THE TAX COMPETITION AMONG EUROPEAN COUNTRIES

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ABSTRACT. Background: Taxes are and form the necessary basis for any form of organization in human society. **Aims:** The aim of the paper is to quantify the outputs of the tax competition among European countries. Specifically, we focus on studying the International Tax Competitiveness Index (ITCI) in the European area and on assessing how this aspect is time dependent. First, we try to find out whether there is a statistically significant relationship in the overall ranking within the ITCI of the surveyed European countries in time. Besides that, we try to confirm whether if the country is at the forefront within the GDP per capita, this country will also be at the forefront of the ITCI. **Sample:** The research sample consists of 27 European countries, for which the overall ranking of the ITCI and GDP per capita (by purchasing power parity (PPP)) were available from 2014 to 2020. **Methods:** We use the Spearman correlation coefficient, Sign test, and Wilcoxon Matched Pairs Test to verify the hypotheses. Results: The results show that variations in the country's level of ITCI change only slowly over time, and it is hard to modify them significantly. Moreover, we present the ranking of European countries within ITCI in 2014-2020 and the ranking within the level of GDP per capita (by PPP). **Conclusions:** We can confirm the assumption that if the country is at the forefront of the ITCI, this country will be located at the forefront of the GDP per capita (by PPP) indicator. **Implications:** The country's tax system is an important determinant of the country's economic performance.

Keywords: taxes, competitiveness, tax competition, International Tax Competitiveness Index

JEL Classification*:* H20, H29

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Introduction

In today's globalized world, where all countries are interconnected, factors of production such as labor and capital are highly mobile. Even in the case of the current coronavirus pandemic, where many companies are struggling with many unexpected problems, it is a priority for companies to invest in countries where they achieve the highest possible rate of return (or the lowest possible loss). Of course, the area of investment or business is significantly affected by the country's tax system. Enterprises will look for countries with the lowest possible tax rates to maximize their after-tax returns. If the tax burden in a country is too high, it will lead to a shift of investment to another country, which will lead to a slowdown in economic growth. The importance of the best possible organization of tax systems is also essential in the context of supporting economic recovery and increasing costs after a coronavirus pandemic.

Taxes are and form the necessary basis for any form of organization in human society. As long as there is a state, it will need a certain amount of financial resources to function. The existence of taxes is, therefore, justified (Sivák, 2015). Competitiveness is a "set of institutions, policies, and factors, which determine a country's level of productivity". In other words, competitive economies tend to produce a higher level of income for their citizens. Moreover, the productivity level determines the profitability rates obtained by investments (physical, human, and technological) in an economy. The profitability rates are fundamental factors of the economic increase rates; therefore, a competitive economy increases faster in the long run (Stefan, 2012).

This paper combines the concept of tax and competitiveness and deals with tax competition. In Europe, the phenomenon of tax competition was already manifested in the early sixties of the 20th century, along with the increase in cross-border mutual (Mihóková, Andrejovská, & Martinková, 2018). This paper aims to analyze the tax competition among European countries.

Theoretical background

Taxes

At present, the term tax is a general term belonging to modern microeconomics or macroeconomics. Taxes belong to the group of indirect economic management tools. According to Schultzová (2011), taxes are a tool for the redistribution of the created product and significantly influence the size of disposable income (pensions) of individual entities. In general, we can characterize the tax as a mandatory, statutory, non-equivalent, usually recurring payment. In what period, in what amount and what taxes are to be paid by tax subjects is determined by the so-called secondary, respectively, additional tax requirements. These requirements precisely specify the designation of the tax administrator, the due date of the tax, the rounding of the tax, the minimum amounts of tax or the non-taxable parts of the tax.

The tax represents a transfer of funds from the private to the public sector. The tax is defined as a mandatory, non-refundable, statutory payment to the public budget. It is a non-purpose and non-equivalent payment (Kubátová, 2010). According to Chorvátová et al. (2006), taxes mean obligatory and non-repayable monetary benefits collected by the state on behalf of financial institutions. Taxes can be characterized as obligatory, statutory amounts that irrevocably deduct part of the nominal income from the tax subject (Široký, 2006). More studies on taxes issues (mainly in Slovakia) are in, e.g., Jenčová & Vašaničová (2019, 2022), Jusková (2019), Jusková & Korečko (2016), Hečková et al. (2019).

