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# Impact of the COVID-19 Pandemic on the Budget of Slovak Local Governments: Much Cry and Little Wool?

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**Abstract**

The aim of the paper is to examine the impact of the COVID-19 pandemic on the budgets of Slovak local governments and to propose measures that would help them better cope with similar shocks in the future (in the economic context). In the first step, we compare tax revenues with their forecast values from 2019. Subsequently, we focus on the dependence of local government revenues on share taxes - personal income tax, which we examine using the Herfindahl-Hirschman Index at the level of individual local governments. We then examine this in the context of size categories of local governments as well as physical space - regions and districts. The results suggest that the COVID-19 impact on local government revenues was much less than expected. However, it revealed the economic limits of the system (structure) of local self-government in Slovakia with a majority of small (and vulnerable) local governments. The way out would be a shift to property taxes, but this is limited due the reluctance of local government representatives to accept a greater degree of responsibility for filling the revenue side of budgets with local taxes and fees.

**Keywords**

COVID-19, Local government, Local taxes and fees, Tax income concentration, Shared taxes, Herfindahl-Hirschman Index

**JEL Classification**

H24, H30, H71

## Introduction

At the first mention of a possible epidemic associated with the COVID-19 disease in Slovakia, it was the self-governments that reacted first, and only then did the state react but very gingerly. After the first restrictions on mobility and subsequent restrictions on trade and production, concerns about the economy began to emerge, local governments not excluding. The main reason why the performance of the national economy is crucial for local governments is their connection to the personal income tax, which is fully remitted to local and regional governments - 70% to local governments and 30% to regions. Many mayors still remembered the effects of the financial crisis associated with restricting the provision of certain public services (e.g. greenery maintenance) or stopping any investment.

Uncertainty about income (likely economic downturn without credible quantification) and expenditure (purchase of protective equipment and implementation of anti-pandemic measures) mobilized mayors, who began to call for support programs similar to those provided for business. In August 2020, the Minister of Finance and Deputy Prime Minister of the Slovak Republic promised them a credit framework of up to 200 mil. EUR, to cover revenue shortfalls caused by the COVID-19 pandemic.

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The COVID-19 pandemic has placed great strains on the budgets of state and local governments. In order to understand these strains and their potential consequences, it is useful to examine some of the fiscal challenges that state and local governments have faced during past economic downturns. Using these experiences as a baseline, we can analyse how the challenges currently facing state and local governments are likely to play out. The current downturn is likely to mirror certain aspects of historical downturns, but it will undoubtedly differ in important respects (Mullin and Pinto, 2021).

Research has also responded to the seriousness of COVID-19 after a few months. In mid-2020, more detailed studies began to appear, which dealt with socio-economic impacts of COVID-19 on the public sector and subsequent budgetary measures are addressed by e.g. Grossi, Ho and Joyce (2020), which, however, represent rather areas of research that need to be focused on and summarize general approaches to addressing the impact of a pandemic on the lives of the population. Bailey, Clark, Colombelli, Corradini, De Propris, Derudder, Fratesi, Fritsch, Harrison, Hatfield, Kemeny, Kogler, Lagendijk, Lawton, Ortega-Argilés, Iglesias Otero & Usai (2020) have a similar approach to the impacts of COVID-19 and subsequent socio-economic transformation and the resulting challenges (supply chain change, climate change, urban transformation impacts, industrial transformation, innovation creation and uneven negative impact of COVID-19 on regions). Țiclău, Hințea & Andrianu (2020) focus on the governance part of local governments. They see possibilities how to increase the resilience of local governments and the ability to cope with such crisis situations in the concepts of adaptive governance and turbulent governance.

Argento, Kaarbøe and Vakkuri, J. (2020) describe and compare the fiscal responses (volume of support) of Finland, Norway and Sweden, but at national level. Joyce and Suryo Prabowo (2020) follow the example of the USA in a similar way but add a projection of the impact on tax revenue for individual states of the Union. Nemec and Špaček (2020) are a bit more specific. In addition to assessing the response of local governments to measures against the proliferation of COVID-19, they partially address the impact of COVID-19 on the budgets of local governments in the Czech Republic and Slovakia. Their evaluation is based on initial estimates of interest associations of towns and municipalities in the Czech Republic and Slovakia situated until mid-2020 and adopted government measures, when in both countries they lack targeted and systematic assistance to local governments.

