WORLD TAX INDEX: METHODOLOGY CHANGES AND REVISION OF DATA FOR OECD COUNTRIES FROM 2000 TO 2018

Rudolf Macek[1], Martin Murín[2]

Abstract

Imposing taxes creates a burden on the agent. To evaluate and compare the burden of taxation among OECD countries standardly used tax quota has several shortcomings. Statutory tax rates are impotent to say anything about the actual tax burden. For these reasons, the World Tax Index has had some advantages. However, during the time it has been requiring some improvements. Therefore, the main aim of the paper is to describe methodology changes and show revised data of World Tax Index for OECD countries. Paper include all methodology changes we made and presented updated data of the World Tax Index in period from 2000 to 2018.

Keywords

Taxation, Tax Burden, Tax Quota, World Tax Index

I. Introduction

All economics agents must consider existence of all above mentioned concepts, because they affect their behaviour and can have significant influence on their decisions. Taxation level can influence majority of economic system components, e.g. work motivation (Borjas, 2020), consumer decisions (Varian, 2010), investment decisions (Vartia, 2008), shifts between legal and shadow or illegal economy (Schneider and Williams, 2013), and with the other aggregate fiscal categories plays a significant role in overall public finance outcomes (Murín, 2016). Finally, due to elementary state´s function existence of taxes is directly connected with government expenditures financing.

It is very important to realize, that final level of taxation is linked to many factors which have potential to determine it (e.g. tax deductibility cost, depreciations, tax reliefs, tax exemptions, administrative complexity payment of taxes). Therefore, information about taxation level or tax burden must be undistorted and economic-policy authorities must work with effective and objective tax approximator. Tax approximator which will cover almost all factors which determine the final level of taxation.

The most used approximator of taxation in empirical studies is tax quota, However, the tax quota has many shortages. For a long time, the authors of this study work with alternative approximator of taxation called World Tax Index of which data are available from 2000.

Aim of this paper is to describe methodology changes, show the revised data of World Tax Index for OECD countries and compare them with the tax quota. This paper, therefore, represents a methodological background of World Tax Index modifications for the further studies of the authors and other researchers interested in tax policy and topics related.

II. Measuring of Taxation – Statutory Tax Rates, Tax Quota, Implicit Tax Rates

Tax revenues represent the most significant income of national budgets. Anyway, tax structure or tax mix are the subject of extensive debate among economists, politicians or other public.

[1] PRIGO University, V. Nezvala 801/1, 73601 Havířov, Czech Republic. E-mail: rudolf.macek@prigo.cz.
[2] PRIGO University, V. Nezvala 801/1, 73601 Havířov, Czech Republic. E-mail: martin.murin@prigo.cz.

Due to this, individual tax systems are so heterogenous (differentiated) and contain a lot of individual national specifics.

Therefore, there exists question about suitable way of comparing these differentiated systems. We have to try to find a certain common element which would aggregate these national specifics into one approximator as much as possible (Macek, 2014).

Tax Misery Index of Tax Freedom index can be considered as very popular tax burden indicators, but they have very small analytical value and cannot be used in sophisticated analysis or in full-fledged creation of economic policy. Statutory tax rates, tax quota, implicit tax rates are approximators which are very often used by politicians and economists and therefore they will be described now.

Statutory tax rates

Statutory tax rates represent very simply way of tax comparison. Because of their simplicity and availability, they can be considered as significant factor which can influence decisions about new investment realization. However, due to the complexity and diversity of tax system elements, direct definition of statutory tax rates is difficult. Individual tax systems contain in addition to nominal tax rates also temporary and permanent tax relief or exemptions, so their construction is not uniform.

Precisely because of the existence of different legislative rules, it is not possible to objectively compare level of taxation. Therefore, statutory tax rates cannot fulfill the role of objective approximator of taxation. Only if taxpayers have limited possibilities to reduce tax base, statutory tax rates can be a suitable indicator of tax burden level (Kotlán, 2010; Blechová, 2008; Szarowska, 2011). On the other hand, there have been several improvements in the vein of comparability, especially in corporate income tax. For instance, Hanappi (2018) presents the concept of corporate effective tax rates based on Devereux and Griffith models. Like Habu (2017) or ZEW (2016), Hanappi (2018) takes into account not only the statutory tax rates but also different provisions affecting the base (e. g. fiscal depreciation, deductions, allowances). This indicator could play a crucial role in an investment making process. Nevertheless, corporate effective tax rates are not suitable for the assessment of the whole tax burden. For that reason, we construct the World Tax Index.

Tax Quota

Tax Quota is one the most known and most used approximator of taxation, which can be used in more sophisticated analysis. In the simplest form it represents share of tax revenues to nominal gross domestic product (*HDPn*) for a calendar year. It also shows part of gross domestic product which is redistributed through public budgets.

