COMPARING PERSONAL INCOME TAX GAP IN THE CZECH REPUBLIC AND SLOVAKIA*

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Abstract

This paper deals with the personal income tax gap in the Czech Republic and Slovakia. One of its sections specifically addresses the relation between the tax gap and various forms of tax evasion concerning the personal income tax, subsequently setting them in the context of its calculation. The key implication of this paper is the estimation and comparison of the personal income tax gap between the Czech Republic and Slovakia using the income method, broken down into specific types of tax evasion, namely (i) unreported income subject to payroll taxes, (ii) misreported tax base by self-employed individuals (*i.e.*, sole proprietors of unincorporated businesses), and (iii) hidden employment. In line with the existing academic literature, a greater magnitude of the tax gap was found for income reported by self-employed persons (*i.e.*, sole proprietors of unincorporated businesses) than for persons with income from dependent activities (*i.e.*, employment and similar legal concepts).

Keywords: Tax gap, personal income tax, Czech Republic, Slovakia
JEL Classification: H21, H24, H26, K34

Introduction

In general, the tax gap can be described as the difference between the relevant tax amount paid to the tax authorities and the taxes that would be paid if all the taxpayer's income was taxed in accordance with tax law (*e.g.*, Brown and Mazur, 2003; Mazur and Plumley, 2007; Durán-Cabré *et al*., 2019). In a moderately different way from previous authors,

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Holmgren (2013) perceives the tax paid to the tax authorities as paid/reported voluntarily, and thus argues that the tax gap is the difference between a so-called "true" tax and a voluntary tax. Both the definitions, however, agree that the essential point is the quantification of the tax that was to be paid under the relevant legislation, but that was not for some reason. According to Brown and Mazur (2003) and Mazur and Plumley (2007), respectively, three causes of the tax gap can be considered, namely (i) non-payment of tax, (ii) non-reporting of income and (iii) failure to file a tax return. However, in the academic literature, the tax gap breakdown into its component parts is not often used, and even when it is, it always conforms to the estimation method used (except articles based on the results of tax audits of individuals in the United States; *e.g.*, Alm and Borders, 2014). The parts can thus be defined somewhat differently depending on what is to be described statistically by estimation. For the sake of completeness, it should be noted that in the case of macroeconomic estimation methods, the tax gap is usually considered in its entirety, rather than differentiated into specific types of tax (*e.g.*, Holmlund and Engstrom, 2009). In terms of the volume of available literature, the personal income tax gap is analysed relatively scarcely, and even much less with a focus on estimating its amount in the Czech Republic or Slovakia (only by Hanousek and Palda, 2006; Finardi and Vančurová, 2014)[1]. Measuring the tax gap is a very important part of effective tax administration, especially when applying the principles of public administration based on an evidence-based policy. For example, Jensen and Di Gregorio (2017) consider its analysis necessary, as it is subsequently possible to make targeted adjustments to the tax system, tax law or the tax administration procedures.

The aim of this paper is to use the collected data to estimate the volume of the personal income tax (hereinafter also referred to as "PIT") gap separately for each form of tax evasion relating to income tax on dependent activities, *i.e.*, income tax paid through so-called remitters (employers), and income tax paid by unincorporated (self-employed) individuals. Specifically for the tax year 2019, separately for the Czech Republic (hereinafter also referred to as "CZ") and Slovakia (hereinafter also referred to as "SK"). As in previous studies, Slovakia was chosen for comparison due to its geographical, legal and historical proximity. For the purposes of setting the basic hypotheses, values concerning (i) the number of tax audits, (ii) the number of audits regarding compliance with obligations pursuant to Act no. 112/2016 Coll. on Registration of Sales (hereinafter also referred to as "EET") and Act No. 289/2008 Coll. on Use of Electronic Cash Registers (hereinafter also referred to as "E-cash Register") and, last but not least, (iii) the volume of tax reassessed retrospectively based on the auditing activities of tax authorities, were extracted

1 In both cases, it was an estimate made by the so-called macroeconomic method (for more details, see Chapter 3).

from available data. Then, the data were converted to a unit value by dividing the nominal amount by the number of employees or self-employed persons, respectively.

Table 1: Number of tax audits and amount of re-assessed PIT for tax year 2019

Type / country	CZ		SK[2]	
	Nominal value	Nominal value / number[3] of taxpayers	Nominal value	Nominal value / number[3] of taxpayers
Number of tax audits (dependent activities)	1,055	0.0002	265	0.0001
Number of tax audits (self-employment)	1,5110	0.0019	654	0.0018
Checks on fulfilment of EET and E-cash Register obligations	53,452	0.0669	9,261	0.0248
PIT re-assessed retrospectively (dependent activities)	CZK 79,899,000	CZK 18.360	CZK 15,423,870	CZK 7.100
PIT re-assessed retrospectively (self-employment)	CZK 138,069,700	CZK 172.870	CZK 1,222,424,280	CZK 3 271.140

Source: Own calculations; adopted data (for a more detailed description, see sections 3.1 and 3.2)

Based on the above, it can be assumed that the tax gap will be lower for the tax paid by employed persons than for the tax paid/declared by self-employed persons (H_A), as the amount of tax re-assessed retrospectively in 2019 was lower for income from dependent activities (see also Mazur and Plumley, 2007). In the Czech Republic, the magnitude of the tax gap should be smaller compared to Slovakia, mainly due to (i) a higher frequency of tax audits and (ii) higher taxes re-assessed retrospectively converted per employee ($H_{B\ comp.\ dependent\ activities\ CZ/SK}$). The proposed hypotheses are based on earlier conclusions (Fonseca and Myles, 2012) stating that taxpayers' willingness to engage in tax evasion decreases with the increasing probability of a tax audit and the amount of possible penalties. Thus, in accordance with Alingham and Sandmo (1972), it is assumed that an upward change in the probability of a tax audit leads to a lower benefit from hidden income. Conversely, it can be assumed that the tax paid by the self-employed persons will