In addition to the impact of COVID-19 on local government budgets in England, Ahrens and Ferry (2020) address the resilience of local governments to economic shocks. Among the main tools to help their resilience are diversification of resources, reduction of cross-country equalisation and strengthening of links to the local economy. In addition to greater stability of local government revenues, they expect such measures to strengthen the principles of local democracy. However, even such measures will not allow the municipality to withstand challenges such as COVID-19 in the long run.

In Slovakia, the process of fiscal decentralization has led into a change in the financial system of local governments since 1 January 2005. Despite the fact that it has undergone several changes during its existence, it declares the efforts to achieve a medium degree of decentralization in Slovakia. This is also one of the reasons why we decided to focus our research on the context of the impact of the COVID-19 pandemic on the revenue side of local government budgets with an emphasis on tax revenues. The aim of this paper is to answer the following questions: Has COVID-19 affected local government tax revenues? And are tax revenues resistant to economic shocks equally across Slovakia?

## Current State

One of the breakdowns of local government tax revenues is the breakdown into typically local taxes, the revenue of which flows only to the budget of the relevant self-governing unit, and shared taxes, the revenue of which is redistributed among several levels of government. There is a different tax jurisdiction associated with this mechanism (possibility to influence the structure of the tax or the tax rate).

*"The system of local taxes provides local governments with the highest degree of fiscal autonomy."* (Jílek, 2008, p. 138) Local governments can plan their revenues with the necessary degree of certainty and subsequently can plan their expenditures. When raising and reducing these taxes, they can transparently bear the consequences of their decisions, and the level of local taxation is significantly linked to the level of local public goods provided.

Tax Sharing is an instrument of fiscal policy in which there is no clear agreement between economists as to whether such taxes constitute their own (tax) revenue or a form of transfer. This divergent approach can also be supported by the fact that, in many cases, the revenue redistribution mechanism is based on a range of criteria which seek to take account of possible disparities that exist in some regions. The most commonly used criterion is population (sometimes modified in relation to different population groups, e.g. compulsory school children, senior citizens), but criteria based on geographical basis (e.g. altitude of a territorial unit) or fiscal capacity (with the aim of equalize the income base of low-income municipalities).

The share tax can be characterized in general as *"a mandatory, statutory amount, by which part of the nominal income of an economic entity is deducted on a non-refundable basis"* (Široký, 2008). However, its specificity lies

in the fact that its income to several, while the law stipulates the percentage shares of individual levels of public administration in its total revenue. Advanced market economies attach different meanings to share taxes.

If we take into account the results of the works of Swianiewicz (2010) and Černěnko (2017) and Černěnko and Peciar (2018), who talk about the different efficiency and capacity of differently sized local governments, we can assume that the size of local government and the extent of its decision-making or tax powers can play an important role in addressing the impact of a pandemic on local government budgets.

## Financing of local governments in Slovakia – focusing on local taxes and fees

The system of local taxes and fees in Slovakia is shown in the following Scheme 1.

