“International tax competition as an element of the country’s marketing strategy”

AUTHORS	Inna Tiutiunyk Viktoriia Taranenko Oleksiy Mazurenko Artem Artyukhov Yuliia Yehorova

ARTICLE INFO	Inna Tiutiunyk, Viktoriia Taranenko, Oleksiy Mazurenko, Artem Artyukhov and Yuliia Yehorova (2023). International tax competition as an element of the country’s marketing strategy. *Innovative Marketing* , *19*(4), 297-309. doi:10.21511/im.19(4).2023.24
DOI	http://dx.doi.org/10.21511/im.19(4).2023.24
RELEASED ON	Thursday, 28 December 2023
RECEIVED ON	Tuesday, 13 June 2023
ACCEPTED ON	Friday, 15 December 2023

JOURNAL	"Innovative Marketing "
ISSN PRINT	1814-2427
ISSN ONLINE	1816-6326
PUBLISHER	LLC “Consulting Publishing Company “Business Perspectives”
FOUNDER	LLC “Consulting Publishing Company “Business Perspectives”

NUMBER OF REFERENCES	NUMBER OF FIGURES	NUMBER OF TABLES
41	2	7

BUSINESS PERSPECTIVES

LLC "CPC "Business Perspectives"
Hryhorii Skovoroda lane, 10,
Sumy, 40022, Ukraine

www.businessperspectives.org

Inna Tiutiunyk (Ukraine), **Viktoriia Taranenko** (Ukraine), **Oleksiy Mazurenko** (Ukraine), **Artem Artyukhov** (Slovakia), **Yuliia Yehorova** (Slovakia)

INTERNATIONAL TAX COMPETITION AS AN ELEMENT OF THE COUNTRY'S MARKETING STRATEGY

Abstract

In the conditions of permanent capital outflow and business registration by residents in other jurisdictions, the issue of developing a country's marketing strategies for doing business and identifying the most effective mechanisms for increasing international tax attractiveness is urgent. The prerequisite of these processes should be the determination of the level of international tax competitiveness followed by identifying the most significant factors of its growth. The purpose of the study is to assess the level of international tax competitiveness as an element of marketing strategies of Ukraine and some EU countries during 2011–2021. The methodological tools are correlation-regression analysis, the Fisher method, and the multiplicative convolution method. The paper assessed the level of international tax competitiveness as a comprehensive indicator that considers procedural, institutional, moral-ethical, and economic components. The calculations showed that the most competitive are the tax systems of Estonia, Latvia, Lithuania, Croatia, Finland, the Czech Republic, and Hungary. Based on hierarchical and non-hierarchical (k-means method) clustering, 3 clusters of regions were identified. For each of them, based on an analysis of the features of the tax system construction and the comparison of marginal and average values, the criteria for the identification of competing countries and those with common development trends were formed. This makes it possible to determine the most effective mechanisms for the implementation of marketing strategies reforming tax policy from the point of view of increasing its international tax attractiveness.

Keywords tax competitiveness, marketing strategy, macro-financial stability, strategic management, shadow economy

JEL Classification H21, E02, E62, C54

Received on: 13th of June, 2023
Accepted on: 15th of December, 2023
Published on: 28th of December, 2023

Inna Tiutiunyk, Doctor of Economics, Associate Professor, Department of Finance Technology and Entrepreneurship, Sumy State University, Ukraine. (Corresponding author)

Viktoriia Taranenko, Candidate of Economic Sciences, Associate Professor, Head of Social Security and Tax Policy Department, University of Customs and Finance, Ukraine.

Oleksiy Mazurenko, Deputy Head of the Main Department of the State Tax Service of Ukraine in Sumy region; Sumy State University, Ukraine.

Artem Artyukhov, Ph.D., Associate Professor, Senior Researcher, Research Institute of Trade and Sustainable Business, Faculty of Commerce, University of Economics in Bratislava, Slovakia.

Yuliia Yehorova, Ph.D., Associate Professor, Researcher, Research Institute of Trade and Sustainable Business, Faculty of Commerce, University of Economics in Bratislava, Slovakia.

Conflict of interest statement:
Author(s) reported no conflict of interest

INTRODUCTION

A prerequisite for the formation of favorable conditions for the development of the economy is the presence of an effective marketing strategy of the state administration. It ensures the growth of international capital mobility, expansion of investment opportunities, access to funds and programs of international financial institutions and funds (Gentsoudi, 2023; Kuzmenko et al., 2023; Kuzior et al., 2022a). A key element in these processes is the presence of an effective tax system aimed at compliance with European standards of transparency and integrity of business conduct, zero tolerance for shady activities, transparency in public administration, etc (Sheliemina, 2023; Lyeonov et al., 2021b; Gentle, 2022; Soares & Pinheiro, 2023).

The high tax competitiveness of the country is a prerequisite for developing the economy. It serves as a driver of the inflow of direct and portfolio investments (Vasylieva & Kasyanenko, 2013), the creation of new jobs (Kuzior et al., 2020; Bhandari, 2023; Ali et al., 2023), the development of the internal market of goods and

services (Melnyk et al., 2021; Kostynets et al., 2020; Shubita, 2023; Kuzior et al., 2023; Verbivska et al., 2023), financing of state programs and activities (Vasilyeva et al., 2022), opening branches of international companies, increasing the level of business activity (Kobiyh & El Amri, 2023; Chornous et al., 2023; Piluso & Heron, 2022), increasing the amount of tax revenues, which allows to reduce the amount of the budget deficit and increase the level of material well-being of the population (Vostrykov & Jura, 2022; Reshetniak & Grifo, 2022; Danylyshyn et al., 2022; Kotina et al., 2023; Razinkova et al., 2023), and a satisfaction of the needs of underprivileged sections of society (Gajdosova, 2023; Lyeonov et al., 2021a).

Considering the above, state authorities are constantly implementing measures to increase the effectiveness of the country's marketing strategy by improving the quality of tax administration and optimizing the tax system. This conditioned the intensification of the efforts of scientists and practitioners in assessing the level of tax competitiveness of the country, identifying the factors of its formation, and determining, on this basis, the most effective tools for its management.

1. LITERATURE REVIEW

A feature of the functioning of the economies of most countries of the world in recent years is a high level of turbulence and uncertainty. This destroys the country's economic and social development indicators and threatens to reduce its attractiveness to international partners (Patel et al., 2023; Vasilyeva et al., 2019; Kuzior et al., 2022b).

One of the indicators that are constantly under the influence of several destabilizing factors is the level of tax competitiveness of the country as an indicator that summarizes the qualitative and quantitative components of the functioning of the tax system (Asare & Samusevych, 2023; Lyeonov et al., 2021c; Yoshimori, 2023).