2 Converted using the CNB exchange rate as of 31 Dec 2019 (CZK 25.410 / EUR).

3 For dependent activities, the number of employees; for self-employed activities, the number of self-employed persons.

be lower than the tax on dependent activities; however, from the viewpoint of the hypothesis relating to the comparison between the two countries, its determination is somewhat more complicated. A closer look at the data contained in Table 1 shows a higher frequency of tax audits carried out for self-employed persons, but, at the same time, with a lower amount of tax re-assessed retrospectively. It can therefore be assumed that the effectiveness of tax auditing activities in this area is higher in Slovakia. Moreover, if the range of entities using the EET or the E-cash Register mandatorily[4] is taken into account, a lower amount of the tax gap can be assumed for the tax paid/reported by self-employed persons in Slovakia ($H_{B\ comp.\ self\text{-}employment\ CZ/SK}$).

In terms of the contribution of this paper to the current level of knowledge, it is possible to point out the missing recent analysis of this area by estimating the tax gap using net income for both the selected countries. Furthermore, it is possible to highlight the contribution to the theory of the general methodology of estimating the tax gap, because in the studied situation the estimation is broken down into partial types of tax evasion, including the determination of the relevant model.

1. Tax Gap

As mentioned above, according to the academic literature (Brown and Mazur, 2003; Mazur and Plumley, 2007), three types (or components) of the aggregate tax gap are distinguished, namely (i) non-payment of tax, (ii) non-reporting of income, and (iii) failure to file a tax return. However, Mazur *et al*. (2003, 2007) focused on the tax gap in the United States, drawing on two specific surveys conducted by the local tax authority (Internal Revenue Service, hereinafter also referred to as "IRS"), namely the Taxpayer Compliance Measurement Program (hereinafter also referred to as "TCMP") and the National Research Program (hereinafter also referred to as "NRP"). Both studies covered research conducted by the tax authorities using tax audits performed by the IRS, where not only data on the amount and reasons for the retrospectively re-assessed tax were collected, but also other information about the taxpayers and their claims, so that the personal income tax gap could be subsequently estimated. Measuring, or specifically focused auditing activities, within the TCMP occurred from 1963 to 1988, and within the NRP from 2000 to 2005 (Gemmell and Hasseldine, 2012). In view of this fact, it can be assumed that the above breakdown of the aggregate tax gap components was chosen due to the availability of relevant data. However, they may, and usually will, not only

4 Compared to the Czech legal system, the obligation to use an electronic cash register (called the E-cash Register since 1 July 2019) has been incorporated in the Slovak legal system since 2008, *i.e.*, 8 years longer. Moreover, in the Czech Republic, this obligation is still postponed for a significant part of the self-employed.

have different collection methodologies or levels of detail, but also different explanatory power in different countries. Thus, when estimating the tax gap in other countries (outside the United States), the examination may be limited to a specific sub-part(s). In addition, a separate calculation of the nonpayment-based tax gap using an estimate may be useless to some extent and reflecting the time at which the above breakdown arose. It can actually be assumed that the current tax authorities, including the less advanced ones, have not only available data on the volume of tax arrears, but also effective tools for the collection of the arrears in question. A partial reason, resulting from a legal doctrine, for limiting the examination of the personal income tax gap to the mere non-reporting of tax can also be based on the form and severity of the tortious conduct punishment, *i.e.*, the relevant procedural legislation[5]. If the breach of duty is not only known to the tax authority, but also adequately punished and effectively enforced, the degree of breach will be minimized *per se* and the resulting values in the estimation could be distorted, including their more difficult interpretation. It can therefore be concluded that at least in the case of comparing the personal income tax gap in the Czech Republic and Slovakia, it is *de facto* possible to omit types/components (i) and (iii) of the tax gap completely, because there is an effective arrears collection system in place and, in addition, the relevant publicly available statistics of individual tax authorities work with tax collection and tax revenue separately.

However, the personal income tax gap can also be viewed in a completely different way, as consisting of separate parts reflecting a specific type of tax evasion. In the academic or professional literature dealing with the tax gap issue, this approach is usually not further specified (perhaps only with the exception of Raczkowski (2015) in this respect).

1.1 Causes of personal income tax gap

As Rudick (1940) points out, there is a clear relation between taxes and tax evasion, even to the extent that they can be considered "twins" (in a figurative sense). Therefore, by definition, they are the main reason for the existence of a tax gap consisting in non-declaration of income in their forms described below (providing that the components of the tax gap resulting from insufficient collection or a failure to file a tax return are not considered).

1.1.1 Non-reporting of income

Achieving income through dependent activities can be considered to some extent as preventing tax evasion *per se* (similarly, *e.g.*, Bäckman, 2014; Whicker and White, 2015),

5 cf. Part Four of the Act no. 280/2009 Coll., Tax Administration Act (CZ), and Part Five of the Act no. 563/2009 Coll., Tax Administration Act (SK), and further cf. Section 241 of the Act no. 40/2009 Coll., Criminal Code (CZ), and Section 277 of the Act no. 300/2005 Coll., Criminal code (SK).

as the calculation and remittance of the tax is performed by the tax remitter that acts independently of the taxpayer's will. However, it is still possible and necessary to admit that some remitters will not *de facto* report part of their employees' income (*unreported employment*). In such a case, the employee's net income consists of a taxed part and a part paid to the taxpayer in cash, off the tax remitter's records. Merikull and Staehr (2008) point out that, according to a study conducted by the Estonian Institute for Economic Research in 2005, most respondents reported this form of tax evasion as being forced by the employer. At the same time, they mentioned that they would not have been hired at all if they had not agreed with the payment of part of the income untaxed. However, this cannot be generalized, as the situation was more or less exclusively referred to by Merikull and Staehr (2008).