There exist simple and compound tax quota. Simple tax quota includes only taxes, which are defined as taxes. Compound tax quota also includes social security contributions and therefore can be perceived as more complex indicator of tax burden.

Total tax quota categorization into individual sub-quotas can be considered as empirical rather than a technical matter. This categorization is most often done according to OECD or ESA 95 classification. Based on this classification, it is possible to determine a partial tax quota for individual types of taxes.

Tax Quota is very often used due to its simplicity, data availability (long time interval) and simple construction. Anyway, there exist a lot of shortages of tax quota which can lower an informative value of real taxation level.

Under certain circumstances tax quota may not reflect real level of taxation (according to Laffer curve), where tax quota as approximator fails. It is caused by the fact, that there may not always

exist demonstrable relationship between tax revenues and effective tax burden. Link between effective taxation size (expressed by nominal tax rates) on the one hand and tax revenues on the other hand changes significantly over time and is non-linear. Therefore, increase in tax burden does not lead to increase of tax revenues (and thus also tax quota), but on the contrary it leads to decrease.

Also, tax quota applies tax revenues to *HDPn*, which can be statistically unreliable and due to shadow economy existence tax quota can be overrated.

Existence of tax expenditures can also reduce objectivity degree of tax quota. Tax expenditures represent taxes which are not paid by economic agents, but economic agents receive them in form of tax reliefs or benefits (resulting payments directly from the law). If these tax expenditures are not added, total tax quota is lower although the nominal tax burden of the taxpayer is the same (Kotlán and Machová, 2012; Kotlán, 2010; Szarowska 2008; Szarowska, 2010; Arnold, 2008; Messere, 1993).

Implicit Tax Rates

Implicit tax rates represent another approximator of taxation. This approximator tries to remove some of shortages which tax quota has. Implicit tax rates do not consider only level of statutory tax rates but also other aspects determining effective taxation level (e.g. differently constructed tax base due to existence of tax reliefs or tax deductibility cost).

Methodology of implicit tax rates is complied according to the European Commission and these rates are calculated to correspond with harmonized system of national and regional accounts – ESA 95.

The calculation of implicit tax rates consists in determining share between tax revenues (or tax liability) from individual types of economic activities to the potential tax base (gross income from which tax is calculated).

On this basis, it is possible to determine the average effective tax burden according to the function of economic activities. Therefore, we can express effective tax burden of capital (ITRC), labor (ITRL) and consumption (ITRc) in economics.

The main problem of this approximator is, that it says nothing about real tax incidence, especially, with regard to impact among individual sectors (labor, capital, consumption). It also failures with respect to time lag between tax liability and real payment of taxes. Implicit taxes rates do not work with administrative cost of paying taxes, too.

From the comparison point of view there can be also problem with fact, that implicit taxes rates are available only for European Union countries (European Commission, 2018; Szarowska, 2009; Vogel, 2009; Bach and Buslei, 2009; Janssen and Buijink, 2000; Walden, 1996 Zechner and Swoboda, 1986, Faber, 2004).

III. World Tax Index – Complex Introduction and Actual Methodology Changes

World Tax Index (WTI) represents comprehensive multi-criteria indicator of the tax burden, which is based on combination of data on tax conditions available from internationally reputable sources (hard data) with data expressing expert opinions, so-called Qualified Expert Opinion - QEO (soft data).

Combination of soft and hard data with an effort to assess tax burden comprehensively are the main advantages of this taxation approximator.

The higher WTI value is, the higher taxation in the economy exists. It is necessary to realize, that WTI incorporates into tax burden assessment a lot of aspects, which determine the final level of tax burden. For instance, administrative complexity of taxes collection, tax exemptions,

tax-deductibility cost, tax reliefs, the importance of tax progressiveness, etc. This index can be also considered as a comprehensive tax index, which covers a substantial part of the tax burden in individual countries. WTI reflects 95% of the tax mix in OECD countries. Other parts of the tax mix are very specific taxes, and their comparison is practically impossible.

Individual sub-indexes of WTI are:

- Corporate Income Tax – (CIT)
- Personal Income Tax – (PIT)
- Value Added Tax – (VAT)
- Individual Property Taxes (PRO)
- Other Taxes on Consumption (OTC).

When we calculate values of individual sub-indexes, we evaluate the influence of several factors which determine final level of taxation (Machová and Kotlán, 2013; Kotlán and Machová, 2012; Machová et al. 2011; Macek, 2015; Macek, 2018). These factors are summarized in Table 1 which follows Machová and Kotlán (2013) latest seminal work on WTI.