In addition to the direct impact on the amount of tax revenues to the budget, the country's low level of tax competitiveness negatively affects its attractiveness for foreign partners from the point of view of starting or expanding a business (Kwilinski, 2019; Njegovanović, 2023).

Tax Foundation (Mengden, 2023) developed the Index of international tax competitiveness of the country, which allows assessing the degree of compliance of the tax system with the principles of neutrality and competitiveness. Its calculation is based on more than 40 indicators that assess not only the level of the tax burden in the country but also how structured tax payments are.

A significant number of scientists were researching issues of ensuring a high level of tax competitiveness in the country and justifying ways to increase it. Thus, Bilan et al. (2018) understand the tax competitiveness of the country as a system of economic relations that arise between individual countries and their associations as a result of the attraction of internal and external financial resources – objects of taxation based on the differentiation of tax rate and fees, manipulation of conditions and objects of taxation.

Keen (2008) considered tax competition as a process of obtaining a strategic competitive advantage due to a non-cooperative game between individual jurisdictions based on the determination of tax rates or individual tax system parameters.

Wilson and Wildasin (2004) suggested considering tax competition in a broad and narrow sense. Broadly speaking, tax competition refers to any form of imposition of taxes and fees by independent governments. This approach is based on the competition between the governments of different countries for the location of tax bases on their territory. In a narrow sense, tax competition means any form of non-cooperative imposition of taxes and fees by independent governments and tax policies that affect the distribution of tax revenues between the treasuries of different states.

The basis of these definitions is the understanding of the country's tax competitiveness as a tool for stimulating the development of the economy. At the same time, Oates (1972) proved the nega-

http://dx.doi.org/10.21511/im.19(4).2023.24

tive impact of tax competitiveness on indicators of the country's economic development. The participation of local self-government bodies in the struggle to attract mobile capital is a prerequisite for reducing the economy's efficiency.

Brueckner (2000) developed a model of the formation of tax competition, which assumed that society independently chooses the volume and direction of investment of funds, its place of residence, registration, and business conduct. The government, in turn, increases the investment attractiveness of its territory by manipulating tax rates for basic payments.

Thus, the results of the conducted analysis indicate a significant number of approaches to understanding tax competition and the drivers of its formation and the lack of studies on assessing the level of the country's tax competitiveness as an element of its marketing strategy.

Based on the results of the literature review, the tax competitiveness of the country is considered as the ability of the tax system to obtain permanent competitive advantages in attracting external and mobilizing internal financial resources that are the object of taxation. This is done by establishing the optimal level of the tax burden and differentiating fiscal instruments to minimize the amount of shadow tax evasion, maximize the country's economic growth rate, and create a favorable business environment.

The purpose of the study is to assess the level of international tax competitiveness as an element of marketing strategies of Ukraine and the EU countries during 2011–2021.

2. METHOD

The implementation of the country's marketing strategy is based on improving the quality of public services, ensuring effective and timely transformation of the sphere of state administration. The country's marketing strategy involves targeting both internal and external (international competitiveness) consumers. A competitive tax system is an integral part of any country's effective marketing strategy.

The assessment of the country's level of tax competitiveness is carried out based on 17 indicators within four components:

- procedural: VAT rate ($ITCI_1$), corporate income tax rate ($ITCI_2$), personal income tax rate ($ITCI_3$), social contributions ($ITCI_4$);
- institutional: Fiscal Health Index ($ITCI_5$), Index of Tax Freedom ($ITCI_6$), time for preparing tax returns and paying taxes ($ITCI_7$), time for border and customs control during export/import ($ITCI_8$), time for processing documents during export/import ($ITCI_9$), cost of processing documents during export/import ($ITCI_{10}$), cost of passing control during export/import ($ITCI_{11}$), number of payments required for settlement with tax authorities ($ITCI_{12}$);
- moral and ethical: Financial Literacy Index ($ITCI_{13}$), level of tax morale of the population ($ITCI_{14}$);
- economic: Index of economic freedom ($ITCI_{15}$), GDP ($ITCI_{16}$), tax potential ($ITCI_{17}$).

The object of the study is the indicators of tax competitiveness of 11 European countries (Ukraine, Poland, the Czech Republic, Slovakia, Slovenia, Romania, Hungary, Croatia, Lithuania, Latvia, and Estonia); the study period is 2011–2021. This is due, firstly, to the availability of a complete set of data for all countries in terms of the analyzed indicators and, secondly, the adoption and implementation during this period of separate regulatory acts, which provided for the reform of the taxation system of these countries, changes in the number of tax payments, the order of their calculation and payment.

The methodological tools are correlation-regression analysis, the Fisher method, the multiplicative convolution method, and a method of hierarchical and non-hierarchical (k-means method) clustering.

Considering the significant differences in the measurement of individual indicators for assessing the level of tax competitiveness, one of the stages of determining the integral indicator is to bring the array of data to a comparable form. Their

normalization can ensure this based on the minimax approach.

For this purpose, the entire set of indicators for assessing the level of tax competitiveness of the country is divided into three groups: indicators-stimulators (their growth has a positive effect on the integral indicator), indicators-disincentives (the growth of this group of indicators leads to a decrease in the level of tax competitiveness of the country), and indicators-nominators (regulations determine their minimum and maximum values).

The normalization of the stimulator indicators is carried out using the following formula:

$$\overline{ITCI}_{it} = \begin{cases} \dfrac{ITCI_{it} - ITCI_{it\_\min}}{ITCI_{it\_\max} - ITCI_{it\_\min}} \\ 1, \begin{bmatrix} ITCI_{it} \geq \overline{ITCI_{i\_\max}} \\ ITCI_{it} \leq \overline{ITCI_{i\_\min}} \end{bmatrix} \end{cases}, \quad (1)$$

where $ITCI_{it}$ is the normalized value of the i-th indicator in the t-th year; $ITCI_{it}$ the actual value of the i-th indicator in the t-th year; $ITCI_{it\_max}$ the maximum normative value of the i-th indicator; $ITCI_{it\_min}$ the minimum regulatory value of the i-th indicator; $ITCI_{it\_min}$ the minimum value of the i-th indicator during the analyzed period; $ITCI_{it\_max}$ the maximum value of the i-th indicator during the analyzed period.