Competitiveness

There are several approaches to competitiveness. Organization for Economic Cooperation and Development (OECD, 2016) defines competitiveness by considering its two fundamental reference levels (the firm and the nation). According to OECD, national competitiveness is "the ability of companies, industries, regions, nations or supranational regions to generate, while being and remaining exposed to international competition, relatively high factor income and factor employment levels on a sustainable basis". The objective of national competitiveness is to maintain and improve citizens' living standards (Hatzichronoglou, 1996). The Institute for Management Development (IMD) has a similar approach. It refers to competitiveness both as a tool and an objective of economic policy. The IMD World Competitiveness Centre (2018) understands competitiveness as "the ability of countries, regions, and companies to manage their competencies to achieve long-term growth, generate jobs and increase welfare".

According to the World Economic Forum (2014), "competitive economies are those that can provide high and rising living standards, allowing all members of a society to contribute to and benefit from these levels of prosperity. In addition, competitive economies are those that are sustainable (meeting the needs of the present generation while maintaining the ability to meet those of future generations)". According to the Hungarian Central Bank (2019) "a national economy is competitive if it utilizes its available resources optimally to attain the highest possible but at the same time sustainable level of welfare".

Krugman (1994) criticizes international competitiveness. He thinks that international competitiveness is an irrelevant and dangerous concept because nations do not compete with each other the way corporations do. An increase in productivity causes increasing the standard of living of a nation. The country's future prosperity depends on its productivity growth and certainly on government policies. Nations compete in the way that they choose policies that promote productivity. As pointed out by Dunning (1995), Porter (1990), and Salvatore (1993), international competitiveness does matter.

Several studies have investigated the impact of entrepreneurship on countries' competitiveness. Regarding European Union countries, Bosma, Sanders, & Stan (2018), Ciocanel & Pavelescu (2015), Szabo & Herman (2012) are the authors who have analyzed the relationship between entrepreneurship and national competitiveness.

The World Economic Forum has found the analysis of competitiveness based on the Global Competitiveness Index since 2005. It is a very comprehensive index measuring national competitiveness from the microeconomic and macroeconomic perspectives (Stefan, 2012).

Tax Competition

The concept of "tax competition" was introduced by Charles Tiebout (1956), while Oates (1972) was one of the early contributors to the tax competition literature. He noted that local governments are likely to "keep taxes low to attract business investment" in competing for mobile capital and that the result of such tax competition "may well be a tendency toward less than efficient levels of output of local services". Zodrow & Mieszkowski (1986) and Wilson (1986) formalized this notion in models.

"Tax competition is any way of fixing tax rates in the absence of cooperation between independent governments under which the choice of each party has an impact on the distribution of the mobile tax base among the regions represented by these governments" (Wilson & Wildasin, 2004). According to Winner (2005) "tax competition is a situation when fiscal activity in one jurisdiction causes fiscal externalities in another."

Historically, the theoretical tax competition (Wildasin, 1988) has focused on inter-jurisdictional capital mobility. In these models, individuals do not cross-border to decide where to live and to work. Wilson (1991) and Bucovetsky (1991) extend the model to include "asymmetric tax competition" between large and small jurisdictions. Although most of the tax competition literature has been concerned with capital mobility (Boadway & Tremblay, 2012), standard models have been extended to labor mobility (Braid, 1996). Another seminal paper by Wilson (1995) is about tax competition with perfectly mobile capital and workers. Wildasin (2011) considers tax competition in a dynamic framework, where labor and capital are complementary, imperfectly mobile production factors. Gabszewicz, Tarola, & Zanaj (2016) analyze tax competition in a model of labor migration when individuals are heterogeneous with respect to their home attachment.

Many politicians and experts support the idea of tax competition, which forces governments to be more efficient. International tax competition among countries is studied in several publications (e.g., Cassette & Paty, 2008; Devereux, Lockwood, & Redoano, 2008; Heinemann, Overesch, & Rincke, 2010; Cassette et al, 2013; Redoano, 2014; Altshuler & Goodspeed, 2015).

Increases in the competition between countries in terms of the attractiveness of their tax environment depend on the current degree of globalization. For potential investors, the competition between countries results in changes in the size of the tax bases of competing countries (Remeur, 2015).

