spb.ru/media/magazines/contents/1/9(46)/pokrovskaya_9_46_128_137.pdf

26. Yeşilyurt E., Türker M. Economic Rationality Analysis of Forestry Sector with Econometric Methods (The General Directorate of Forestry Case). *Bartın Orman Fakültesi Dergisi*. 2019:21(3):893–898. https://doi.org/10.24011/barofd.546172

27. Gavetti G., Levinthal D. Looking Forward and Looking Backward: Cognitive and Experiential Search. *Administrative Science Quarterly*. 2000;45(1):113–137. https://doi.org/10.2307/2666981

28. Huber G.P. Organizational Learning: The Contributing Processes and the Literatures. *Organization Science*. 1991;2(1):88–115. https://doi.org/10.1287/orsc.2.1.88

29. Gavetti G., Levinthal D.A., Rivkin J.W. Strategy Making in Novel and Complex Worlds: The Power of Analogy. *Strategic Management Journal*. 2005;26(8):691–712. https://doi.org/10.1002/smj.475

30. Miller K. Risk and Rationality in Entrepreneurial Processes. *Strategic Entrepreneurship Journal*. 2007;1(1-2):57–74. https://doi.org/10.1002/sej.2

31. Aldrich H., Zimmer C. Entrepreneurship Through Social Networks. *California Management Review*. 1986;33:3–3. Available at: https://www.researchgate.net/profile/Howard-Aldrich/publication/291165757_Entrepreneurship_Through_Social_Networks/links/569ea49a08ae2c638eb584d0/Entrepreneurship-Through-Social-Networks.pdf

32. Jia Y., Tsui A., Yu X. Beyond Bounded Rationality: CEO Reflective Capacity and Firm Sustainability Performance. *Management and Organization Review*. 2021:17(4):777–814. https://doi.org/10.1017/mor.2021.4

33. Hogarth R.M., Karelaia N. Simple Models for Multiattribute Choice with Many Alternatives: When It Does and Does Not Pay to Face Trade-offs with Binary Attributes. *Management Science*. 2005;51(12):1860–1872. https://doi.org/10.1287/mnsc.1050.0448

34. Littlechild S.C. Three types of market process. In: Langlois R.N. (ed.) *Economics as a process: Essays in the new institutional economics*. Cambridge: Cambridge University Press; 1986, pp. 27–29. Available at: https://assets.cambridge.org/97805213/78598/excerpt/9780521378598_excerpt.pdf

35. Alvarez S.A., Barney J.B. Discovery and Creation Alternative Theories of Entrepreneurial Action. *Strategi Entrepreneurship Journal*. 2007;1(1-2):11–26. https://doi.org/10.1002/sej.4

36. Hatchuel A. Towards Design Theory and Expandable Rationality: The Unfinished Program of Herbert Simon. *Journal of Management and Governance*. 2001;5:260–273. https://doi.org/10.1023/A:1014044305704

37. Agarwal R., Audretsch D., Sarkar, M.B. Knowledge Spillovers, Entrepreneurship and Economic Growth. *Strategic Entrepreneurship Journal*. 2007;1(3–4):263–286. https://doi.org/10.1002/sej.36

38. Sarasvathy S.D. Causation and Effectuation: Toward a Theoretical Shift from Economic Inevitability to Entrepreneurial Contingency. *Academy of Management Review*. 2001;26(2):243–263. https://doi.org/10.2307/259121

39. Troise C., Matricano D., Candelo E., Schjoedt L. A ten-year cross-national examination of the dance between intuition and rationality in entrepreneurial processes. *International Entrepreneurship and Management Journal*. 2021;18:663–692. https://doi.org/10.1007/s11365-021-00760-8

40. Allingham M.G., Sandmo A. Income Tax Evasion: A Theoretical Analysis. *Journal of Public Economics*. 1972;1(3-4):323–338. https://doi.org/10.1016/0047-2727(72)90010-2

41. Coricelli G., Joffily M., Montmarquette C., Villeval M.C. Cheating, Emotions, and Rationality: An Experiment on Tax Evasion. *Experimental Economics*. 2010;13(2):226–247. https://doi.org/10.1007/s10683-010-9237-5

42. Dabla-Norris E., Gradstein M., Miryugin F. *Misch Productivity and Tax Evasion*. IMF Working Papers 260. 2019. https://ideas.repec.org/p/imf/imfwpa/2019-260.html

43. Bachas P.J., Fattal Jaef R.N., Jensen A. Size-dependent Tax Enforcement and Compliance: Global Evidence and Aggregate Implications. *Journal of Development Economics*. 2019;140:203–222. https://doi.org/10.1016/j.jdeveco.2019.05.001

44. Blackburn K., Bose N., Capasso S. Tax Evasion, the Underground Economy and financial Development. *Journal of Economic Behavior & Organization*. 2012;83(2):243–253. https://doi.org/10.1016/j.jebo.2012.05.019

45. Labunets Iu.E., Mayburov, I.A. The Impact of the Size of Enterprises on Tax Evasion in the Forestry Industry of Russia. *Journal of Tax Reform*. 2022;8(1):88–101. https://doi.org/10.15826/jtr.2022.8.1.110

46. Alm J., Liu Y. Zhang K. Financial Constraints and Firm Tax Evasion. *International Tax and Public Finance*. 2019;26;71–102. https://doi.org/10.1007/s10797-018-9502-7

47. Fajnzylber P., Maloney W., Montes-Rojas, G. Does formality Improve Micro-firm Performance? Evidence from the Brazilian SIMPLES program. *Journal of Development Economics*. 2011;94(2):262–276. https://doi.org/10.1016/j.jdeveco.2010.01.009

48. Gordon R., Li W. Tax Structures in Developing Countries: Many Puzzles and a Possible Explanation. *Journal of Public Economics*. 2009;93(7-8):855–866. https://doi.org/10.1016/j.jpubeco.2009.04.001

49. Sarte P.-D.,G. Informality and Rent-seeking Bureaucracies in a Model of Long-run Growth. *Journal of Monetary Economics*. 2000;46(1):173–197. https://doi.org/10.1016/S0304-3932(00)00020-9

50. La Porta R., Shleifer A. Informality and Development. *Journal of Economic Perspectives*. 2014;23(3):109–126. https://doi.org/10.1257/jep.28.3.109

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