Table 1: Individual sub-indexes of World Tax Index and their factors

A) Corporate Income Tax (CIT)	**B) Personal Income Tax (PIT)**
A1) Nominal tax rates	B1) Nominal tax rates
A2) Progressivity	B2) Progressivity
A3) Incentives	B3) Personal deductions
A4) Tax deductibility of costs	B4) Social security contributions
A5) Administration	
C) Value Added Tax (VAT)	**D) Individual Property Taxes (PRO)**
C1) Standard Tax Rate	D1) Net wealth tax
C2) Reduced Tax Rate	D2) Real estate tax
C3) Registration Duty	D3) Inheritance tax
	D4) Gift tax
	D5) Other property taxes
E) Other Taxes on Consumption (OTC)	
E1) Beer	
E2) Wine	
E3) Alcohol	
E4) Tobacco	
E5) Mineral oils	

Source: Machová and Kotlán (2013)

As is mentioned above, WTI is based on hard data and soft data combination. Hard data had to be standardized, and then they were recalculated with QEO component. For more complex WTI calculation, see, e.g. Kotlán and Machová (2012), where one can read methodology used for standardization of hard data and more other detailed information.

WTI as taxation approximator were revised several times. Our methodology changes will be described in following text. We have not changed calculation method of WTI, our modification is based on questionnaire research and hard data modification (improvements). Furthermore, we decided to provide a deeper description of the sources of hard data to researchers easier calculate their WTI on their own.

Structure of questionnaire corresponds to the structure of the WTI and its sub-indexes, where tax experts and selected tax researchers express their opinion on the importance of individual parts of WTI or individual parts of sub-indexes. Database of tax experts and tax researchers has been significantly modified and adjusted to make whole process of data collection more efficient. Due to this, the whole process of questionnaire acquisition is simpler and response rate of questionnaire is much higher as well. At the same time, our database has expanded considerably thanks to new acquired contacts. As a result of above mentioned, the QEO component can be considered representative.

Data on sub-indexes of World Tax Index

World tax index combines subjective (soft) data with objective (hard) data. In this section, we presented hard data based on table 1. We are describing relevant sources and sub-index calculations (if any). It has to be said that particular sub-index is not always observable directly. Therefore, some assumptions and approximations had to be made, which will be discussed later.

Corporate income tax – CIT

We begin with the Corporate income tax (CIT). This sub-index consists of 5 dimensions. They namely are nominal tax rates, progressivity, incentives, tax-deductibility costs and administration (cost, or perhaps even more precise, demandingness of tax administration). A1 has been approximated by the combined statutory corporate income tax rate retrieved from OECD (2020e) Tax Database, which follows original approach to A1 (Kotlán and Machová, 2012).

Determine tax progressivity could be a relatively difficult task. Progressivity of the corporate tax system could be far more complex to be appropriately observed by one simple proxy. Although, the questionnaire, as well as the context of CIT itself, focuses on the progressivity in statutory rates merely. A2 therefore present progressivity in tax rates, which are approximated by difference between corporate statutory tax rate (A1) and combined targeted corporate income tax rate for small business corporation (OECD, 2020f). If the country in the specific year was not using targeted statutory tax rate, the difference is automatically equal to 0. Bigger the difference more progressive tax. In the vein of WTI purposes, A2 has been calculated the way that the higher values mean higher progressivity. What worries us most is the described view on the progressivity. It is by far the most concerning aspect of the WTI composition. The discussion of whether more progressivity directly means a higher tax burden is relevant and should be conducted. On the other hand, the questionnaire had been arranged in a way which is in line with the statement above, moreover, the original contribution of Kotlán and Machová (2012) or later Machová and Kotlán (2013) did it this way.

The proxy used for A3 is R&D tax expenditure and direct government funding of business expenditures to R&D retrieved from OECD (2020g) R&D tax incentives database. We are aware of potential shortfalls of such indicator like it does not need to include all protentional tax incentives. For instance, if the big investor decides to come into the country because of the tax vacation deal, it likely will not appears in the tax R&D incentives. Despite these facts, such tax practice is occasional and more depended on the individual measure than on systematic scheme. On the other hand, recent economic development has revealed that in term of tax incentive (especially among EU countries where tax competition is less desirable), the R&D incentives being exploiting the most. The second potential caveat is that our proxy for A3 includes not only tax incentives but the direct governmental R&D expenditures, but the direct support is an incentive and this caveat is no longer relevant.

Perhaps the most challenging was to set a good indicator for the tax deductibility costs (A4). Based on the comprehensive review we found the concept of the corporate effective average tax rate (EATR), which is a tax policy indicator reflecting the average tax contribution a firm

makes on an investment project earning above-zero economic profits. The methodology of EATR follows Devereux and Griffith approach.[3] Most importantly, EATR tracks different tax rules among countries that affect the tax base such as fiscal depreciation and other deductions or allowances, which is basically the information we need for A4. To create the dataset A4 we had to connect several sources together due to data availability. Most of the data were retrieved from Oxford Centre for Business Taxation (CBT) tax database (Habu, 2017). All countries expect for Latvia and Lithuania have data available from 2000 to 2017 in CBT. In case of Latvia and Lithuania we have relied on Centre for European Economic Research (ZEW, 2015). Years from 2018 are updated using OECD Tax Database (2020d) for all OECD countries. At time of writing this contribution the OECD Tax Database was covering only period from 2017 to 2019. Computation of A4 is based on logic, if there is a positive difference between actual statutory tax rate and EATR means that the applied tax rules allow to reduce tax obligation. The higher difference, the higher tax deductibility of costs. Thanks to the standardization of the data, they do not need to be retrieved from one source. However, we suggest that whole cross-sectional data are from one source for particular year.