De Mooij & Ederveen (2003) comprised more than 25 empirical studies and discovered that the average corporate tax rate elasticity is high: after the rate of corporate tax had decreased by 1%, foreign investment increased by 3.3%, in general. Podviezko, Parfenova, & Pugachev (2019) proposed to choose the ultimate criterion of competitiveness of a country's tax system to be the integral magnitude of its tax revenues over a long-term period. They have formed a hierarchy structure with the following categories and criteria: tax burden (income tax in %, profit tax in %), convenience of settlement (number of payments required for settlement with tax authorities), quality of tax system governance (time required to prepare a tax report in hours, ease of doing business in rank), the growth rate (average annual growth of the GDP 2009-2015 in %), the remuneration of labor (labor costs per hour in euros), the level of corruption (corruption index). In their paper, they used the MCDA (multiple criteria decision-aid)

approach to evaluate several countries in terms of tax competitiveness. They used SAW - simple additive weighting and PROMETHEE II – preference ranking organization method for enrichment evaluation.

Banociova & Tahlova (2019) aimed to characterize the tax competition among the 28-EU member states in the period 2007-2017 and assess whether states are competitive in the field of corporate taxation. Tax competitiveness among states was perceived by the level of CITRs (corporate income tax revenues) in relation to GDP (gross domestic product). The level of CITRs was influenced by tax variables (statutory tax rate, marginal effective tax rate, statutory tax rate to the power of 2, marginal effective tax rate to the power of 2, anti-evasion rules, control rules of foreign companies, loss of carry-forward, loss of carry-back, tax incentives for research and development, transfer pricing rules), international factors that have a link to tax competitiveness among states (inflow of foreign direct investment in relation to GDP, the land area above sample average, openness, globalization index), other factors affecting the corporate environment in the state (share of GDP of the state in relation to total GDP, GDP growth, unemployment rate, inflation, natural logarithm GDP per capita) and time effect. They have been specified an econometric model of panel regression (fixed model with individual effects).

Some authors created criteria for describing the attractiveness and competitiveness of national tax systems, which comprise the following topics: the favorable tax environment; the business tax burden; the quantity of different taxes and convenience of settlements with tax authorities; economic and demographic factors; the quality of tax administration; and the level of remuneration or corruption (see Goodspeed, 1998; Devereux & Loretz, 2013; Garrett & Mitchell, 2001; Baskaran & da Fonseca, 2014; Swank, 2016). Budget deficit/surplus-to-GDP, government debt-to-GDP, and government expenditure-to-GDP ratios are the macroeconomic variables that affect the tax environment of the countries.

Measuring national competitiveness is a complex task. It is usually not measured with a single ratio but based on a specific set of criteria. In most cases, the factors influencing national competitiveness are tax burden and the tax regime (Vargha, Németh, & Pályi, 2019).

Many indicators or ratios are substantial from the point of tax competitiveness. They evaluate the labor-related burdens carried by employers and employees and the extent of the employee's net disposable revenues (Mádi & Árva, 2016).

The Washington-based Tax Foundation (2018) calculated a separate tax competitiveness index considering more than forty factors for calculating the index. They pay attention to the rate of tax burdens as well as the structure of taxation and tax regulation.

The structure of a country's tax code is a substantial determinant of its economic performance. The variety of approaches to taxation among OECD countries creates a need for a way to evaluate these systems relative to each other. For that purpose, the International Tax Competitiveness Index (ITCI) has been developed to compare how countries structure their tax systems. The ITCI seeks to measure whether a country's tax system is neutral and competitive. The ITCI looks at more than 40 tax policy variables. It utilizes 41 variables across five categories: corporate income tax, individual taxes, consumption taxes, property taxes, and international tax rules. Each category has multiple subcategories. These variables measure not only the level of tax rates but also how taxes are structured. The ITCI looks at a country's corporate taxes, individual income taxes, consumption taxes, property taxes and the treatment of profits earned overseas. The ITCI is a relative ranking of the competitiveness and neutrality of the tax code in each of the 36 OECD countries. The ITCI is designed to measure a country's tax code on a relative basis rather than on an absolute measurement. This means that a score of 100 does not signify the absolute best possible tax code but the best tax code among the 36 OECD countries. Each country's score on the ITCI represents its relative difference from the best country's score (Bunn & Assen, 2020). In this paper, we do not consider all OECD countries, but we select only those from Europe.