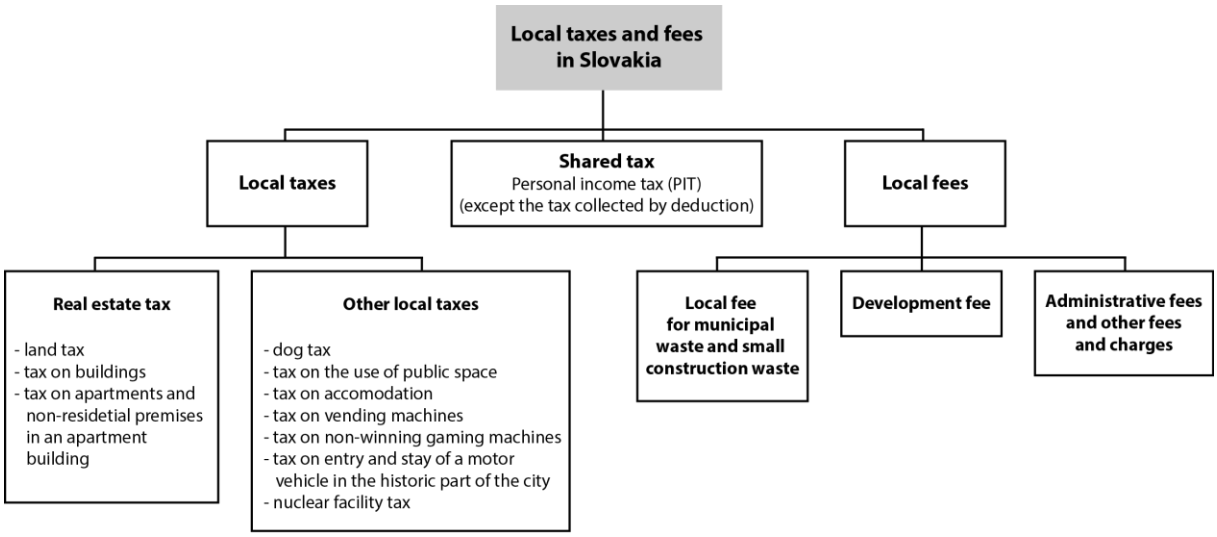


**Fig. 1.** System of local taxes in Slovakia.
**Source**: authors.

### *Real estate taxes*

Real estate tax in Slovakia cannot be described as neutral. This is due to the existence of a number of exemptions in real estate taxation (for more details, see §17 of Act No. 582/2004 Coll., on local taxes and local fees for municipal waste and small construction waste).

On the other hand, it is important to emphasize that real estate tax provides little room for tax avoidance and thus contributes to a fairer and, above all, more efficient tax system. It is more difficult to hide real estate from the tax administrator. On the contrary, it is relatively easier not to admit economic activity and thus avoid paying the tax. The difference between potential and actual income represents a gap in property tax. The potential tax revenue is achieved if all existing real estate is taxed at an unreduced rate and at the same time all real estate is declared for real estate tax (Líšková, Výškrabka, 2018). The law (Act No. 582/2004 Coll.) specifies the cases in which the municipality may reduce the rate and which properties are automatically exempted. The value of these tax exemptions and reductions is a legal part of the gap. The illegal part of the gap represents the tax liability levied but not paid and the potential income from unrecognized real estate. The amount of unpaid real estate tax, i.e. the difference between tax levied and paid, is only part of the illegal gap. Real estate for which no tax return has been filed, resp. an incorrectly filed return has been filed, they fill the illegal part of the tax gap. (e.g. Youngman, 2016).

In addition to real estate tax, in the conditions of Slovakia we also include in the group of local taxes a **dog tax, a tax on the use of public space, a tax on accommodation, a tax on vending machines, a tax on non-winning gaming machines, a tax on entry and stay of a motor vehicle in the historic part of the city and a nuclear facility tax**. The specificity of these local taxes is that, as part of fiscal decentralization, they have been transformed from the existing local fees, some of which have been merged or abolished altogether. The only local fee, which remained in the form of the so-called user fee is a local fee for municipal waste and small construction waste (Neubauerová and Brindzová, 2016).

### *Shared taxes*

In the conditions of Slovakia, at present (2021) such a tax is the personal income tax (except for the tax collected by deduction), which is included in the group of territorial self-government's own tax revenues. From the point of view of economic substance, however, the mechanism of redistribution of its revenue is more or less a transfer (tax revenue is concentrated centrally and on the basis of set criteria it is redistributed to budgets of local and regional governments. Since 2016, the PIT revenue is distributed to regional and local governments in the ratio

30:70.

In the case of Slovakia, the PIT consists of two components: PIT from dependent activity (employees) and PIT from business activity (self-employed persons). In the case of employees, the PIT is levied by a monthly deduction from wages (so-called advance tax) and paid to the state. The amount of the monthly advance payment for PIT is based on the employee's current monthly income (in Slovakia 2 tax rates are applied depending on the amount of income) and the applied options for reducing the tax base (e.g. spouse, number of children). The tax return for PIT (filed in March of the following year) then serves as a clearing mechanism to take into account changes in the possibility of reducing the tax base and the tax paid (birth of the child, loss of employment of the spouse or taking maternity/parental leave). Part of the clearing mechanism is the offsetting of other income outside the employment relationship (work on agreements, royalties, income from capital, rental of real estate, etc.), from which the advance payment for PIT was not deducted or their total exceeded the limit of € 19,506.56. From this amount, the deductible item is gradually reduced, and the taxpayer moves to a higher tax band and is taxed at a higher tax rate. In most cases, this leads to the obligation to pay income tax (positive impact on the public budget, in our case local government revenues).

As mentioned above, the advance on PIT is collected on a monthly basis and is also distributed on a monthly basis to individual local governments. This means that changes in economic performance, whether positive or negative, will be reflected in local government revenues almost immediately (within a month) through changes in employment or wages.