It should also be added that a necessary condition for the possibility of tax evasion in the form of unreported dependent activities is the existence of funds not included in the remitter's standard records. This means funds that have been received in cash and not properly recorded in the accounts. However, in connection with the transition to non-cash transactions and the obligation to use the EET or the E-cash Register, this possibility of personal income tax evasion is largely limited.

On the other hand, the potential tax evasion zone for self-employed persons is much bigger. For example, Široký (2003) mentions two basic forms, namely (i) overestimation of expenses/costs and (ii) non-reporting of income from self-employment. The first category will include, in particular, the inclusion of non-business items usually used for private consumption in expenses recognized for tax purposes (cf. Long and Gwartney, 1987) as well as situations where expenditures are increased artificially by deducting non-existent costs that were not actually paid by the self-employed person, not only in the form of falsification of supplier invoices or expense receipts, but also, for example, by a related party providing sham supplies. Another of the tax evasion methods mentioned above will be implemented mainly by accepting cash payments that are not properly included in self-employed persons' records. Similarly to remitters of income tax on dependent activities, the ability of a self-employed person to achieve a tax reduction using one of the above methods depends on the scope of information provided to the tax authorities. Thus, the mandatory use of the EET or the E-cash Register will present a significant restriction on the possibility of tax evasion on the revenue side. In addition, if the self-employed person is a value added tax remitter, the overall ability to carry out tax evasion on the expense side is limited due to the obligation to submit the so-called VAT control statement. Among other things, it contains data on all received supplies above the statutory limit, and such data are then verified against data reported by the goods supplier or service provider. *A limine,* with a fully functioning EET or E-cash Register, applicable

to all self-employed persons regardless of their business activities, the ability to not report part of their income or to increase costs unduly should be substantially limited. Thereafter, the only remaining possibility of tax evasion is the inclusion in the eligible expenses of a self-employed person such expenditures that serve the private, rather than the business needs of the taxpayer. It is also possible to consider unreported rental income, income from capital assets and other income that is difficult for the tax administrator to identify without a tax audit, since information about the existence of such income was not detected by the tax authority in the analytical activities of the tax administration authorities.

The last of the possible approaches to reduce the resulting tax liability is a procedure which is referred to as an *abuse of law* in the modern legal theory (for more details, see Kamínková, 2018). This is a situation where the taxpayer cunningly interprets the applicable substantive tax law, usually on the basis of a linguistic interpretation, without taking into account the real intention of the legislator in accordance with established case law (quite surprisingly, this problem was already discussed by Rudick, 1940).

1.1.2 Disguised performance of dependent activities (hidden employment)

A specific case of tax evasion that can be implemented in both the selected countries is the disguised performance of dependent activities (hidden employment), locally called "Švarc System"[6] (*e.g.*, Poruban, 2014). It is a model where work is performed as self-employment activity, rather than dependent activity (employment). All this despite the fact that the contractual arrangement in question (usually a contract for the provision of services) would, under normal conditions, establish a relationship between an employee and an employer, *i.e.*, a dependent activity. Thus, this includes situations where the alleged self-employment activity shows the signs of dependence, *i.e.*, the work is typically performed at one place for a long time, exclusively for one recipient of services/hidden employer[7], the hidden employer is in a relationship of superiority and subordination[8] with the hidden employee, *etc.* With regard to the different tax burden of dependent and self-

6 The mentioned method of tax evasion does not apply to all countries, as some of them approach the issue in terms of the parties' free will, or leave the choice of the contractual arrangement fully to the taxpayer and the employer, *i.e.*, they can choose whether the activity will be carried out as employment or self-employment without any punishment (for more details, see Šimka, 2014).

7 Judgment of the Supreme Administrative Court of 24 February 2005, file no. 2 Afs 62/2004-70 (CZ).

8 Judgment of the Supreme Administrative Court of 13 February 2014, file no. 6 Ads 46/2013-3 (CZ); similarly Judgment of the Supreme Court of 23 August 2017, file no. 10Sžo/59/2016 (SK).

employment activities, it is possible to use this arrangement to substantially reduce, *inter alia*, the personal income tax paid by the taxpayer[9]. However, if the factual signs of independence in performing such activities are not met, it constitutes tax evasion.

1.1.3 Tax fraud of higher complexity

According to Toder (2007), in addition to the possibilities described above, high-income taxpayers have the option of using more sophisticated tax evasion structures, which are too expensive for the average taxpayer to use. Typically, this involves the transformation of untaxed income held in foreign accounts not subject to the mandatory exchange of information[10] into so-called offshore assets (bearer shares, other valuable assets held abroad, paintings, *etc*.). Then, their eventual sale also happens through foreign bank accounts (Farny *et al*., 2015). It is thus a scheme which, in fact, cannot be easily detected without proper foreign cooperation, nor can its partial magnitude be estimated from the tax gap perspective.

A less complex and substantially easier form is the transfer of tax residence to a jurisdiction with a lower level of personal income taxation (Farny *et al*., 2015). However, this technique is again relevant only for persons who are able to meet the requirements of tax residency in the tax jurisdiction in question, which is associated with certain costs again. Whether this is a form of tax evasion depends on whether the asserted foreign tax residence meets the requirements of international tax law. It should also be noted that this form of tax liability reduction is not relevant for income from dependent activities, as such income is taxed according to the principle of *lex loci laboris*, *i.e*., with a few exceptions, at the place of work, similarly income from self-employment. In reality, therefore, it is only possible to transfer the so-called other income in this way.

1.2 Theoretical approaches to measuring personal income tax gap

The academic literature dealing with the issue of measuring the tax gap contains *de facto* two lines of approaches, namely (i) macroeconomic and (ii) microeconomic (Gemmell and Hasseldine, 2012). Macroeconomic methods are usually based on estimates

9 Including social security, state employment policy and public health insurance contributions, both on the part of the employee and the employer.