The following formula is used for the destimulatory indicators:

$$\overline{ITCI}_{it} = \begin{cases} \dfrac{ITCI_{it\_\max} - ITCI_{it}}{ITCI_{it\_\max} - ITCI_{it\_\min}} \\ 1, \begin{bmatrix} ITCI_{it} \geq \overline{ITCI_{i\_\max}} \\ ITCI_{it} \leq \overline{ITCI_{i\_\min}} \end{bmatrix} \end{cases}. \quad (2)$$

Normalization of denominator indicators is carried out according to the following formula:

$$\overline{ITCI}_{it} = \begin{cases} \dfrac{ITCI_{it\_max} - ITCI_{it}}{ITCI_{it\_max} - ITCI_{it\_min}} \\ 1, \begin{bmatrix} ITCI_{it} \leq \overline{ITCI_{i\_max}} \\ ITCI_{it} \leq \overline{ITCI_{i\_min}} \end{bmatrix} \end{cases}. \quad (3)$$

The normalized values of the indicators range from –1 to +1.

The dependence of the country's tax competitiveness on the drivers of its formation can be formalized using the following function:

$$ITCI = f\left(proc_t, inst_t, moral_t, econ_t\right), \quad (4)$$

where $ITCI_t$ is the level of tax competitiveness of the country in period t; $proc_t$ are the process determinants of tax competitiveness in period t; $inst_t$ are the institutional determinants of tax competitiveness in period t; $moral_t$ are the moral and ethical determinants of tax competitiveness in period t; $econ_t$ are the economic determinants of tax competitiveness in period t.

A comprehensive assessment of the level of the country's tax competitiveness is carried out according to the formula:

$$\begin{aligned} ITCI_A &= \sum_{i=1}^{n} a_i ITCI_i^A, \\ ITCI_M &= \sum_{i=1}^{n} \left(ITCI_i^M\right)^{a_i}, \end{aligned} \quad (5)$$

where $ITCI_A$ and $ITCI_M$ are partial indicators (for the additive and multiplicative form) of the i-th component of tax competitiveness; n is the number of indicators; a_i are the weighting coefficients of indicators for which the condition is fulfilled:

$$\sum_{i=1}^{n} a_i = 1, \quad a_i \geq 0, \quad i = \overline{1,n}. \quad (6)$$

Bringing individual sub-indices characterizing tax competitiveness within each of the components to a comparative form is carried out by normalizing them with a known mathematical expectation and variance.

The weighting coefficients within each of the sub-indices will be determined according to the Fishburn formula:

$$w_i = \frac{2 \cdot (n - i + 1)}{n \cdot (n + 1)}, \quad (7)$$

where n is the number of indicators; i is the rank of the indicator determined using the method of expert evaluations.

http://dx.doi.org/10.21511/im.19(4).2023.24

In the next stage, a cluster analysis of countries was conducted from the point of view of determining tax competitor countries and countries with similar tax systems. These measures are implemented with the help of hierarchical and non-hierarchical (k-means methods) clustering in terms of process, institutional, moral-ethical, and economic determinants of the formation of tax competitiveness. Calculations are carried out using Stata 16 software.

3. RESULTS AND DISCUSSION

In the first stage of the study, the values of indicators for assessing the level of tax competitiveness of the analyzed countries are normalized (a fragment is given in Table 1).

The prerequisite for determining the integral level of the country's tax competitiveness is the calculation of weighting factors and ranks for each of the indicators (Table 2).

Table 2. Weighting factors for assessing the level of the country's tax competitiveness

Indicator	Rank	Weighting factor
$ITCI_1$	2.5	0.101
$ITCI_2$	2.5	0.101
$ITCI_3$	2.5	0.101
$ITCI_4$	2.5	0.101
$ITCI_5$	11.5	0.042
$ITCI_6$	11.5	0.042
$ITCI_7$	7.5	0.069
$ITCI_8$	7.5	0.069
$ITCI_9$	7.5	0.069
$ITCI_{10}$	7.5	0.069
$ITCI_{11}$	7.5	0.069
$ITCI_{12}$	7.5	0.069
$ITCI_{13}$	15	0.020
$ITCI_{14}$	16.5	0.010
$ITCI_{15}$	14	0.026
$ITCI_{16}$	13	0.033
$ITCI_{17}$	16.5	0.010

Based on the obtained weighting factors, the countries' tax competitiveness levels were evaluat-

Table 1. Normalized values of indicators for assessing the level of the country's tax competitiveness (in the example of Ukraine)

Indicator	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021
$ITCI_1$	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
$ITCI_2$	0.00	0.57	0.86	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
$ITCI_3$	1.00	1.00	1.00	1.00	0.00	0.67	0.67	0.67	0.67	0.67	0.67
$ITCI_4$	0.14	0.09	0.00	0.34	0.53	1.00	0.95	0.88	0.79	0.79	0.79
$ITCI_5$	–	–	–	–	–	–	0.00	0.40	0.74	0.81	1.00
$ITCI_6$	0.05	0.00	0.07	0.68	0.66	0.53	0.80	0.83	1.00	0.76	0.87
$ITCI_7$	0.00	0.00	0.51	0.82	0.94	0.94	0.92	1.00	1.00	1.00	1.00
$ITCI_8$	1.00	1.00	1.00	0.03	0.00	0.00	0.00	0.00	0.00	0.00	0.00
$ITCI_9$	0.98	0.98	0.98	1.00	0.98	0.98	0.98	0.98	0.39	0.00	0.00
$ITCI_{10}$	0.14	0.00	0.13	0.19	1.00	1.00	1.00	1.00	1.00	1.00	1.00
$ITCI_{11}$	0.83	1.00	0.83	0.73	0.00	0.00	0.00	0.00	0.00	0.00	0.00
$ITCI_{12}$	0.00	0.00	0.82	0.82	1.00	1.00	1.00	1.00	1.00	1.00	1.00
$ITCI_{13}$	0.16	0.12	0.37	0.36	0.49	0.58	0.83	0.91	1.00	0.94	0.95
$ITCI_{14}$	0.18	0.13	0.42	0.40	0.55	0.65	0.94	1.00	1.00	1.00	1.00
$ITCI_{15}$	0.00	0.03	0.05	0.34	0.11	0.10	0.22	0.59	0.63	0.88	1.00
$ITCI_{16}$	0.72	0.84	0.91	0.39	0.00	0.02	0.19	0.37	0.58	0.60	1.00
$ITCI_{17}$	1.00	0.91	0.16	0.37	0.12	0.49	0.83	0.36	0.58	0.00	–