In table 1 the last sub-index of CIT is A5. To capture the effect of administration costs levied on the taxpayers due to the difficulty of the tax collection process is approximated the same way as Kotlán and Machová (2012) did in their origin paper. World Bank (2020) in

its project Doing Business provides measures of business regulations for firms in 190 countries. We use an indicator called time to prepare and pay taxes in hours to estimate protentional administrative cost. This method is in line with the standard microeconomic theory of opportunity cost.

Personal income tax – PIT

From the perspective of PIT, only methodological improvement of Machová and Kotlán (2013) was made in progressivity (B2). All other parameters follow original approach in their approximation. B1 is represented by an average income tax rate. It is not easy to choose the proper definition of what is the base we should calculate the indicator of the income tax rate. There are many legal differences between country-specific tax codes. We decided to use gross wage earnings of a single person with no child at 100% of average earnings as a base and then take the average tax rate of such person in %. Data were obtained from OECD (2020b) Tax Database.

For progressivity of PIT (B2), we employed approach, which is used, e.g. by Lehman et al. (2016). They calculate the tax progressivity according to the following expression:

$$progressivity = 1 - \frac{1 - t^{167\%}}{1 - t^{67\%}} \tag{1}$$

where t^n is an average tax rate from gross wage earnings of a single person with no child at the respective percentage of average earnings of such person. According to equation (1), we compare tax rates at 167% of average wage and tax rates at 67% of the average wage. These both indicators are obtainable from OECD (2020b) Tax Database. We can divide the results of equation (1) into three intervals. If $progressivity \in (0,1)$ then we say that personal income tax is progressive. If $progressivity = 0$ it means perfect proportionality. If $progressivity \in (0, -\infty)$ then the system is regressive. Similarly to the discussion presented in A2, we cannot simply decide whether the higher progressivity means a higher tax burden. We conclude the same conclusion as we did with A2. The questionnaire had been made in the way that the higher progressivity leads to a higher tax burden.

[3] For more detailed description, see e.g. Hanappi (2018).

As it was already said, for the B3 and B4 we followed origin approach. B3 presents the share of the sum of tax allowance and tax credits to average gross earnings before taxes of one person at 100 % of the average wage. The source of the sum of tax allowance and tax credits was the OECD (2020c) Tax Database. For the gross wage earnings, we rely on the OECD Tax Wages publications, data of which are gathered in the OECD Tax Wages database. B4 is expressed by an average share of employees' social security contribution to their gross wage earnings for one person with no child at 100% of the average national wage. Data came from the OECD Tax Database OECD (2020b).

Value added tax – VAT

Value Added Tax/Goods and Services Tax (VAT/GST) is one of the most used taxes on consumption within the advanced economies. For sub-indexes of VAT, we rely on Consumption Tax Trends publications (e.g. OECD, 2018), which are the source for OECD database for Value Added Tax/Goods and Services Tax (VAT/GST) covers the period from 1976-2019. It contains information about the general tax rate, reduced tax rates and registration/collection thresholds. These data were employed for C1, C2 and C3 sub-indexes. C1 represents general VAT/GST tax rates. Reduced tax rates for C2 are the averages of reduced rates. Thresholds from the time, since the entity has been subject to VAT/GTS in C3, were converted to USD in PPS. Data for the US are roughly approximated. US consumption taxes system is different from the rest. Data for the estimation were retrieved from the State and Local Sales Tax Rates (e.g. Cammenga, 2020).

Individual Property Taxes – PRO

Sub-index PRO is practically in line with the tax category 4000 tax on property from Global Revenue Statistics Database (OECD, 2020). As Kotlán and Machová (2012) pointed out, to our knowledge there is no better indicator which can be used here. Therefore, D1 is approximated using 4100 Recurrent taxes on immovable property to GDP (%), D2 by 4200 Recurrent taxes on net wealth to GDP (%), D3 is approximated by 4300 Estate, inheritance and gift taxes to GDP (%), D4 by 4400 Taxes on financial and capital transactions to GDP (%), and D5 using 4500 Other property taxes to GDP (%). All these variables were retrieved from the Global Revenue Statistic Database (OECD, 2020a).