10 For more details, see Act no. 164/2013 Coll., on International Cooperation in Tax Matters (CZ), or Act no. 359/2015 Coll., on Automatic Exchange of Bank Accounts Information for Tax Purposes (SK).

of the volume of the grey economy (using, for example, the MIMIC approach; see Schneider and Buehn, 2008), from which the amount of the unreported tax is derived by simply multiplying it by the tax rate (Giles, 1997). However, in most cases, these methods are not able to distinguish between each type of tax, but measure the tax gap aggregately for all types (Gemmell and Hasseldine, 2012; Raczkowski, 2015). Among other things, one can point out another fundamental shortcoming of such methods in the construction of the compound tax required for this method (Gemmell and Hasseldine, 2012). The second sub-line of this technique can be found rather rarely in the academic literature; however, it is still an approach that is used. Specifically, it is based not on the volume of the grey economy, but on macroeconomic indicators such as disposable income and average industry expenditure and their subsequent measurement (Holmlund and Engstrom, 2009; Finardi and Vančurová, 2014). However, neither of these classes of macroeconomic approaches addresses the real cause of the tax gap emergence, or the magnitude of specific tax evasion types; they only indicate the relationship between the grey economy and potentially unreported taxes. Further, Dare *et al*. (2019) pertinently mention that changes in tax policy or law cannot be made effectively based on the results of macroeconomic estimates. However, the main advantage is the simplicity of their determination (Dare *et al*., 2019), as it is possible to use commonly available data that are not difficult to collect.

The microeconomic line of approaches to determining the tax gap is somewhat more diverse compared to the aforesaid. Their basic unifying criterion is the fact that they are based on the approximated tax base of a particular taxpayer. For example, Raczkowski (2015) or Mazur and Plumley (2007) mention the possibility of using an audit-based method, *i.e*., a calculation based on data obtained during tax audits. Again, there are several shortcomings to this approach, starting with the time delay of the outputs (Mazur and Plumley, 2007), as they are based on *ex ante* data, the availability of which depends on the tax audit completion time. Another integral part of limitations to this sub-line is the general quality of auditing activities (Toder, 2007). When ordinary or extraordinary remedies are used thereafter, because the taxpayer or the tax remitter did not agree with the result of the retrospective re-assessment procedure, the data will be distorted to a certain extent. The same applies in the event that certain concealed income is not revealed within the tax audit, because a more sophisticated method of tax evasion was used or the tax administrator failed to perform the audit in a sufficient quality.

Another partial microeconomic approach, usually considered to be the most accurate, is to extrapolate the tax gap using data obtained otherwise than from tax audits (Toro, 2013; Ghezzi *et al*., 2013). Such data are collected in separate surveys covering the scope of income, including information on the application of individual tax credits/tax bonuses

or non-taxable parts of the tax base. Due to the complexity of obtaining the basic dataset and the subsequent calculation of the relevant tax, this method is very rarely used. It is also possible to come across a modified approach, for example, approximating the net income from a certain item in the tax return. For example, in Alm and Borders (2014), the amount of net income was determined on the basis of the amount of deductible gifts and donations (referred to as *cash charitable contributions* in the United States). Although microeconomic approaches *in natura* have a greater degree of reliability in the resulting tax gap values (Gemmell and Hasseldine, 2012), they also suffer from certain limitations. In particular, they are based on answers of respondents from a selected sample, which may be distorted or false, or the selected tax return indicator approximating net income may not describe the taxpayers' income distribution.

2. Empirical Part

Due to the availability of the necessary data, albeit collected for research in another sub-area of the tax theory (see below for details), an approach based on values identified in a separate sample survey was used. In accordance with Toro (2013), this method should suffer from the least susceptibility to the approach or data file defects. With regard to the specified tax evasion types in the area of personal income tax defined in Chapter 2, it is possible to express the aggregate tax gap mathematically as follows:

$$TG_{pit,i} = tg_{us,i} + tg_{uis,i} + tg_{he,i} + tg_{hnwi,i} \quad (1)$$

where TG_{pit} represents the aggregate value of the personal income tax gap ($Tax\ Gap_{personal\ income\ tax}$) for a given tax period, tg_{ue} means the part of the tax gap created as a result of unreported dependent activities ($tax\ gap_{unreported\ employment}$), tg_{uis} then represents the value of unreported taxes on self-employed persons ($tax\ gap_{unreported\ income\ by\ self\text{-}employed}$), tg_{he} the volume of tax evasion caused by the use of the so-called "Švarc System" ($tax\ gap_{hidden\ employment}$) and tg_{hnwi} the volume of tax evasion due to more sophisticated methods specific to high-income groups ($tax\ gap_{high\text{-}net\ wealth\ individuals}$).

2.1 Data file description

The complete data set was further reduced or adjusted, so that the calculation was based only on the answers of those respondents who answered all the above questions and at the same time achieved a non-zero net monthly income. The final data set thus contained 901 observations (p_{CZ}) in the Czech Republic and 898 in Slovakia (p_{SK}).

2.2 Tax gap calculation method description

Based on the sample survey, the respondents' net monthly income distribution was determined, as well as their split into persons performing dependent activities (hereinafter also referred to as "employees") and self-employment activities (hereinafter referred to as "self-employed persons"). As a first step, the number of employees and self-employed persons, divided into the relevant income groups, was extrapolated for the entire population. Data on the number of economically active persons were taken from the Eurostat LFSI_EMP_A statistics, and data on the number of self-employed persons from LFSQ_ESGAED. The number of employees was subsequently determined by the difference between the two statistics. The resulting numbers of persons according to the income distribution for each of the countries are included in Tables 2 and 3.