The Ministry of Finance of the Slovak Republic is responsible for the distribution of PIT revenue among local governments. Based on statistical data, the forecast PIT yield for the relevant year and the formula for the distribution of PIT, it calculates the expected share of the PIT revenue for individual local governments (in 2020, this breakdown changed twice with respect to COVID-19 - in April and June). In the case of local governments, the formula is based on indicators such as: the number of citizens of the local government, the number of pupils attending schools and kindergartens established by the local government, the number of inhabitants older than 62 years and the altitude of the local government. The exact functioning of the mechanism is regulated in Government Regulation no. 668/2004 Coll.

***Development fee***

The development fee came into force on November 1, 2016. This fee was implemented in the competencies of self-governing municipalities as another financial instrument or another source of a possible increase in the municipality's own income. The purpose of this fee lies in charging for development or construction use (development) by the zoning plan of land designated for that. The revenue (income) from this fee can only be used to cover capital expenditures related to the construction, including the settlement of the land, which are exhaustively listed by law[1]. One of the measures to mitigate the effects of the coronavirus was the possibility for municipalities until the end of 2020 to use the revenues from the local development fee to cover the current expenditures of the local government. This fee is approved by a generally binding regulation, exclusively by the local government authorities and is valid only in the territory of the municipality.

The need to have such an additional source of income was declared by the representatives of the local government, especially the representatives of regional cities, due to the fact that the enormously increasing construction, especially in larger cities, raises the need to build additional infrastructure. The reality was that it did not meet with such a response as expected. The local development fee is not used by most small municipalities, and as the main reason they repeatedly cite the problem associated with the depopulation of municipalities and, conversely, the need to support any new construction in the municipality. Thus, they usually do not want to burden citizens with additional fees, because they are afraid of the competitive environment of the surrounding municipalities (Kaliňák et al. 2020).

## Methods and Data

The aim of this paper is to examine the impact of the COVID-19 pandemic on the tax revenue of Slovak local governments and their resilience to economic shocks. To do so, we rise two research questions:

RQ1: Has COVID-19 pandemic affected local government tax revenues? If so, how?

RQ2: Are tax revenues resistant to economic shocks equally across Slovakia?

### Local government tax revenues and the impact of COVID-19 on them

To evaluate the situation of local government tax revenues and in a broader context, we plot and describe the development of PIT and local taxes in a longer time frame, using data on the actual revenue of individual taxes. To determine the impact of CVOID-19 on local tax revenue, we compare the forecasted PIT revenue from the end of 2019 with the actual revenue in 2020.

[1] For more details see Act No. 447/2015 Coll., Act on Local devolopment fee

Data on tax revenues (actual or budgeted) come from RIS (Budget Information System). Aggregated data on the revenue of individual taxes come from the website of the Ministry of Finance of the Slovak Republic (section Finance>Public Finance>Fiscal decentralisation and Territorial self-government). The datasets used are:

- balance of revenues and expenditures of municipalities (evaluation of the results of budgetary management of municipalities),
- an overview of personal income tax revenue.

**Concentration of tax revenues**

We decided to use HHI to analyse the concentration of tax revenues. HHI is a standard method used to determine the degree of market concentration in a selected industry. As such, it is used by regulators[2] in assessing the impact of mergers or in another economic research[3]. Ratmanova and Wroblowsky (2012) use the HHI to examine the fragmentation of Czech tax system.

The PIT revenue represents a significant part of the revenues of Slovak local governments. The very share of PIT in tax revenues does not say much about the shares of other taxes or their other relations. The advantage of using the HHI in our case is to express the degree of concentration of local government tax revenues through a single number, capture the interrelationships between revenues (HHI is the sum of squares of shares in the whole vs. the sum of shares, which is always 100%) and subsequent simple evaluation based on value of the index.

Data on the actual revenue of individual taxes for 2019 are used to calculate the HHI. The steps of the analysis are as follows:

First, we calculate the tax revenue concentration index for each municipality. For the calculation we used the standard Herfindahl-Hirschman Index, which is calculated as:

$$H = \sum_{i=1}^{N} t_i^2 \tag{1}$$

Where $t_i^2$ is in our case the share of a specific tax in the total tax revenues of the municipality.