Methodology

Research Aim, Hypotheses, and Methods

The paper aims to quantify the outputs of the tax competition among European countries. Specifically, we analyze the ITCI, which was developed to compare the ways that countries structure their tax systems, and thus we assess how this aspect is time dependent. Therefore, the paper's main objective is to determine whether there is a relationship in the overall ranking of the ITCI among the surveyed European countries in time, specifically between the years 2014, 2015, 2016, 2017, 2018, 2019, and 2020. The partial aim is to find out whether we can confirm the assumption that if the country is at the forefront of the GDP per capita by purchasing power parity (PPP) indicator, this country will be at the forefront of the ITCI. Because of the above objective, we formulated the following research hypothesis:

H1: We assume that there is a statistically significant relationship in the overall values of the ITCI of the surveyed European countries between monitored years.

H2: We assume that there are statistically significant differences in the position of European countries within the ITCI and within the position of the GDP per capita.

To verify the H1, we use Spearman's rank correlation coefficient as the proper representative measure for ranks correlation. It is a non-parametric rank statistic proposed as a measure of the strength of the association between two variables (Hauke & Kossowski, 2011). The higher the absolute value of Spearman's rank correlation coefficient, the stronger the association between the two variables (Puth et al., 2015). The procedure tests the specific null hypothesis (H_0) that two variables are not associated in the population and that the observed value of the correlation statistics differs from zero only by chance (Frapporti et al., 1991). The coefficient is calculated according to the formula (1),

$$r_s = 1 - \frac{6\sum_{i=1}^{n} d^2}{n\left(n^2 - 1\right)} \tag{1}$$

where d is the difference between ranks for the paired observations and n is the number of paired observations test (Vašaničová & Košíková, 2019; Vašaničová, 2022).

To verify the H2, we use the Sign test and Wilcoxon Matched Pairs. "The Sign test is a non-parametric test that is used to test whether two groups are equally sized. The sign test is used when dependent samples are ordered in pairs, where the bivariate random variables are mutually independent. It is based on the direction of the plus and minus sign of the observation, and not on their numerical magnitude." (Majumdar et al, 2019, p. 115). The nonparametric statistical hypotheses relate to the median are: H_0: No difference in median of the signed differences; H_1: Median of the signed differences is less than zero (Carter & Lubinsky, 2015, p. 294). "The Wilcoxon Matched Pairs signed-ranks test is non-parametric analogue of the t-test for matched samples. However, this test is based on richer information than the sign test." The null hypothesis (H_0) is that two sets of paired observations come from populations having the same distribution. The alternative hypothesis (H_1) states that the two sets of paired observations come from populations having different distributions (Russo, 2004, p. 169).

Research Background and Research Sample

The research sample consists of 27 European countries, for which the overall ranking of the ITCI and GDP per capita (PPP) were available in the years 2014, 2015, 2016, 2017, 2018, 2019, and 2020. Because ITCI is a ranking of the competitiveness and neutrality of tax codes in OECD countries, we included only European countries that are also part of the OECD in the analysis. In our research sample, we include Turkey, too, even though the larger part of its area is in Asia. On the other hand, ITCI values for all monitored years were not known for Latvia and Lithuania because Latvia became part of the OECD in 2016 and Lithuania only in 2018. Because of more frequent cross-border cooperation, more similar functioning of tax systems and territory, we focused mainly on European countries. Specifically, we do not consider the following OECD countries: Australia, Canada, Chile, Israel, Japan, Korea, Mexico, New Zealand, United States.

According to the section theoretical background, the ITCI measures the degree to which the OECD countries' tax systems promote competitiveness through low tax burdens on business investment and neutrality through a well-structured tax code (Pomerleau & Lundeen, 2014). According to Bunn & Asen (2020), a well-structured tax code can promote economic development while raising sufficient revenue for a government's priorities.

The ITCI considers more than forty variables across five categories: Corporate Taxes, Consumption Taxes, Property Taxes, Individual Taxes, and International Tax Rules. These variables measure not only the level of tax rates but also how taxes are structured. To calculate the variable, subcategory, category, and final score, first, the average and the standard deviation from each variable is calculated. Then each variable is standardized to compare variables with each other. Next is to calculate subcategory scores from variables, with each individual variable score is equally weighted and added together. The subcategories and categories are then modified in the same method (to eliminate any negative values, the inverse of the lowest z-score plus one in each subcategory is added to each country's z-score and the adjusted (sub)category scores for each country are scaled to 100, relative to the country with the best score in each (sub)category). The overall normalized score for each country is calculated by multiplying each category's normalized score by 20 percent (equal weight for the five categories) and adding them together (Pomerleau & Cole, 2015).