Table 2: Number of employees and self-employed persons in the Czech Republic broken down by the amount of monthly net income

		Dependent activities			Self-employment		
		number	%	total	number	%	total
less than CZK 4,000		0	0.0	0	2	0.8	6 520
CZK 4 000	CZK 6,000	6	0.9	39 808	5	2.0	16 300
CZK 6 001	CZK 8,000	3	0.5	19 904	5	2.0	16 300
CZK 8,001	CZK 10,000	4	0.6	26 538	4	1.6	13 040
CZK 10,001	CZK 12,500	14	2.1	92 884	6	2.5	19 560
CZK 12,501	CZK 15,000	46	7.0	305 192	14	5.7	45 640
CZK 15,001	CZK 17,500	48	7.3	318 461	12	4.9	39 120
CZK 17,501	CZK 20,000	99	15.1	656 826	28	11.4	91 280
CZK 20,001	CZK 25,000	157	23.9	1 041 633	34	13.9	110 840
CZK 25,001	CZK 30,000	98	14.9	650 191	29	11.8	94 540
CZK 30,001	CZK 40,000	116	17.7	769 614	44	18.0	143 440
CZK 40,001	CZK 50,000	33	5.0	218 942	32	13.1	104 320
CZK 50,001	CZK 75,000	25	3.8	165 865	21	8.6	68 460
CZK 75,001	CZK 100,000	5	0.8	33 173	7	2.9	22 820
more than 100,000		2	0.3	13 269	2	0.8	6 520
		656		4 352 300	245		798 700

Source: Own calculations, combined data (more detailed description in the text)

There were 15 income bands selected for the sample survey in the Czech Republic and only 5 in Slovakia. It is clear that the use of a higher number of bands will have a better significance for the whole population; however, as mentioned above, this limitation was created by the secondary use of the data collected for originally unintended purposes. Nevertheless, it should be noted that *per se* the amount of the tax gap for income tax paid/reported primarily by self-employed persons can have a smaller magnitude.

Table 3: Number of employees and self-employed persons in Slovakia broken down by monthly net income

Income band[11]		Dependent activities			Self-employment		
		number	%	Total	number	%	Total
Less than CZK 10,164		47	6.8	146,558	22	10.9	40,700
CZK 10,164	**CZK 15,246**	122	17.5	380,426	26	12.9	48,100
CZK 15,247	**CZK 20,328**	189	27.2	589,349	41	20.3	75,850
CZK 20,329	**CZK 30,492**	238	34.2	742,143	58	28.7	107,300
More than CZK 30,492		100	14.4	311,825	55	27.2	101,750
		696		2,170,300	202		373,700

Source: Own calculations, combined data (more detailed description in the text)

As a second step, the amendments to substantive tax law in both the countries were compared in detail, *i.e.*, Czech Act no. 586/1992 Coll. on Income Tax (hereinafter referred to as "CZ ITA") and Slovak Act no. 595/2003 Coll. on Income Tax (hereinafter referred to as "SK ITA"). The comparison included all items affecting the amount of tax paid/reported, *i.e.*, tax rates, percentages of flat-rate expenditure, as well as the amount of tax credit/bonuses and non-taxable parts of the tax base (except non-taxable parts of tax bases in the amount of gratuitous transactions (donations and gifts), as it would be quite problematic to determine the amount of the deduction to be taken into account when calculating the tax gap). The comparison is shown in Tables 4 and 5.

Although the nominal personal income tax rate in the Czech Republic was 15% as of 31 December 2019, it is necessary to recalculate its amount for subsequent use in the calculation of the tax gap for income tax on dependent activities.

11 See footnote 2 above.

As of 31 December 2019, the tax base was constructed so that the employee's gross income was increased by the value of social security and health insurance contributions paid by the employer, *i.e.*, 33.8% (aggregate). Thus, the effective personal income tax rate for income from dependent activities was 20.07%.

Table 4: Personal income tax rates and percentage of flat-rate expenditure in Czech Republic and Slovakia in taxation period 2019

Type / Country	CZ	SK[12]	Note
1st rate	15.00%	19.00%	cf. Sec. 16 CZ ITA and Sec. 15 SK ITA
1st rate (effective)	20.07%	19.00%	cf. Sec. 6(13) CZ ITA and Sec. 15 SK ITA
2nd rate	22.00%	25.00%	cf. Sec. 16a CZ ITA and Sec. 15 SK ITA
limit for 2nd rate	CZK 1,569,552	CZK 921,274.62	cf. Sec. 16a CZ ITA and Sec. 15 SK ITA
Flat-rate expenditure	30–80%	60%	cf. Sec. 7(7) CZ ITA and Sec. 6(10) SK ITA

Source: Own analysis, information adopted from the relevant legal regulations

Table 5: Tax credit/bonuses and non-taxable parts of personal income tax base in Czech Republic and Slovakia in tax year 2019

Type / Country	CZ	SK[13]	Note
basic (taxpayer)	CZK 24,840.00	min. CZK 19,009.13	cf. Sec. 35ba(1)(a) CZ ITA and Sec. 11(2) SK ITA
children			
– 1st child	CZK 15,204.00	min. CZK 6,760.08	cf. Sec. 35c CZ ITA and Sec. 33 SK ITA
– 2nd child	CZK 19,404.00	min. CZK 6,760.08	cf. Sec. 35c CZ ITA and Sec. 33 SK ITA
– 3rd child	CZK 24,204.00	min. CZK 6,760.08	cf. Sec. 35c CZ ITA and Sec. 33 SK ITA
spouse	CZK 24,840.00	min. CZK 19,009.13	Sec. 35ba(1)(b) CZ ITA and Sec. 11(3) SK ITA
mortgage interest	CZK 300,000.00	CZK 10,164.00	Sec. 15 CZ ITA and Sec. 33a SK ITA
pension/life insurance premium	CZK 48,000,00	CZK 869,02	Sec. 15(5) and 15(6) CZ ITA and Sec. 11(9) SK ITA