Table 3. Assessment of the country's tax competitiveness level

Country	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021
Ukraine	0.64	0.64	0.64	0.66	0.66	0.67	0.68	0.68	0.67	0.69	0.69
Poland	0.68	0.68	0.71	0.71	0.7	0.72	0.72	0.72	0.74	0.74	0.75
The Czech Republic	0.71	0.71	0.74	0.74	0.73	0.75	0.75	0.75	0.77	0.77	0.78
Slovakia	0.67	0.67	0.70	0.70	0.69	0.71	0.71	0.71	0.73	0.73	0.74
Slovenia	0.68	0.68	0.71	0.71	0.70	0.72	0.72	0.72	0.74	0.74	0.75
Romania	0.66	0.66	0.69	0.69	0.68	0.70	0.70	0.70	0.72	0.72	0.73
Hungary	0.71	0.71	0.74	0.74	0.73	0.75	0.75	0.75	0.77	0.77	0.78
Croatia	0.72	0.72	0.75	0.75	0.74	0.76	0.76	0.76	0.78	0.78	0.79
Lithuania	0.75	0.75	0.78	0.78	0.77	0.79	0.79	0.79	0.82	0.82	0.83
Latvia	0.76	0.76	0.79	0.79	0.78	0.80	0.80	0.80	0.83	0.83	0.84
Estonia	0.78	0.78	0.81	0.81	0.80	0.83	0.83	0.83	0.85	0.85	0.86

ed from 2011 to 2021. The results shown in Table 3 indicate that during the analyzed period, the level of tax competitiveness of the analyzed countries practically did not change. Ukraine, Romania, and Slovakia have the lowest values of tax competitiveness, and Estonia, Latvia, and Lithuania have the highest.

In the next stage, the analyzed countries were clustered according to the level of their tax competitiveness. To increase the reliability of the clustering process, a dispersion analysis of indicators was conducted for different numbers of clusters (from 2 to 4). This made it possible to determine the optimal number of clusters that ensures the highest quality and objectivity of the obtained results (Table 4).

The criteria for deciding the number of selected clusters are the intergroup and intragroup variance values and the factor characteristic error. The objective selection criteria are the maximization of intergroup variance values and the minimization of intragroup variance values. In addition, the most optimal option is the one in which the error value of the factor characteristic does not exceed 0.05.

According to these criteria, the highest reliability of the obtained results is achieved when 4 clus-

Table 4. Dispersion analysis of indicators of tax competitiveness for different clustering methods

Indicator	$\sigma^2_{intergr}$	$\sigma^2_{intragr}$	μ	Indicator	$\sigma^2_{intergr}$	$\sigma^2_{intragr}$	μ
2 clusters							
$ITCI_1$	17.863	25.552	0.000	$ITCI_{10}$	156.850	232.212	0.000
$ITCI_2$	11.005	17.652	0.007	$ITCI_{11}$	128.510	190.255	0.054
$ITCI_3$	9.854	11.652	0.000	$ITCI_{12}$	28.850	42.711	0.000
$ITCI_4$	15.980	23.658	0.124	$ITCI_{13}$	65.957	97.647	0.000
$ITCI_5$	0.658	0.974	0.000	$ITCI_{14}$	30.955	19.570	0.000
$ITCI_6$	0.521	0.772	0.000	$ITCI_{15}$	0.365	0.540	0.000
$ITCI_7$	0.635	0.940	0.351	$ITCI_{16}$	577.308	854.694	0.000
$ITCI_8$	0.658	0.974	0.000	$ITCI_{17}$	72.199	45.645	0.000
$ITCI_9$	265.950	393.732	0.000				
3 clusters							
$ITCI_1$	11.698	27.718	0.000	$ITCI_{10}$	103.317	152.958	0.000
$ITCI_2$	12.968	21.658	0.000	$ITCI_{11}$	84.650	125.322	0.024
$ITCI_3$	7.985	11.124	0.000	$ITCI_{12}$	19.003	28.134	0.000
$ITCI_4$	18.958	26.985	0.004	$ITCI_{13}$	43.446	64.321	0.000
$ITCI_5$	0.433	0.642	0.000	$ITCI_{14}$	48.119	71.239	0.000
$ITCI_6$	0.343	0.508	0.000	$ITCI_{15}$	0.240	0.356	0.000
$ITCI_7$	0.418	0.619	0.148	$ITCI_{16}$	378.046	1145.241	0.000
$ITCI_8$	0.433	0.642	0.000	$ITCI_{17}$	112.233	166.158	0.000
$ITCI_9$	175.181	259.352	0.000				

http://dx.doi.org/10.21511/im.19(4).2023.24

Table 4 (cont.). Dispersion analysis of indicators of tax competitiveness for different clustering methods

Indicator	$\sigma^2_{intergr}$	$\sigma^2_{intragr}$	μ	Indicator	$\sigma^2_{intergr}$	$\sigma^2_{intragr}$	μ
4 clusters							
$ITCI_1$	27.266	22.089	0.000	$ITCI_{10}$	239.416	200.741	0.000
$ITCI_2$	16.798	15.260	0.000	$ITCI_{11}$	196.158	164.471	0.000
$ITCI_3$	15.345	10.073	0.000	$ITCI_{12}$	44.037	36.923	0.000
$ITCI_4$	24.392	20.452	0.000	$ITCI_{13}$	100.677	84.413	0.000
$ITCI_5$	1.004	0.842	0.000	$ITCI_{14}$	25.033	20.989	0.000
$ITCI_6$	0.796	0.667	0.000	$ITCI_{15}$	0.557	0.467	0.000
$ITCI_7$	0.969	0.813	0.000	$ITCI_{16}$	881.203	738.862	0.000
$ITCI_8$	1.004	0.842	0.000	$ITCI_{17}$	58.386	48.954	0.000
$ITCI_9$	405.946	340.371	0.000				
5 clusters							
$ITCI_1$	33.717	20.596	0.000	$ITCI_{10}$	296.056	187.171	0.000
$ITCI_2$	20.772	14.228	0.004	$ITCI_{11}$	242.564	153.352	0.007
$ITCI_3$	18.975	9.392	0.000	$ITCI_{12}$	54.455	34.427	0.000
$ITCI_4$	30.162	19.069	0.207	$ITCI_{13}$	124.495	78.707	0.000
$ITCI_5$	1.242	0.785	0.000	$ITCI_{14}$	30.955	19.570	0.000
$ITCI_6$	0.984	0.622	0.000	$ITCI_{15}$	0.689	0.435	0.000
$ITCI_7$	1.199	0.758	0.365	$ITCI_{16}$	1089.677	688.915	0.000
$ITCI_8$	1.242	0.785	0.000	$ITCI_{17}$	72.199	45.645	0.000
$ITCI_9$	501.984	317.362	0.000				

Note: $\sigma^2_{intergr}$ is the intergroup variance; $\sigma^2_{intragr}$ is the intragroup variance; μ is the factor characteristic error.

ters of countries are selected. Even though with 5 clusters significantly better intergroup and intragroup dispersion values are achieved, the graphical interpretation of the average values of each of the analyzed indicators of the country's tax competitiveness within each cluster proves the presence of minor differences between them (significant similarity of cluster centers). This complicates the procedure for interpreting the obtained results and the distribution of countries between clusters.