Table 1 shows the structure of the ITCI from 2020, but since the creation of the ITCI in 2014, every year, slight changes have been made in ways that could improve measurement competitiveness and neutrality.

Table 1. Components of the International Tax Competitiveness Index (Final Score)

Category	Subcategory	Tax Policy Variables
Corporate Taxes	Corporate Rate	Top Marginal Corporate Rate
	Cost Recovery	Loss Carryback Loss Carryforward Machinery Industrial Buildings Intangibles Inventory Allowance for Corporate Equity
	Tax Incentives and Complexity	Patent Box Implied Tax subsidy Rates on R&D Expenditures Corporate Complexity (CC) (Time) CC (Yearly Profit Payments) CC (Other Yearly Payments)
Consumption Taxes	Consumption Tax Rate	VAT/Sales Tax Rate
	Consumption Tax Base	VAT/Sales Tax Threshold VAT/Sales Tax Base as a Percent of Total Consumption
	Consumption Tax Complexity	Hours to Comply
Property Taxes	Real Property Taxes	Real Property or Land Tax Real Property Taxes Deductible
	Wealth/Estates Taxes	Net Wealth Tax Estate/Inheritance Tax
	Capital/Transaction Taxes	Transfer Taxes Asset Taxes Capital Duties Financial Transaction Tax
International Tax Rules	Territoriality (Participation Exemption	Dividend Exemption Capital Gains Exemption Country Limitations
	Withholding Taxes	Dividend Withholding Tax Interest Withholding Tax Royalties Withholding Tax
	Tax Treaties	Number of Tax Treaties
	International Tax Regulations	Controlled Foreign Corporation Rules (Income and Exemptions) Interest Deduction Limitations
Individual (Income) Taxes	Ordinary Income Taxes and Payroll Taxes	Top Marginal Income Tax Rate Top Income Tax Rate Threshold Ratio of Marginal to Average Tax Wedge
	Income Tax Complexity	Payments Time
	Capital Gains/Dividends	Top Marginal Capital Gains Tax Rate Top Marginal Dividends Tax Rate

Source: *own processing according to Bunn & Asen (2020)*

In 2015 and 2016, only slight changes were made to how scores are scaled or how it has scored interest deduction limitations in the international tax regulations category. In 2017 the scoring method of controlled foreign corporation rules changed. In 2018, there were a few following changes. For example, the variable that captured variation in VAT exemptions has been removed because all countries allow some exemptions from the VAT tax base. Moreover, some new measures have been included to better reflect the income tax structure. In 2019, Lithuania was included in the research sample of the ITCI. A variable that identified whether a country allows for taxpayers to adjust the basis of their capital

gains for inflation has been removed. In 2020, several changes to the way the ITCI treats corporate taxes, consumption taxes, and international taxes were incorporated. These changes have been applied in all years' scores to allow consistent comparison across years (Pomerleau & Cole, 2015; Pomerleau, 2016; Pomerleau, Hodge, & Walczak, 2017; Bunn, Pomerleau, & Hodge, 2018; Bunn & Asen, 2019, Bunn & Asen, 2020).

The data used for the composition of the ITCI was obtained from numerous sources, e.g., Bloomberg Tax Country Guides, Deloitte International Tax Source, Ernst & Young International Tax Guides, European Commission, International Monetary Fund, Organisation for Economic Co-operation and Development, Oxford University Centre for Business Taxation Database, PricewaterhouseCoopers Worldwide Tax Summaries (Bunn & Asen, 2020).

Results

We use Spearman's rank correlation coefficient to verify the existence of a statistically significant relationship in the ranking of the ITCI among the 27 surveyed European countries (Austria, Belgium, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Netherlands, Norway, Poland, Portugal, Slovak Republic, Slovenia, Spain, Sweden, Switzerland, Turkey, United Kingdom) in 2014, 2015, 2016, 2017, 2018, 2019, and 2020. The resulting correlation coefficients presented in the correlation matrix (Table 2) show how the ITCI is time dependent. High correlation coefficient values may indicate that ITCI values change very slowly in the time frame. It would mean that when the country has a high ITCI, it is likely to retain this high value more easily. At the same time, if the index for a given country has a low value, no significant change in pillar value is expected in the next period. From the resulting correlation coefficients, we can see that there is a high correlation between the observed periods. The highest relationships are between the values of pillars in consecutive years. The highest relationships are between the values of categories in consecutive years, specifically between 2015 and 2016, 2016 and 2017, 2018 and 2019.