Source: Own analysis, information adopted from the relevant legal regulations

12 *Ibidem.*

13 *Ibidem.*

Subsequently, the values used for the calculation of each sub-item were derived from this analysis, for which it is necessary to adjust the personal income tax calculated using the income method of estimating the tax gap. A normal statistical distribution was assumed for this purpose, *i.e.*, the values of each tax credit/bonus or non-taxable part of the tax base were derived from (i) the average value of the relevant item (if available) or (ii) determined as the mean value. Namely for Slovakia, however, their maximum amount was further used[14]. Specifically, in the case of flat-rate expenditure, a value of 60%[15] was used, while compliance with flat-rate expenditure limits was not assumed. For the sake of completeness, it should be noted that for self-employed persons using flat-rate expenditure, the *de facto* tax rate is only 6% and 7.6% respectively, as these are not actual costs and expenses affecting their net income[16]. For the purpose of determining the total tax credit/bonus used per dependent child, the Eurostat LFST_HHNHTYCH data, describing the distribution of the number of children in the population, were used. The volume of interest on mortgage loans was derived from the average amount of the mortgage loan for the first year of repayment based on data published on the hypoindex.cz[17] and banky.sk websites[18]. Last but not least, the value of premium paid for pension or private life insurance in the Czech Republic was determined as the median of the possible maximum amount of the non-taxable part of the tax base, *i.e.*, CZK 24,000 (maximum CZK 48,000); in Slovakia as the maximum value of the deduction, *i.e.*, EUR 180. All the values used are summarized in Table 6.

The third step was to calculate personal income tax not adjusted for each tax credit/tax bonus or non-taxable part of the tax base, as a net multiple of the median value (assuming a normal distribution) of the selected net income margins and the ratio of persons engaged in (i) dependent activities, or (ii) self-employment activities in the whole population (see Tables 2 and 3). For the highest income band, the upper limit was set to double its value, from which the mean value was then calculated. Furthermore, those income bands were excluded from the calculation for which the tax to be paid was lower than zero after deducting the basic tax credit. For example, for self-employed persons, when considering the above tax rates and applying the flat-rate expenditure of 60% (see Table 6),

14 Due to the negligible amount of the tax bonuses and non-taxable parts of the tax base.

15 In Slovakia, only a single amount of flat-rate expenditure is set; in the Czech Republic, the largest number of trades is covered by the 60% rate.

16 A more precise determination was not possible because the specific income levels of individual respondents were not known; moreover, for the selected income bands, the difference between the minimum value and the value for the tax base derived from the highest income band was negligible.

17 https://www.hypoindex.cz/hypoindex-vyvoj/

18 https://banky.sk/61448-sk/historicky-vyvoj-hypotek-na-slovensku/

non-zero personal income tax was paid by Czech taxpayers in the income range of CZK 30,000 – CZK 40,000; for Slovakia this range was CZK 20,329 – CZK 30,492. As a next step, the total personal income tax was increased by the tax resulting from the application of the second tax rate, or the solidarity tax increase. In the Czech Republic, the second tax rate in question would only apply to income in the highest band to the extent of the entire relevant part of the data set and, in addition, in the second highest band to the extent of 50% of this group. In Slovakia, due to the different income bands, the methodology of approximation was used for the high-income taxpayer group to which the second tax rate would apply. The most suitable descriptive statistics appeared to be the share of taxpayers falling into the last two income bands and the total number of respondents in the data set for the Czech Republic.

Table 6: Values used to estimate tax gap for tax year 2019

Type / Country	CZ	SK[19]
Tax rates / flat-rate expenditures		
– 1st rate	15.00%	19.00%
– 1st rate (effective)	20.10%	19.00%
– 2nd rate	22.00%	25.00%
Flat - rate expenses	60%	60%
Tax rate when applying flat-rate expenditures	6.0%	7.6%
Reliefs / Non-taxable parts		
basic	CZK 24,840.00	CZK 19,009.13
children		
– 1st child	CZK 15,204.00	CZK 6,760.08
– 2nd child	CZK 19,404.00	CZK 6,760.08
– 3rd child	CZK 24,204.00	CZK 6,760.08
spouse	CZK 24,840.00	CZK 19,009.13
mortgage interest	CZK 57,660.00	CZK 47,694.57
pension/life insurance premium	CZK 24,000.00	CZK 869.02

Source: Own analysis

19 See footnote 2 above.

The last step was the correction of personal income tax calculated as described above by the amount of tax credit/tax bonuses and non-taxable parts of the tax base. From the respondents' answers to the question of whether they apply partial tax credit/tax bonuses or non-taxable parts of the tax base, the following ratios were determined, from which, using combined data from Tables 6 and 7, the aggregate values were calculated by which the personal income tax had to be adjusted[20].

Table 7: Ratios of taxpayers applying credit/tax bonuses and non-taxable parts of tax base in tax year 2019

Type of tax credit/tax bonus or non-taxable part of tax base / Country	CZ	SK
children	32.58%	30.97%
– 1st child	14.92%	14.53%
– 2nd child	14.24%	12.44%
– 3rd child	3.42%	4.00%
spouse	4.54%	4.90%
mortgage interest	21.03%	3.00%
pension/life insurance premium	38.70%	18.68%

Source: Own analysis, own data

Using the procedure described above, the level of the personal income tax gap was identified depending on the type of activity, *i.e.*, the values of tg_{ue} and tg_{uis} were determined.

For the purpose of quantifying the magnitude of tax evasion caused by the use of hidden employment ("Švarc System") – tg_{he} – an analysis of data on all self-employed respondents was performed by assessing whether the respondent's profession can by its nature meet the criteria of hidden employment (for more details, see section 2.1). The results were then compared with the frequency of the same profession performed in the dependent work regime in order to verify the assumption that the professions in question are performed in both forms. The resulting shares of self-employed persons who potentially perform dependent activities due to the nature of their profession, are listed in the following table, broken down into the professions with the highest frequency.