Thus, the results of the dispersion analysis of tax competitiveness indicators for different clustering methods proved the expediency of dividing countries into 4 groups (Table 5).

In the next stage of the research, an analysis of each of the selected clusters was carried out, and the marginal and average values of each of the indicators of tax competitiveness were determined. This made it possible to form criteria for identifying competing countries and those with common trends in the development of the tax system.

The values of the centers of each of the selected clusters in terms of indicators of the process component of the formation of tax competitiveness are shown in Figure 1.

The results of the comparative analysis of the average values of indicators within the process component for each identified cluster proved the presence of minor differences in the levels of VAT taxation. At the same time, the level of the tax burden on social contributions is characterized by the greatest fluctuations.

Table 5. Clustering of countries according to indicators of tax competitiveness based on the k-means method

Cluster 1	Cluster 2	Cluster 3	Cluster 4
Lithuania, Latvia	Poland, the Czech Republic	Slovakia, Slovenia, Hungary, Croatia, Estonia	Ukraine, Romania

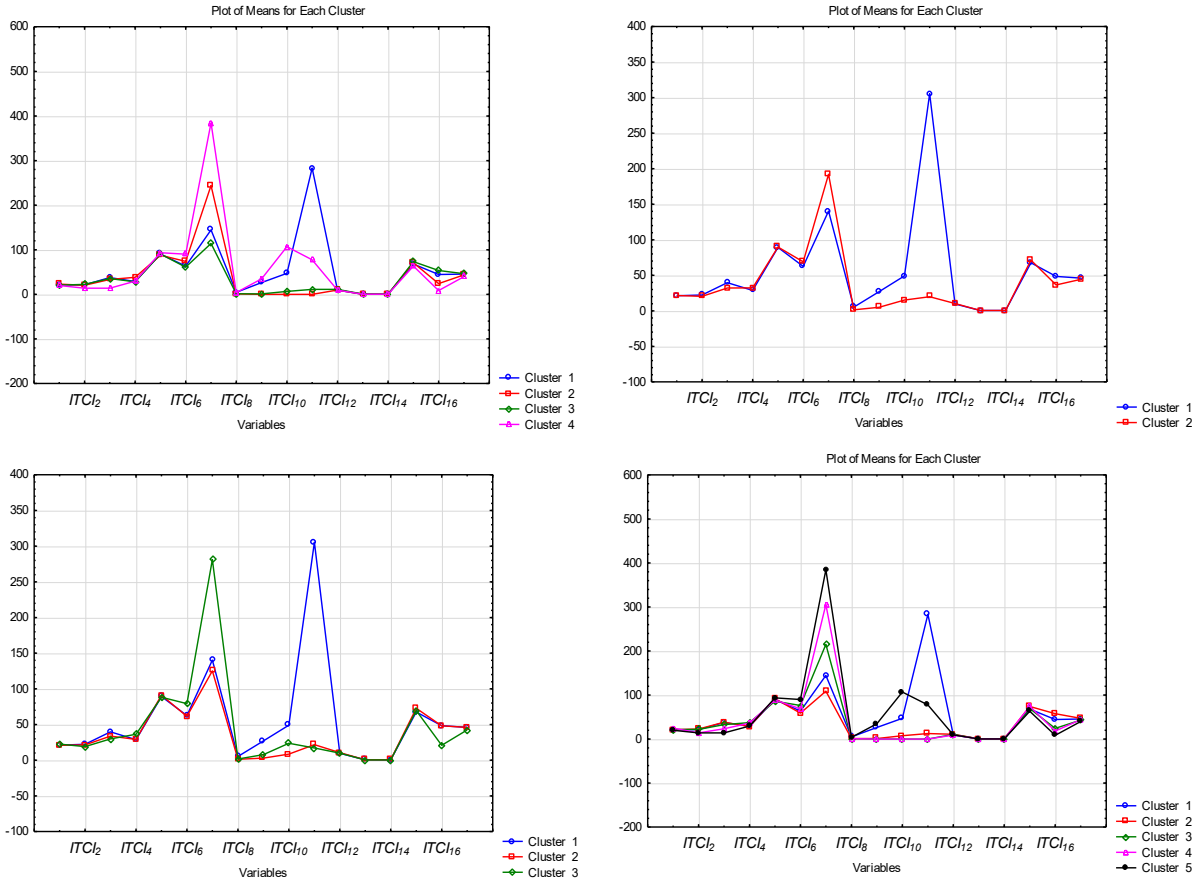

Figure 1. Average values of indicators of the formation of tax competitiveness for the formed clusters

Similar calculations for other components of the assessment of the country's tax competitiveness made it possible to highlight the following features of the construction of the tax system of the countries forming a certain cluster:

- cluster 1 includes countries with average values of indicators within the process, institutional, moral-ethical, and economic components. These countries have an average level of tax burden with simultaneous moderate levels of fiscal health and tax freedom, financial literacy, economic freedom, and GDP;

- the countries included in cluster 2 are characterized by a higher level of tax burden for VAT, corporate income tax, personal income tax, and social contributions. In addition, these countries are characterized by low levels of fiscal health, tax, and economic freedom, and the population of these countries has a significantly lower level of financial literacy and tax morale;

- countries-representatives of the third cluster have an above-average level of tax competitiveness, which is characterized by higher-than-average levels of the tax burden, duration and cost of tax assessment and payment procedures in the implementation of export-import operations, lower than average levels of fiscal health, tax and economic freedom;

- cluster 4 includes countries with a significantly lower level of tax burden on individuals compared to legal ones, the best values of tax morale of the population, the highest levels of economic and tax freedom, and fiscal health.