Table 2. Correlation matrix of European countries

	2014	2015	2016	2017	2018	2019	2020
2014	---	0.9254	0.9485	0.9346	0.9038	0.8992	0.8538
2015		---	0.9792	0.9615	0.8731	0.8877	0.8462
2016			---	0.9747	0.8947	0.9138	0.8721
2017				---	0.9350	0.9371	0.9104
2018					---	0.9665	0.9439
2019						---	0.9383
2020							---

Source: *own processing*

Nevertheless, small deviations are apparent, indicating a possible significant shifting of a country within the overall ranking. In Table 3, we present the specific ranking of the individual European countries (according to the value of ITCI and according to the value of GDP per capita (PPP).

We can note that even though the ranking values are not always the same, the first and last places remain relatively stable, occupied by the same countries. Since 2016, significant changes should occur because Latvia (which is at the forefront in ITCI) became part of the OECD and appeared for the first time in the ITCI ranking. It was similar in 2018 when Lithuania was added.

Significant deviations in the order of ITCI (jump by more than four places) were in 2015 in Slovenia and the United Kingdom. Slovenia dropped seven places, due to VAT changes that restricted the deductibility of some inputs and the United Kingdom improved eight places due to a cut in its corporate income tax rate from 21 percent to 20 percent (Pomerleau & Cole, 2015). Other significant changes occurred between 2017 and 2018 when Belgium improved five places after tax reform that progressively reduced its statutory income tax rate. Hungary's ranking has also improved by five places. Its advantage is that Hungary has the lowest ratio in cost for each additional dollar raised from labor taxes as well as the lowest top marginal corporate income tax rate in the OECD at 9 percent. In contrast, the United Kingdom dropped by eight places. The United Kingdom receives the worst threshold score for VATs/sales taxes in OECD countries, which means favoring smaller businesses over larger ones, and the UK is characterized by a high collection of property taxes (Bunn, Pomerleau, & Hodge, 2018). In 2019, the most significant change compared to the previous year was Belgium, which dropped by seven

places due to adopting international tax rules following an EU directive (Bunn & Asen, 2019). By contrast, in 2020, Belgium improved its ranking by six places because the corporate tax rate fell and the wealth tax was abolished. Norway improved by five places, thanks to the adopted provision on loss carry-back during a coronavirus pandemic. Iceland dropped five places and Netherlands eight places. In the case of the Netherlands, this was mainly due to the progressive tax system with a combined high rate of personal income.

Table 3. Ranking of countries within the ITCI and GDP per capita (PPP) from 2014 to 2020

Country	2014		2015		2016		2017		2018		2019		2020	
	ITCI	GDP	ITCI	GDP	ITCI	GDP	ITCI	GDP	ITCI	GDP	ITCI	GDP	ITCI	GDP
Austria	10	6	13	6	14	6	10	8	8	8	10	8	10	8
Belgium	18	11	19	11	21	11	20	11	15	11	22	11	16	11
Czech Republic	13	17	11	17	10	17	7	17	7	16	8	16	7	15
Denmark	14	7	17	8	17	8	17	5	17	6	20	5	21	5
Estonia	1	19	1	21	1	20	1	19	1	19	1	19	1	19
Finland	9	12	12	12	15	12	15	12	12	12	15	12	14	12
France	25	14	25	14	26	14	26	14	26	14	27	13	24	13
Germany	16	8	14	10	16	9	18	9	14	9	13	9	13	10
Greece	21	23	20	23	23	25	22	25	22	26	23	26	22	26
Hungary	15	24	18	24	19	23	16	24	11	24	12	23	12	23
Iceland	19	10	16	9	18	5	19	6	20	7	18	7	23	7
Ireland	12	4	8	2	11	2	13	2	16	2	14	2	17	2
Italy	23	15	24	15	25	15	25	15	25	15	25	15	27	16
Latvia	n.a.	27	n.a.	27	2	27	3	26	2	25	2	25	2	24
Lithuania	n.a.	22	n.a.	22	n.a.	21	n.a.	20	n.a.	20	3	20	5	18
Luxembourg	4	1	5	1	6	1	4	1	3	1	5	1	4	1
Netherlands	5	5	4	5	5	7	6	7	4	5	7	6	15	6
Norway	11	2	10	4	9	4	12	4	13	4	16	4	11	4
Poland	20	25	22	25	22	24	23	23	24	23	26	22	26	22
Portugal	24	20	23	19	24	19	24	21	23	21	24	21	25	21
Slovak Republic	6	21	6	20	7	22	8	22	9	22	9	24	8	25
Slovenia	8	18	15	18	12	18	14	18	18	18	17	18	19	17
Spain	22	16	21	16	20	16	21	16	21	17	19	17	20	20
Sweden	3	9	3	7	4	10	5	10	6	10	6	10	6	9
Switzerland	2	3	2	3	3	3	2	3	5	3	4	3	3	3
Turkey	7	26	7	26	8	26	9	27	10	27	11	27	9	27
United Kingdom	17	13	9	13	13	13	11	13	19	13	21	14	18	14