20 The tax bonus per child was not treated in the same way as in the case of the basic credit, as in both countries the application of this credit may give rise to an overpayment of income tax (simply put, a negative tax may arise). Other items can be claimed only if the personal income tax is sufficient.

For the affected group of respondents according to Table 8, it was then determined which specific income bands they belong to. The value of tg_{he} was derived using the same procedure used to determine tg_{ue} and tg_{uis}; however, the difference between the tax rates for dependent and self-employment activities was used in calculating the tax itself, as only this part represents the potential amount of tax evasion. Tax credit/tax bonuses or non-taxable parts of the tax were not applied either, as their amount for the taxpayers in question is already included in tg_{uis}. The only exception was the basic tax credit for income groups for which it was not previously applied in tg_{uis}.

Table 8: Share of self-employed persons potentially performing hidden dependent activities in tax year 2019

Type of profession / Country	CZ	SK
Share of self-employed persons potentially performing hidden dependent activities in whole population	31.43%	33.66%
Thereof:		
software developers	2.04%	8.42%
managers/executives (including construction industry)	8.16%	7.43%
administrative staff	7.35%	5.94%
sales assistants	4.90%	1.49%

Source: Own analysis, own data

2.3. Resulting tax gap values

The calculated personal income tax values and the TG_{pit} tax gap were compared with the personal income tax values according to the statistics available in the two countries. The resulting comparison is shown in Tables 9 and 10. However, it is necessary to point out the differences in the tax statistics of the two countries and also in the statistics distortion by the value of tax bonuses, which lead to lower values of each personal income tax component in the statistics of both the countries. The Czech Tax Administration Authority publishes data on income tax from dependent activities[21] separately, but it does not further distinguish the remaining part of the revenue from this tax, which then forms one aggregate group. Statistical data concerning withholding tax on personal and corporate

21 Tax statistics of the TAA CZ (2019 tax statistics) https://www.financnisprava.cz/cs/dane/analyzy-a-statistiky/danova-statistika

income are also somewhat meaninglessly combined. These facts *per se* represent a limitation of the estimate.

Table 9: Estimated personal income tax gap in Czech Republic in tax year 2019

	PIT according to TAA CZ[22]	PIT according to estimate	$TG_{pit,\,i}$	PIT share according to TAA CZ / PIT according to estimate
Dependent activities (*ue*)	CZK 216,290,103,422.01	CZK 229,675,692,071.87	CZK 13,385,588,649.86	94.17%
Self-employment (*uis*)	CZK 9,892,961,198.03	CZK 21,061,284,152.52	CZK 11,168,322,954.49	46.97%
Hidden employment (*he*)	CZK 0.00	CZK 4,385,400,212.06	CZK 4,385,400,212.06	38.88%[23]
Sophisticated schemes (*hnwi*)	CZK 0.00	CZK 0.00	CZK 0.00	–
Total	CZK 226,183,064,620.04	CZK 255,122,376,436.45	CZK 28,939,311,816.41	

Source: Own calculations, own data (with the exception of the column *PIT according to TAA CZ*)

Then again, in Slovakia, the available tax statistics[24] distinguish income tax from dependent activity and, similarly to the Czech Republic, show other income separately. However, rather illogically, the tax income from the activities of self-employed persons includes tax revenues achieved by taxing non-resident taxpayers. This, of course, affects the resulting breakdown of the tax gap between tg_{ue} and tg_{uis}. Unfortunately, no better data to eliminate this estimation inaccuracy are available.

The amount of tg_{hnwi} was not found in either country, as all respondents answered that their residence is in the Czech Republic and Slovakia, respectively. As Toder (2007) points out as well, the possibility of using sophisticated tax schemes clearly concerns a very limited number of people, who were not captured by any representative sample survey.

22 See footnote 15 above.

23 The total share of tax declared by self-employed persons and the calculated tax gap for tg_{uis} and tg_{he}.

24 Tax statistics of the TAA SK (Annual Report of the Financial Administration Authority of Slovakia p. 30 table 21; https://www.financnasprava.sk/sk/financna-sprava/vyrocne-spravy/_1/Dátum%20publikovania/MTE=/NjY=/OTk=/MQ==/MjU=/bnVsbA==/opb

Table 10: Estimated personal income tax gap in Slovakia in tax year 2019[25]

	PIT according to TAA SK[26]	PIT according to the estimate	$TG_{pit,\,i}$	PIT share according to TAA SK / PIT according to estimate
Dependent activities (*ue*)	CZK 79,058,133,000.00	CZK 88,854,007,144.86	CZK 9,795,874,144.86	88.98%
Self-employment (*uis*)	CZK 2,177,382,900.00	CZK 2,426,323,833.92	CZK 248,940,933.92	89.74%
Hidden employment (*he*)	CZK 0.00	CZK 1,823,914,671.42	CZK 1,823,914,671.42	51.23%[27]
Sophisticated schemes (*hnwi*)	CZK 0.00	CZK 0.00	CZK 0.00	
Total	CZK 81,235,515,900.00	CZK 93,104,245,650.21	CZK 11,868,729,750.21	–

Source: Own calculations, own data (with the exception of the column *PIT according to TAA SK*)

Based on the comparison made, it can be concluded that the hypothesis H_A was verified, because in both the countries the ratio of the tax gap arising from dependent activities to the statistical data of tax authorities (expressed in percentage) is lower than for the tax reported by self-employed persons, *i.e.*, tg_{ue} is higher than the sum of tg_{uis} and tg_{he}. The hypothesis $H_{B\ comp.\ dependent\ activities\ CZ/SK}$ can also be confirmed with regard to the amount of tg_{ue} in the Czech Republic and Slovakia. Last but not least, $H_{B\ comp.\ self\text{-}employment\ activities\ CZ/SK}$ can also be considered confirmed. Thus, these results are *de facto* consistent with the available doctrinal resources, in particular Alingham and Sandmo (1972), and also close to the conclusions made in other similar analyses (*e.g.*, Alm and Borders, 2014; Mazur and Plumley, 2007). However, it is quite remarkable that the volume of the tax gap for self-employment activities tg_{uis} in Slovakia is *prima facie* lower than in the Czech Republic, but after the inclusion of tg_{he} it shows a similar level. This can be justified by a different structure/distribution of tax evasion. While tg_{uis} may reach a lower level due to the earlier and more widespread introduction of the E-cash Register[27], once tg_{he} is included, the values across the two countries become relatively comparable. Thus, the structure of tax evasion is probably different in both countries.