To verify the reliability of the obtained results regarding the selection of 4 clusters of countries within the framework of the components of the formation of the country's tax competitiveness, the clustering of countries was carried out using the Ward method (Figure 2). The advantage of this

http://dx.doi.org/10.21511/im.19(4).2023.24

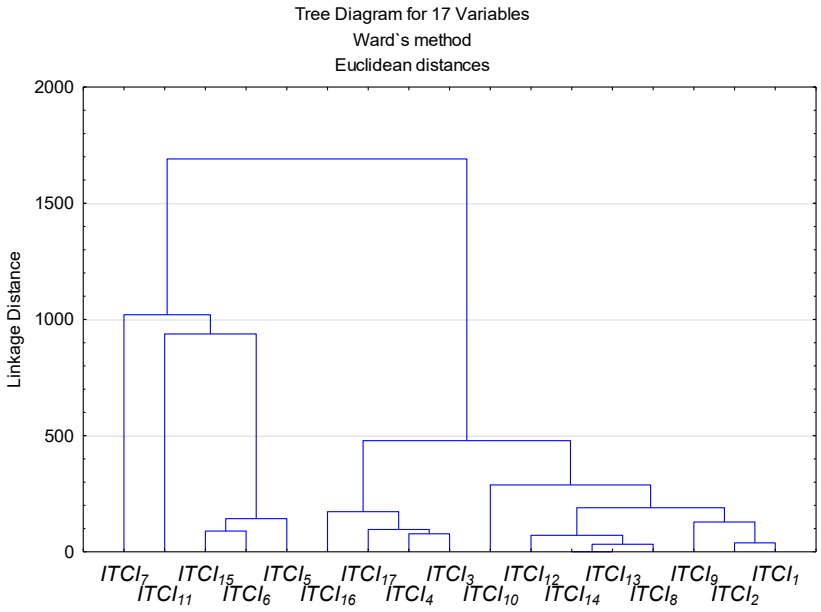

Figure 2. Clustering of countries according to tax competitiveness indicators using the Ward method

method is the ability to group countries with a simultaneous minimal increase in the intra-group sum of squared deviations, i.e., optimization of the minimal dispersion within clusters.

In the next stage, the optimal number of clusters was determined using the Kalinsky-Kharabash criterion. Table 6 proves the feasibility of dividing the countries into 3 clusters. Thus, the pseudo-F value of the Kalinsky-Kharabash index for 3 clusters is the maximum, which indicates the highest accuracy of the clustering procedure.

Table 6. Reliability test of clustering of countries according to the Kalinsky-Kharabash criterion

Number of clusters	Kalinsky-Kharabash pseudo-F index
2	12.20
3	13.71
4	12.12
5	11.98
6	11.58
7	10.71
8	6.5

The results of the clustering of countries according to indicators of tax competitiveness using the Ward method and the Kalinsky-Kharabash criterion made it possible to divide the countries into three clusters (Table 7).

Thus, the clustering of countries according to the indicators of the formation of tax competitiveness using the Ward method (Table 7) and the k-means method (Table 5) prove that clusters 1 and 2 are formed from the same countries. At the same time, cluster 3, formed by the Ward method, includes countries from clusters 3 and 4 by the k-means method.

The obtained results conclude the expediency of dividing countries into 3 clusters based on indicators of tax competitiveness formation. The first cluster includes countries whose tax system is characterized by a moderate burden on taxpayers. In addition, these countries are characterized by an average level of tax morale and financial literacy of the population, and the values of their fiscal health, tax and economic freedom are also at an average level. Cluster 2 unites countries characterized by a significantly higher level of tax burden on legal entities and a moderate burden on individuals. At the same time, the population's finan-

Table 7. Clustering of countries according to indicators of tax competitiveness formation based on Ward's method

Cluster 1	Cluster 2	Cluster 3
Lithuania, Latvia	Poland, the Czech Republic	Slovakia, Slovenia, Hungary, Croatia, Estonia, Ukraine, Romania

cial literacy and tax morale are among the lowest. The third cluster is formed from countries with higher than average tax rate values, characterized by average levels of fiscal health, tax and economic freedom, more expensive and time-consuming tax administration procedures when carrying out export-import activities.

The results indicate significant differences in the tax systems of European countries, the average level of their tax competitiveness, and the absence of positive dynamics in the direction of its growth. The obtained results correlate with previous studies on the grouping of countries by the level of competitiveness of the tax system (Bilan et al., 2018; Keen, 2008). At the same time, the difference of this study is that, unlike previous studies (Mengden, 2023), it offers an approach to assessing the level of tax competitiveness that combines objective and subjective components (procedural, institutional, moral-ethical, and economic components) and significantly increases the objectivity of the obtained results. The limitations of this paper are, firstly, the presence of significant differences between the tax systems of individual countries, which makes their comparison impossible, and secondly, the lack of data in terms of individual indicators of the functioning of the tax system for certain periods of time, which limited the object of the study.

CONCLUSION

This study is devoted to assessing the level of international tax competitiveness as an element of marketing strategy of Ukraine and the EU countries during 2011–2021. Based on the analysis of scientific literature, a list of indicators of the formation of the country's tax competitiveness was determined. Using correlation-regression analysis, the Fisher method, and the multiplicative convolution method, the tax competitiveness of 11 countries for 2001–2021 was assessed. Based on the obtained results, the expediency of improving the tax policy of most of the analyzed countries is substantiated. It has been proven that over the past 11 years, most countries' competitiveness level has remained at an average level (0.6-0.8) and has not significantly improved. It was concluded that the lowest indicators of tax competitiveness are shown by Ukraine (0.69), Romania (0.73), and Slovakia (0.74), and the highest – Estonia (0.86), Latvia (0.84), and Lithuania (0.83).

The obtained results proved the need to improve the state tax policy of most countries under analysis. Priority attention should be given to countries with low levels of tax competitiveness. It was determined that the basis of increasing the tax competitiveness of the country should be taking into account the features of the tax system of competing countries.

For this purpose, using hierarchical and non-hierarchical (k-means method) clustering methods, countries were clustered by the level of tax competitiveness. This made it possible to distinguish 3 clusters of countries. The first cluster (Lithuania, Latvia) is characterized by a moderate tax system, average levels of tax morale and financial literacy of the population, fiscal health, tax and economic freedom. Countries of the second cluster (Poland and the Czech Republic) show a higher level of tax burden on legal entities and a moderate burden on individuals. The third cluster countries (Slovakia, Slovenia, Hungary, Croatia, Estonia, Ukraine, and Romania) have the highest tax burden, average level of fiscal health, and tax and economic freedom.

Thus, measures to increase the tax competitiveness of the countries of the third cluster should include increasing the efficiency of tax and customs services, reducing corruption in state bodies, improving the procedure for calculating and paying taxes, reducing time spent on filling out and maintaining tax reporting, increased liability for tax evasion, developed methodology for identifying risky financial transactions, and improved the tools for implementing the taxation system.