Other Taxes on Consumption – OTC

Sub-index called other taxes on consumption (OTC) is the only one sub-index, which, we think, should be modified in the future. The authors fully realize the original purpose of the sub-index. However, its composition is not able to truly reflect the complexity of today's modern country-specific consumption tax systems. Neither we can suggest how to construct such a sub-index. What we have become aware of is that presented approach in table 1 is relatively simple that could be no longer a proper way to understand other consumption taxes than VAT/GTS.

For these reasons, we decided to approximate OTC in several steps. In the first step, we retrieved general government revenues in national currency for category 5121 Excises from OECD (2020). Then we converted these values into purchasing power parities (USD) and divided by the population size. In the last step, we used the weights of OTC gained from the questionnaire survey and multiplied them by the PPP of excises from the previous calculations.

This procedure seems to be optimal from the point of the research purpose and the data accessibility constraint. Specific national tax systems are very different and complex in term of other taxes on consumption, which make almost impossible to create a comprehensive questionnaire approach. On the other hand, the strategy of OTC, which relies on excises only and defines them as beer, wine, tobacco, alcohol and mineral oils is not truly able to capture the complexity of actual national tax policies.

IV. World Tax Index and Comparison with Tax Quota

In the previous section, we show all the important changes we have made in methodology. It mostly involves changes in hard data. In this section, we want to present the data we gain. Table 2 shows the average values of the World Tax Index and its sub-indexes in the period from 2000 to 2018 and the comparison of the WTI with the original results of Kotlán and Machová (2012).

The table 2 is likely to difficult to read, but before we present a more meaningful figure, we need to emphasize that in comparison with original results of Kotlán and Machová (2012) our average WTI is higher for the majority of countries. Only Chile, Japan, Netherlands, Norway and Turkey have smaller WTI in our dataset than in case of Kotlán and Machová´s (2012) WTI. The last column of Table 2 shows the difference between our country average and Kotlán and Machová (2012) average WTI. Positive *diff_WTI* means that we got higher WTI and negative means we gained lower. Turkish absolute difference is the biggest among all followed countries. We can say that our sample has a smaller variance and values are little higher on average than the previous WTI.