25 See footnote 2 above.

26 See footnote 15 above.

27 *Ibidem*.

It is also necessary to mention the limitations of the performed estimate (beyond the above-mentioned limits of available tax statistics), which must be worked with/considered.

- Some of the respondents will certainly earn some income that can be exempt from personal income tax, but is included in the net income (similarly, Gemmell and Hasseldine, 2012, for the United States).
- The calculations did not take into account the limits of flat-rate expenditure set by the relevant legal regulations of the two selected countries.
- The selected net income bands may not sufficiently describe the whole population *in genere* (however, this is a general limitation of sample surveys).
- These estimates do not describe other income (rental income, income from capital assets, *etc*.), as not only these are not listed separately in the tax statistics published by the relevant tax authorities, but were not identified separately in the sample survey, either. Therefore, the magnitude of the tax gap for tg_{uis} includes unrecognized rental and other similar other income as well.

Conclusion

The presented paper deals with the issue of the personal income tax gap. At the theoretical level, it is built on individual forms of tax evasion which are put in the context of determining the methodology for calculating the tax gap. Specifically, a distinction is made between the causes of tax evasion consisting in a failure to report certain income, hidden employment (employment is also referred to as "dependent activities" in this text) and their more sophisticated form used by a high-income group of taxpayers. Based on the above breakdown, a personal income tax gap model was derived as the sum of (i) the part representing the tax gap resulting from reporting a lower tax base for income tax on dependent activities, (ii) the part representing the unreported tax by self-employed persons, (iii) the volume of tax evasion caused by the use of the so-called "Švarc System" and, last but not least, (iv) the magnitude of tax evasion due to the use of more sophisticated methods specific to high-income groups. The calculation of the tax gap was performed using the microeconomic method, as the derivation of the tax gap from the respondents' net income margin. Based on the breakdown of partial tax evasion forms according to Brown and Mazur (2003), only the area of unreported income was analysed.

The aim of this paper was to estimate the personal income tax gap for the tax year 2019 in the Czech Republic and in Slovakia, in the above-mentioned breakdown into its

individual components. Regarding the results of the estimate made, it can be concluded that similarly to Holmlund and Engstrom (2009), Dare *et al*. (2019) and others, a higher estimate of the tax gap for self-employment than for dependent work (*i.e*., employment) was arrived at in both the countries. In the case of Slovakia, the observed values also correspond to the phenomenon described in Bäckman (2014) or Whicker and White (2015), *i.e*., the magnitude of the tax gap for income tax on dependent activities is usually lower in highly developed countries compared to moderately or less developed countries. Thus, the hypotheses H_A, $H_{B\ comp.\ dependent\ activities\ CZ/SK}$ as well as $H_{B\ comp.\ self\text{-}employment\ activities\ CZ/SK}$ were confirmed, as *in fine* the percentage of the tax gap was (i) lower for the tax on income from dependent activities compared to the tax reported by self-employed persons in both the countries, (ii) higher for the tax on dependent activities in Slovakia and (iii) higher for the tax reported by self-employed persons in the Czech Republic. It can also be noted that the causes of the tax gap for self-employed persons are different in the Czech Republic and in Slovakia. While in the case of Czech self-employed persons, according to estimates, the method of income non-reporting prevails, hidden employment is a preferred form among Slovak taxpayers.

One of the possible causes of differences between the level of the personal income tax gap in the Czech Republic and Slovakia may be the problem described in Lang *et al*. (1997), *i.e*., the frequency and quality of tax audits, including automated auditing tools such as the EET or the E-cash Register. The taxpayers' behaviour thus appears to be entirely consistent with the assumption made in Alingham and Sandmo (1972). As a solution to reduce the magnitude of the tax gap in the relevant area, it would come as the first idea to further intensify and improve auditing activities but, for example, Brown and Mazur (2003) prefer strategic solutions aimed at improving tax perception, which would lead to improved voluntary payment of taxes. They do not consider measures of a repressive nature to be appropriate. It must not be forgotten that the value of the effective tax paid by taxpayers as a result of a failure to report certain income constitutes a *de facto* effective tax rate for the taxpayer, and it cannot be assumed that the tax revenue would increase by an amount equal to the tax gap if corrective measures were taken. This is likely to reflect common economic principles acting when the effective tax burden is increased (Gemmell and Hasseldine, 2012). Thus, the partial effects of the tax and economic doctrine of the Laffer curve will be manifested (for more details, see Hájek *et al*., 2021). In this context, it is possible to point out the different approach of the Slovak tax administration authorities which, by amending Act no. 563/2009 Coll. on Tax Administration, introduced the Tax Reliability Index as of 1 January 2018 as a tool for positive taxpayer motivation to properly meet their tax obligations. Consequently, reliable tax entities can be granted specific tax benefits.

In terms of the direction of further research in this area, it is possible to primarily emphasize the appropriateness of repeated tax gap assessment (similar to what happened in other countries in the past; see Mazur and Plumley, 2007, for details concerning the US; see Dare *et al*., 2019, for South Africa). This should be conducted on data collected exclusively for these purposes, which would in turn increase the quality of the estimate made. Repeated estimates would also increase the possibility of a time comparison for each value and a possible analysis of the measures taken to minimize the tax gap, for example using regression analysis or other methods.

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