For the countries of the first cluster, the priority measures should be increasing the level of publicity and transparency of public authorities, financial monitoring, and control bodies, reducing bureaucracy

http://dx.doi.org/10.21511/im.19(4).2023.24

and corruption in the country, simplifying financial monitoring and control over tax administration processes, increasing stability of the national economy by eliminating schemes for the legalization of illegally obtained income.

AUTHOR CONTRIBUTIONS

Conceptualization: Oleksiy Mazurenko.
Data curation: Inna Tiutiunyk, Oleksiy Mazurenko, Viktoriia Taranenko.
Formal analysis: Inna Tiutiunyk, Oleksiy Mazurenko, Artem Artyukhov.
Funding acquisition: Inna Tiutiunyk, Oleksiy Mazurenko, Yuliia Yehorova.
Investigation: Inna Tiutiunyk, Oleksiy Mazurenko.
Methodology: Oleksiy Mazurenko.
Project administration: Inna Tiutiunyk, Oleksiy Mazurenko.
Resources: Inna Tiutiunyk, Oleksiy Mazurenko.
Software: Inna Tiutiunyk, Oleksiy Mazurenko, Viktoriia Taranenko, Artem Artyukhov.
Supervision: Inna Tiutiunyk, Oleksiy Mazurenko, Viktoriia Taranenko.
Validation: Inna Tiutiunyk, Oleksiy Mazurenko, Viktoriia Taranenko.
Visualization: Inna Tiutiunyk, Oleksiy Mazurenko, Viktoriia Taranenko.
Writing – original draft: Inna Tiutiunyk, Oleksiy Mazurenko, Viktoriia Taranenko, Artem Artyukhov, Yuliia Yehorova.
Writing – review & editing: Inna Tiutiunyk, Oleksiy Mazurenko, Viktoriia Taranenko, Artem Artyukhov, Yuliia Yehorova.

ACKNOWLEDGMENT

The study is funded by the EU NextGenerationEU through the Recovery and Resilience Plan for Slovakia under the project No. 09I03-03-V01-00042.

The authors are grateful to the participants of projects "National security of Ukraine through the prevention of financial fraud and money laundering: war and post-war challenges" (2023–2025, state registration number: 0123U101945) and "De-shadowing and regulatory efficiency of environmental taxation: optimization modelling to ensure national security and rational use of nature" (2022–2024, registration number 0122U000777) for numerous discussions and comments.

REFERENCES

1. Ali, W.B., Kim, L., Pongsakornrungsilp, S., & Chinchanachokchai, S. (2023). Factors influencing job stress: Evidence from tellers in Cambodia. *Problems and Perspectives in Management, 21*(4), 140-149. https://doi.org/10.21511/ppm.21(4).2023.11
2. Asare, K., & Samusevych, Y. (2023). Exploring financial fraud, tax tools, and economic security research: Comprehensive bibliometric analysis. *Financial Markets, Institutions and Risks, 7*(3), 136-146. https://doi.org/10.61093/fmir.7(3).136-146.2023
3. Bhandari, M. P. (2023). The fundamental principles of social sciences. *Business Ethics and Leadership, 7*(2), 73-86. https://doi.org/10.21272/bel.7(2).73-86.2023
4. Bilan, Y., Lyeonov, S., Vasylieva, T., & Samusevych, Y. (2018). Does tax competition for capital define entrepreneurship trends in Eastern Europe? *On-line Journal Modelling the New Europe, 27,* 34-66. https://doi.org/10.24193/OJMNE.2018.27.02
5. Brueckner, J. K. (2000). A Tiebout/tax competition model. *Journal of Public Economics, 77*(2), 285-306. https://doi.org/10.1016/S0047-2727(99)00086-9
6. Chornous, G., Fareniuk, Y., Giedraitis, V. R., Ulvidienė, E., & Kharlamova, G. (2023). A data science-based marketing decision support system for brand management. *Innovative Marketing, 19*(2), 38-50. https://doi.org/10.21511/im.19(2).2023.04
7. Danylyshyn, B., Cymbal, O., Ostafiichuk, Y., & Pylypiv, V. (2022). The tax changes impact on the municipal budgets revenues in Ukraine. *Financial and Credit Activity Problems of*

Theory and Practice, 5(46), 126-136. https://doi.org/10.55643/fcaptp.5.46.2022.3843

8. Gajdosova, K. (2023). Role of GDP in the sustainable growth era. *SocioEconomic Challenges, 7*(3), 94-112. https://doi.org/10.61093/sec.7(3).94-112.2023

9. Gentle, P. F. (2022). Book review on Frank N. Pieke, & Koichi Iwabuchi (2021). Global East Asia: Into the Twenty-First Century. *Business Ethics and Leadership, 6*(4), 118-120. https://doi.org/10.21272/bel.6(4).118-120.2022

10. Gentsoudi, V. (2023). The impact of effective leadership on public sector's financial instruments: Empirical evidence from Greece. *Business Ethics and Leadership, 7*(2), 47-54. https://doi.org/10.21272/bel.7(2).47-54.2023

11. Keen M. (2008). Tax competition. In S. N. Durlauf & L. E. Blume (Eds.), *The New Palgrave Dictionary of Economics.* London: Palgrave Macmillan. https://doi.org/10.1057/978-1-349-95121-5_2156-1

12. Kobiyh, M., & El Amri, A. (2023). Inefficiency of financial markets and paths to the development of a modern financial theory. *Financial Markets, Institutions and Risks, 7*(2), 95-100. https://doi.org/10.21272/fmir.7(2).95-100.2023

13. Kostynets, V., Kostynets, I., Korneyev, M., Nebaba, N., & Sopin, E. (2020). Development of internal tourism and hospitality in Ukraine. *Tourism and Travelling, 3*(1), 25-33. https://doi.org/10.21511/tt.3(1).2022.04

14. Kotina, H., Stepura, M., Kornieva, A., & Slavkova, A. (2023). Fiscal solvency and fiscal limitations under economic crisis and recovery: An empirical approach of Ukraine. *Investment Management and Financial Innovations, 20*(1), 277-292. https://doi.org/10.21511/imfi.20(1).2023.24

15. Kuzior, A., Babenko, V., Rekunenko, I., & Pohodenko, B. (2023). The current state of scientific research of the process of risk management of Ukrainian energy sector enterprises. *Management Systems in Production Engineering, 31*(3), 322-331. https://doi.org/10.2478/mspe-2023-0036

16. Kuzior, A., Grebski, W., Kwilinski, A., Krawczyk, D., & Grebski, M. E. (2022a). Revitalization of post-industrial facilities in economic and socio-cultural perspectives – A comparative study between Poland and the USA. *Sustainability, 14*(17), 11011. https://doi.org/10.3390/su141711011