Table 2 Average values of WTI and its sub-indexes for 2000–2018

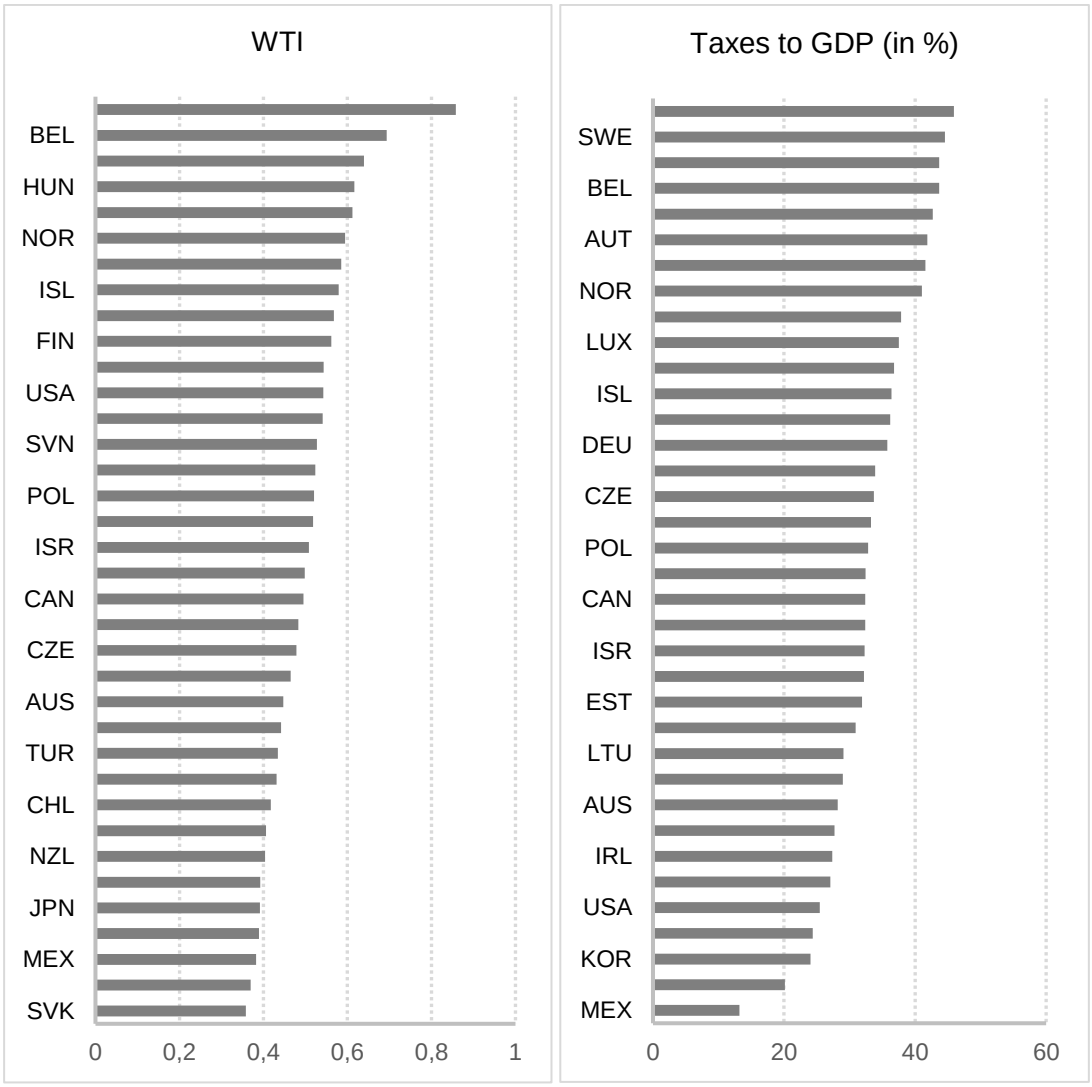
Country	WTI	CIT	PIT	VAT	PRO	OTC	*diff_WTI*
AUS	0,447	0,151	0,189	0,041	0,040	0,025	0,157
AUT	0,612	0,029	0,330	0,211	0,003	0,040	0,102
BEL	0,693	0,017	0,407	0,201	0,045	0,023	0,063
CAN	0,495	0,259	0,142	0,006	0,076	0,012	0,175
CZE	0,479	0,035	0,209	0,201	0,001	0,033	0,119
DEU	0,639	0,068	0,391	0,159	0,009	0,012	0,109
DNK	0,858	0,025	0,507	0,261	0,012	0,052	0,278
ESP	0,431	0,025	0,210	0,143	0,036	0,017	0,081
EST	0,406	0,029	0,159	0,183	0,000	0,035	0,076
FIN	0,562	0,037	0,263	0,133	0,016	0,113	0,082
FRA	0,518	0,123	0,125	0,193	0,064	0,013	0,018
GBR	0,465	0,042	0,224	0,125	0,034	0,040	0,155
GRC	0,483	0,036	0,235	0,147	0,044	0,021	0,123
HUN	0,617	0,023	0,175	0,390	0,003	0,026	0,077
CHE	0,389	0,060	0,272	0,036	0,009	0,011	0,129
CHL	0,418	0,143	0,040	0,215	0,010	0,010	**-0,102**
IRL	0,498	0,034	0,225	0,183	0,026	0,030	0,238
ISL	0,579	0,060	0,279	0,184	0,022	0,035	0,119
ISR	0,508	0,073	0,144	0,273	0,011	0,007	0,048
ITA	0,568	0,025	0,303	0,183	0,039	0,018	0,108
JPN	0,392	0,124	0,191	0,035	0,036	0,007	**-0,158**
KOR	0,393	0,116	0,126	0,082	0,025	0,043	0,013
LTU	0,370	0,107	0,112	0,092	0,001	0,058	–
LUX	0,585	0,015	0,298	0,120	0,037	0,116	0,155
LVA	0,442	0,079	0,245	0,095	0,002	0,020	–
MEX	0,382	0,095	0,090	0,189	0,001	0,006	0,002

NLD	0,524	0,055	0,233	0,165	0,011	0,060	**-0,026**
NOR	0,594	0,065	0,249	0,222	0,009	0,049	**-0,026**
NZL	0,404	0,033	0,256	0,098	0,012	0,005	0,064
POL	0,520	0,060	0,127	0,308	0,006	0,018	0,160
PRT	0,541	0,106	0,146	0,265	0,015	0,009	0,101
SVK	0,358	0,114	0,045	0,139	0,004	0,056	0,012
SVN	0,527	0,036	0,380	0,032	0,008	0,072	0,027
SWE	0,543	0,098	0,167	0,067	0,018	0,194	0,113
TUR	0,434	0,034	0,084	0,229	0,007	0,079	**-0,526**
USA	0,542	0,345	0,110	0,018	0,045	0,024	0,152

Source: own survey and calculations, data freely available at www.worldtaxindex.com; Kotlán and Machová (2012)

Like Machová and Kotlán (2013), we were curious about how our WTI is in comparison with Tax quota. Therefore, in Figure 1, we calculated average WTI and average compound tax quota (total tax revenues of the general government to GDP). Although several countries are at the same rank (or near it) in both indicators, this is not the rule for every country. We can find some examples of the deviation. For instance, the US ended up in the fifth position in WTI. In the case of tax quota, the US is the fifth smallest one. Or Sweden. Swedish tax quota is the second highest despite this is Swedish WTI eleventh. These two cases are extremes, but they help to mould a bigger picture, which is that the WTI is not directly comparable with the tax quota.