Source: *own processing*
Note: *n.a. denotes not available*

The best-rated countries in the ITCI are (see the light gray cellars in Table 3) Estonia (1st place during the whole monitored period), Switzerland, Luxembourg, Latvia, and Lithuania, which, after joining the OECD countries, replaced Sweden and the Netherlands in the first places. Among the worst-rated countries (see dark gray cellars in Table 3) are France, Italy, Portugal, Poland, and Greece. Weaknesses in these countries are, e.g., in the case of France, the high tax burden on labor or the high corporate income tax rate. The disadvantages of Italy and Poland are multiple distortionary property taxes with separate levies on real estate, net wealth, estates, and financial transactions. Portugal and Greece have high corporate tax rates.

Although we have confirmed that the country's position is changing very slowly over time, space for change is still available. It is especially evident in countries that have significantly changed their position in one year, e.g., due to a cut in its corporate income tax rate, various tax reforms, adopted provision on loss carry-back during a coronavirus pandemic, etc.

Slovakia belongs to the top ten evaluated countries of ITCI, and its values were comparable to the scores of Turkey, the Netherlands (except for 2020), and Austria. According to Bunn & Asen (2020), the strengths of the Slovakian tax system are low personal income rate on dividends, the better-than-average tax treatment of business investment in machinery, buildings, and intangibles, corporations can deduct property taxes when calculating taxable income. Compared with countries in the first places, Slovakia lags behind them mainly in restricting the amount of net operating losses companies can use to offset future profits or in VAT amount. Slovakia's ranking according to GDP per capita is considerably worse compared to OECD countries.

The results in Table 2 confirm hypothesis H1 on the existence of statistically significant relationships in the overall ranking of the ITCI of the surveyed European countries between monitored years. Results show that variations in the level of ITCI (that means structure tax systems, its competitiveness, and neutrality) in a country change only slowly over time, and it is difficult to modify them. Nevertheless, we see that changes are possible. Therefore, we consider it appropriate to focus on the benefits of the tax systems of the best-ranking countries and take an example from them. For example, Estonia's corporate income tax system allows reinvesting companies' profits tax-free, or Estonia apply property taxes only to the value of the land.

Next, we tested the second hypothesis, H2, using the Sign test and Wilcoxon Matched Pairs test. GDP data for 2020 were not available, so we omitted this year from the analysis. Even though some differences are evident (e.g., Estonia has the best tax code in European and the OECD countries, but it is ranked from 19 to 21 among 27 monitored countries according to GDP per capita). According to our results (Table 4), we cannot confirm the existence of statistically significant differences in the position of European countries within the ITCI and the GDP per capita.

Table 4. Sign test a Wilcoxon Matched Pairs test for assessing differences between rankings

Pair of Variables ITCI & GDP in year	Sign test			Wilcoxon Matched Pairs test		
	Percent v < V	Z	p-value	T	Z	p-value
2014	45.8333	0.2041	0.8383	139.5000	0.3000	0.7642
2015	50.0000	-0.2041	0.8383	127.0000	0.6571	0.5111
2016	45.8333	0.2041	0.8383	135.0000	0.4286	0.6682
2017	48.0000	0.0000	1.0000	155.5000	0.1883	0.8506
2018	39.1304	0.8341	0.4042	131.0000	0.2129	0.8314
2019	37.0370	1.1547	0.2482	175.0000	0.3363	0.7366
2020	36.0000	1.2000	0.2301	154.5000	0.2153	0.8296

Source: *own processing*

We reject the H2 hypothesis. It follows that we can confirm the assumption that if the country is at the forefront of the ITCI this country will be at the forefront of the GDP per capita by PPP indicator.