17. Kuzior, A., Liakisheva, A., Denysiuk, I., Oliinyk, H., & Honchar, L. (2020). Social risks of international labour migration in the context of global challenges. *Journal of Risk and Financial Management, 13*(9), 197. https://doi.org/10.3390/jrfm13090197

18. Kuzior, A., Pidorycheva, I., Liashenko, V., Shevtsova, H., & Shvets, N. (2022b). Assessment of national innovation ecosystems of the EU countries and Ukraine in the interests of their sustainable development. *Sustainability, 14*(14), 8487. https://doi.org/10.3390/su14148487

19. Kuzmenko, O., Yarovenko, H., & Perkhun L. (2023). Assessing the maturity of the current global system for combating financial and cyber fraud. *Statistics in Transition new series, 24*(1), 229-258. https://doi.org/10.59170/stattrans-2023-013

20. Kwilinski, A. (2019). Implementation of blockchain technology in accounting sphere. *Academy of Accounting and Financial Studies Journal, 23*(2S), 1-6. Retrieved from https://www.abacademies.org/articles/implementation-of-blockchain-technology-in-accounting-sphere-8219.html

21. Lyeonov, S., Bilan, S., Yarovenko, H., Ostasz, G., & Kolotilina, O. (2021a). Country's health profile: Social, economic, behavioral and healthcare determinants. *Economics & Sociology, 14*(3), 322-340. https://doi.org/10.14254/2071-789X.2021/14-3/17

22. Lyeonov, S., Pimonenko, T., Chygryn, O., Reznik, O., & Gaynulina, R. (2021b). Green brand as a marketing instrument: Principle, features and parameters. *International Journal of Global Energy Issues, 43*(2/3), 147-165. Retrieved from https://ideas.repec.org/a/ids/ijgeni/v43y2021i2-3p147-165.html

23. Lyeonov, S., Vasilyeva, T., Bilan, Y., & Bagmet, K. (2021c). Convergence of the institutional quality of the social sector: The path to inclusive growth. *International Journal of Trade and Global Markets, 14*(3), 272-291. https://doi.org/10.1504/IJTGM.2021.115712

24. Melnyk, L., Kubatko, O., Piven, V., Klymenko, K., & Rybina, L. (2021). Digital and economic transformations for sustainable development promotion: A case of OECD countries. *Environmental Economics, 12*(1), 140-148. https://doi.org/10.21511/ee.12(1).2021.12

25. Mengden, A. (2023, October 18). *International Tax Competitiveness Index 2023.* Tax Foundation. Retrieved from https://taxfoundation.org/publications/international-tax-competitiveness-index/

26. Njegovanović, A. (2023). Financial evolution and interdisciplinary research. *Financial Markets, Institutions and Risks, 7*(1), 71-95. https://doi.org/10.21272/fmir.7(1).71-95.2023

27. Oates, W. E. (1972). *Fiscal federalism* (54 p.). New York: Harcourt Brace Jovanovich Inc.

28. Patel, S., Kasztelnik, K., & Zelihic, M. (2023). Global overview of modern financing typologies to mitigate financial risks in developed countries. *SocioEconomic Challenges, 7*(2), 54-66. https://doi.org/10.21272/sec.7(2).54-66.2023

29. Piluso, N., & Heron, E.L. (2022). The macroeconomic effects of climate policy: A Keynesian point of view. *Environmental Economics, 13*(1), 16-27. https://doi.org/10.21511/ee.13(1).2022.02

30. Razinkova, M., Nebaba, N., Korneyev, M., Yakovenko, T., & Bohorodytska, A. (2023). Assessment of Ukraine's external debt burden under geopolitical

http://dx.doi.org/10.21511/im.19(4).2023.24

instability. *Public and Municipal Finance, 12*(2), 67-81. https://doi.org/10.21511/pmf.12(2).2023.06

31. Reshetniak, Ya., & Grifo, S. (2022). The role and place of the healthcare system in the formation of the national brand. *Health Economics and Management Review, 3*(2), 61-68. https://doi.org/10.21272/hem.2022.2-07

32. Sheliemina, N. (2023). Interrelationship between indexes of the population medical care quality and macroeconomic efficiency. *Health Economics and Management Review, 4*(1), 47-59. https://doi.org/10.21272/hem.2023.1-05

33. Shubita, M. F. (2023). Relationship between marketing strategy and profitability in industrial firms: Evidence from Jordan. *Innovative Marketing, 19*(2), 17-26. https://doi.org/10.21511/im.19(2).2023.02

34. Soares, R. de M. e, & Pinheiro, P. (2023). Fiscal attractiveness of Portuguese municipalities. *Public and Municipal Finance, 12*(2), 1-16. https://doi.org/10.21511/pmf.12(2).2023.01

35. Vasilyeva, T., Kuzmenko, O., Bozhenko, V., & Kolotilina, O. (2019). Assessment of the dynamics of bifurcation transformations in the economy. *SHS Web of Conferences, 65*, 04006. https://doi.org/10.1051/shsconf/20196504006

36. Vasilyeva, T., Yarovenko, H., Babenko, D., Kalicheva, N., Frolova, N., & Shylovtseva, N. (2022). The barycentric model of determining the sustainable growth determinants. *Heritage and Sustainable Development, 4*(2), 145-164. https://doi.org/10.37868/hsd.v4i2.148

37. Vasylieva, T. A., & Kasyanenko, V. O. (2013). Integral assessment of innovation potential of Ukraine's national economy: A scientific methodical approach and practical calculations. *Actual Problems of Economics,* 6(144), 50-59. Retrieved from http://nbuv.gov.ua/UJRN/ape_2013_6_7

38. Verbivska, L., Kriuchkova, N., Melnychenko, R., Bak, N., & Yakushko, I. (2023). Taxation strategy for small businesses in the context of digitalization. *Financial and Credit Activity Problems of Theory and Practice, 4*(51), 66-79. https://doi.org/10.55643/fcaptp.4.51.2023.4119

39. Vostrykov, P., & Jura, A. (2022). Environmental taxes impact for the population health protection: Cross-country analysis. *Health Economics and Management Review, 3*(4), 35-45. https://doi.org/10.21272/hem.2022.4-04

40. Wilson, J. D., & Wildasin, D. E. (2004). Capital tax competition: bane or boon. *Journal of Public Economics, 88*(6), 1065-1091. https://doi.org/10.1016/S0047-2727(03)00057-4

41. Yoshimori, M. (2023). Rising global economic power by China to challenge new global order. *SocioEconomic Challenges, 7*(2), 21-30. https://doi.org/10.21272/sec.7(2).21-30.2023