Figure 1 Average Values of the WTI and Tax Quota, 2000 – 2018



Source: own survey and calculations, data freely available at www.worldtaxindex.com; data on tax quota retrieved from OECD (2020a)

Hence, we think it is interesting to see what the correlation between WTI, its sub-indexes and respective tax quotas is. Table 3 shows the calculated Pearson correlation coefficients for pairwise combinations of WTI or particular WTI sub-index and respective tax quota.

Table 3 Correlation between WTI (WTI sub-indexes) and respective tax quotas

Pearson correlation coefficient	WIT	CIT	PIT	VAT	PRO	OTC
	0.708**	0.0314	0.656**	0.563**	0.729**	0.262**

Source: own calculations
*Note: ** statistically significant at 1% significance level*

From the results in Table 3 stems that the WTI is positively correlated with the tax quota. It holds for all sub-indexes as well. The most correlated is PRO with respective tax quota. It is understandable due to the nature of WTI sub-index PRO construction. WTI and total tax quota are correlated only a little less. Smallest coefficient we obtained in the case of CIT and corporate income tax revenues to GDP. This is the only coefficient that was not statistically significant among all presented in Table 3.

V. Conclusion

Aim of this paper was to describe methodology changes and show revised data of World Tax Index for OECD countries. This paper represents methodological background of World Tax Index modification for further research of authors. As it was already said for several times, to make a comprehensive international comparison of taxation and the burden of taxation, standardly used tax quota has its limits and shortcomings. For a similar purpose, the statutory tax rates are even worse. Effective tax rates are able to mitigate some of the shortcomings, but they are not generated to say anything about the whole picture. Therefore, the idea behind the World Tax Index makes sense. World Tax Index is an index which focuses on the evaluation of tax burden and it deals with the major limits of tax indicator reviewed above. We made some improvements of the original World Tax Index approach. In this paper we present all these methodological changes. Furthermore, we refer to hard data more precisely, which should lead to easier recalculation of World Tax Index by other researchers. We used improved methodology to compute the World Tax Index for all OECD countries in the period from 2000 to 2018. We showed that the World Tax Index is not truly comparable with tax quota despite some similarities. World Tax Index could be a better indicator for policy evaluation purpose with the ambition to increase benefits.

References

Arnold, J. (2008). Do Tax Structures Affect Aggregate Economic Growth? Empirical Evidence from a Panel of OECD Countries. *OECD Working Papers*, Working Paper No. 643.

Bach, S., Buslei, H. (2009). The Impact of Loses on Income Tax Revenue and Implicit Tax Rates of Different Income Sources. *DIW Wochenbericht.* Working Paper No. 950.

Blechová, B. (2008) Charakteristika přístupů používaných v EU pro hodnocení efektivního daňového zatížení příjmu. In: *Teoretické a praktické aspekty veřejných financí 2008: 8th International Conference*. Praha: Vysoká škola ekonomická, pp 1-11, ISBN 978-80-245-1378-2.

Borjas, G. J. (2020). *Labor economics*. 8th edition. New York: McGraw-Hill Education, 2020. xvi, 478. ISBN 9781260565522.

Cammenga, J. (2020). *State and Local Sales Tax Rates, Midyear 2020*. Fiscal Fact No. 716. Washington DC: Tax Foundation.

European Commission (2018). *Taxation Trend in European Union.* European Commission. Retrieved April 27, 2020, from: https://ec.europa.eu/taxation_customs/news/taxation-trends-report-2018_en

Faber, C. (2004). An Implicit Tax Rate for Non-Financial Corporations: Definition and Comparison with other Tax Indicatros. *European Commission.* Working Paper No. 5.

Habu, K. (2017). *Centre for Business Taxation Tax Database 2017*. University of Oxford.

Hanappi, T. (2018). Corporate Effective Tax Rates: Model Description and Results from 36 OECD and Non-OECD Countries. *OECD Taxation Working Papers,* Working paper No. 38, Paris: OECD Publishing.

Janssen, B., Buijink, W. (2000). Explicit, Implicit and Total Taxes in the Corporate Sector: Evidence for the Netherladns. *University of Mastricht.* Working Paper No. 2000-09.

Kotlán, I., Machová, Z. (2012). Vliv zdanění korporací na ekonomický růst: selhání daňové kvóty? *Politická ekonomie,* 60(6), 743-763.

Kotlán, I. (2010). *Daňové zatížení a struktura daní v ČR ve srovnání s vybranými zeměmi OECD a EU a legislativní změny ve smyslu de lege ferenda.* Praha: Národohospodářský ústav Josefa Hlávky.

Lehmann, E., Lucifora, C., Moriconi, S., & Van der Linden, B. (2016). Beyond the labour income tax wedge: the unemployment-reducing effect of tax progressivity. *International Tax and Public Finance,* 23(3), 454-489.