Conclusion

The 'International Tax Competitiveness Index report compiled by Tax Foundation states that the tax-base structure should be simple for taxpayers to support economic development and increase tax revenues for the development of the state. The global trend in the context of changes in the corporate tax structure is a reduction of statutory tax rates and adoption of measures that extend the tax base. However, the tax systems of individual countries are quite diverse. The ITCI was, therefore, developed to make it easier to compare and evaluate countries in terms of the structure of the tax system.

The rate of tax attractiveness of the environment is monitored through the 'Tax Attractiveness Index'. The Tax Attractiveness Index captures a range of tax aspects relevant to decision-making in the area of the company's location, reflecting not only the tax rate but also other aspects, e.g., the anti-evasion rules, the straight-line depreciation methods, the declining balance method, or the accelerated depreciation method, the loss of carry-forward or carry-back options, the number of years of their transfer, alternatively their abolition, the application of tax concessions and incentives, for example for science and research, or the transfer pricing rules. The growth of the Tax Attractiveness Index assumes more appropriate legislative and tax conditions and tax environment in the state.

We aimed to find out how the structure of the tax system and, thus its competitiveness and neutrality within European countries can be influenced over time. The analysis results show that this aspect's development has only slowly changed over time. Countries with a high level of ITCI will likely keep this level in the years to come. However, it is a significant visible shift in the location of the countries under the measures adopted. As mentioned in the results, Norway improved by five places, thanks to the adopted provision on loss carry-back during a coronavirus pandemic. This difficult situation thus makes it more difficult for business, on the one hand, but opens room for improvement, on the other.

In the context of analyzed International Tax Competitiveness, Estonia, Switzerland, Luxembourg, Latvia, and Lithuania are the best tax structure in the European area. On the contrary, France, Italy, Portugal, Poland, and Greece are the worst. Slovakia belongs to the top ten evaluated

countries of the ITCI, and its values were comparable to those of Turkey, the Netherlands and Austria. Low personal income rate on dividends, better-than-average tax treatment of business investment in machinery, buildings, and intangibles, and the fact that corporations can deduct property taxes when calculating taxable income are strengths of the Slovakian tax system. In Slovakia, an amendment to the Income Tax Act is being prepared, including a tax loss that has not yet been applied (for the years 2015-2018). Based on Eurostat's recommendations, a methodological adjustment is being prepared - the impact of "COVID-19".

However, the structure of the country's tax system is also an important determinant of the country's economic performance, which significantly supports economic development and increases government revenue. We were, therefore, interested in whether there are differences in the country's order according to the assessment of the structure of the tax system (ITCI) and according to GDP per capita. The results did not confirm statistically significant differences. It follows that we can confirm the assumption that if the country is at the forefront of the ITCI this country will be located on the forefront of the GDP per capita by PPP indicator.

We can compare our results with several existing studies about tax competition or tax competitiveness. Banociova & Tahlova (2019) characterized tax competition between EU member states over ten years and assessed whether they are competitive in corporate taxation. They confirmed that there is tax competition in the field of corporate income tax between EU states. Helcmanovska & Andrejovska (2021) determined the impact of selected indicators on corporate tax revenues in EU states from 2004 to 2019. The result of this work was that there are differences between the new and old member states at different levels. The analysis of the tax competitiveness of the EU member countries showed that the new member countries, characterized by a lower level of the tax burden, can be considered more tax "competitive" (Mihokova, Andrejovska, & Martinkova, 2018).

This study had several limitations. First, we analysed data from 2014 to 2020 and focused only on European countries. Repeating the analysis for an extended period can reveal the interesting outcome. Researchers can also extend the analysis to other OECD countries. Second, we did not consider the other qualitative or quantitative data. Moreover, in addition to our methods, we suggest using multidimensional scaling or panel regressions.

We are not aware that there is a similar study that would deal with tax competition between EU countries in a similar way; therefore, the issue investigated in this paper is original, and we consider it a great contribution.

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