Macek, R. (2018). Labour Taxation and its Impact on Economic Growth – Complex Analysis. *DANUBE – Law and Economic Review,* 9(1), 49-61.

Macek, R. (2015). Vplyv jednotlivých dani na ekonomický rast v krajinách OECD: dynamická panelová regrasia. *Ekonomický časopis,* 63(7), 718-736.

Macek, R. (2014). The Impact of Taxation on Economic Growth: Case Study of OECD Countries. *Review of Economic Perspectives,* 14(4), 309-328.

Machová, Z. et al. (2011). *Tax Burden in OECD Countries WTI Application.* Ostrava: VŠB-TU.

Machová, Z., Kotlán, I. (2013). World Tax Index: New Methodology for OECD Countries 200-2010. *DANUBE – Law and Economic Review,* 4(2), 165-179.

Messere, K. (1993). *Tax Policy in OECD Countries: Choices and Conflicts.* Amsterdam: IBFD Publications.

Murín, M. (2016). Vplyv spôsobu tvorby fiškálneho deficitu na ekonomický rast. *Politická ekonomie,* 64(2), 176-192.

OECD (2020a). *Global Revenue Statistics Database*. Retrieved January 4, 2020, from https://www.oecd.org/tax/tax-policy/global-revenue-statistics-database.htm

OECD (2020b). *OECD Tax Database: Average personal income tax and social security contribution rates on gross labour income*. Retrieved January 3, 2020, from https://stats.oecd.org/index.aspx?DataSetCode=TABLE_I5

OECD (2020c). *OECD Tax Database: Central government personal income tax rates and thresholds*. Retrieved January 3, 2020, from: https://stats.oecd.org/index.aspx?DataSetCode=TABLE_I1

OECD (2020d). *OECD Tax Database: Effective Tax Rates*. Retrieved January 2, 2020, from https://stats.oecd.org/Index.aspx?DataSetCode=CTS_ETR

OECD (2020e). *OECD Tax Database: Statutory Corporate Income Tax Rates*. Retrieved January 2, 2020, from https://stats.oecd.org/Index.aspx?DataSetCode=CTS_CIT

OECD (2020f). *OECD Tax Database: Targeted statutory corporate income tax rate*. Retrieved January 2, 2020, from https://stats.oecd.org/Index.aspx?QueryId=59543#

OECD (2020g). *R&D tax expenditure and direct government funding of BERD*. Retrieved January 2, 2020, https://stats.oecd.org/Index.aspx?DataSetCode=RDTAX

OECD (2018). *Consumption Tax Trends 2018: VAT/GST and Excise Rates, Trends and Policy Issues*. Paris: OECD Publishing.

Schneider, F., Williams, C. C. (2013). *The Shadow Economy*. London: The Institute of Economic Affairs.

Szarowska, I. (2011). Jak vysoké je korporátní daňové zatížení? *Acta Academia Karvinesia,* 13(2), 196-207.

Szarowska, I. (2010). Changes in Taxation and Their Impact on Economic Growth in the European Union. *Munich Personal PePEc Archive*, Working Paper No. 32354.

Szarowska, I. (2009). Tax Burden and Competition in the European Union – Does it Change? *Munich Personal RePEc Archive*, Working Paper No. 19934.

Szarowska, I. (2008). Tax Quota Development in the Czech Republic and in the European Union. *Munich Personal RePEc Archive*, Working Paper No. 12152.

Varian, H. R. (2010). *Intermediate Microeconomics: A Modern Approach*. 8th Edition. New York: W. W. Norton & Company.

Vartia, L. (2008). How do Taxes Affect Investment and Productivity?: An Industry-Level Analysis of OECD Countries. *OECD Economics Department Working Papers*, Working Paper No. 656, Paris: OECD Publishing.

Vogel, L. (2009). Tax Avoidance and Fiscal Limits: Laffer Curves in an Economy with Informal Sector. *European Comission.*, Working Paper No. 448.

Walden, M. (1996). Implicit Tax Rates of the Expanded Earned Income Tax Credit for Welfare Recipients in North Carolina. *Journal of Consumer Affairs.* 30(2), 348-372.

Zechner, J. Swoboda. P. (1986). The Critical Implicit Tax Rate and Capital Structure. *Journal of Banking and Finance.* 10(3), 327-341.

ZEW (2016). Project for the EU Commission: Effective Tax Levels using the Devereux/Griffith Methodology. Zentrum fuer Europaeische Wirtschaftsforschung, Project for the EU Commission, TAXUD/2013/CC/120, Final Report 2016.

World Bank (2020). *Time to prepare and pay taxes (hours).* Retrieved January 3, 2020, from https://data.worldbank.org/indicator/IC.TAX.DURS