Interpretation of H will be based on the interpretation used to assess the degree of concentration of firms in the market

H <0.01 - highly competitive industry

H <0.15 - unconcentrated industry

0.15 <H <0.25 - moderate concentration

H> 0.25 - high concentration

In order to get a more accurate picture of the concentration of tax revenues, we decided, where possible, to divide tax revenues into the smallest "units" that the municipality can influence, which in some cases reached the level of subheadings. The components for calculating HHI are:

$t_{01}$ Category 110 - Taxes on income and on capital

Category 120 - Property taxes at subheading level

$t_{02}$ 121001 - from land

$t_{03}$ 121002 - from buildings

$t_{04}$ 121003 - from dwellings and non - residential premises

Heading 133 - taxes on specific services at subheading level

$t_{05}$ 133001 - for a dog

$t_{06}$ 133003 - for non-winning gaming machines

$t_{07}$ 133004 - for vending machines

$t_{08}$ 133005 - for entry and stay of a motor vehicle in the historical part of the city

$t_{09}$ 133006 - for accommodation

[2] According to the Department of Justice and Federal Trade Commission *Horizontal Merger Guidelines*.
[3] See Cavalleri, M.C., Eliet, A., McAdam, P., Petroulakis, F., Soares, A., Vansteenkiste, I. (2019) Concentration, market power and dynamism in the euro area. *Working Paper Series,* European Central Bank

$t_{10}$ 133012 - for the use of public space

$t_{11}$ 133013 - for municipal waste

$t_{12}$ 133014 - for nuclear installations

$t_{13}$ 133015 - for development

$t_{14}$ Category 134 - Taxes on the use of goods and on business licenses

$t_{15}$ Category 139 - Other taxes on goods and services

Subsequently, a linear regression was performed with categorical variables for size categories of local governments (12), regions (8) and size categories and regions.

These criteria were selected due to the impact of the size of the municipality on its efficiency and performance (office capacity; Swianiewicz 2010, Černěnko 2017, Černěnko and Peciar 2018, Tomečko 2020 and Klimovský and Nemec 2021) and different socio-economic development level of individual regions (which can be compared for example by regional GDP per capita. We assume that (H1) tax revenues of small municipalities will be more concentrated than tax revenues of larger municipalities and (H2) the concentration of tax revenues across regions differs (due to regional disparities).

**Table 1.** Indexes of local government size groups and regions.

a) Indexes of local government size categories

| Index No. | population |
|---|---|
| 1 | up to 250 |
| 2 | 251-500 |
| 3 | 501-1000 |
| 4 | 1001-2000 |
| 5 | 2001-3000 |
| 6 | 3001-4000 |
| 7 | 4001-5000 |
| 8 | 5001-10000 |
| 9 | 10001-20000 |
| 10 | 20001-50000 |
| 11 | 50001-100000 |
| 12 | more than 100000 |

b) Indexes of regions

| Index No. | region |
|---|---|
| 1 | Bratislava (Bratislavský) |
| 2 | Trnava (Trnavský) |
| 3 | Trenčín (Trenčiansky) |
| 4 | Nitra (Nitriansky) |
| 5 | Žilina (Žilinský) |
| 6 | Banská Bystrica (Banskobystrický) |
| 7 | Prešov (Prešovský) |
| 8 | Košice (Košický) |

**Model 1**

$$y = \beta_0 + \beta_1 x_1 + \varepsilon \quad (2)$$

Where *y* was represented by the Herfindahl-Hirschman Index of tax concentration, $\beta_0$ represented the constant value and $x_1$ represented the size category of the local government.

**Model 2**

$$y = \beta_0 + \beta_1 x_1 + \varepsilon \quad (3)$$

Where *y* was represented by the Herfindahl-Hirschman Index of tax concentration, $\beta_0$ represented the constant value and $x_1$ represented the region of the local government.

**Model 3**

$$y = \beta_0 + \beta_1 x_1 + \beta_2 x_2 + \varepsilon \quad (4)$$

Where *y* was represented by the Herfindahl-Hirschman Index of tax concentration, $\beta_0$ represented the constant value, $x_1$ represented the region of the local government and $x_2$ represented the size category of the local government.

## Data

Data on local government revenues and their structure come from RIS (Budget Information System).

Data on the population come from the Statistical Office of the Slovak Republic, the DataCube database.

## Results

### COVID-19 and its impact on local government tax revenues

In recent years, thanks to economic growth, the total revenue from personal income tax4 has also increased. It consists of 2 components – PIT on dependent activity and PIT on business activity. Figure 2 shows total income of PIT revenue as well as the yield from the above-mentioned components. Major part of income is formed by the PIT on dependent activity and on average represented 96.54%, while the PIT on business activity accounted for only 3.46% of the total income on average. Importantly, however, its share of total personal income tax revenue has since 2012 by 2020 decreased from 5.25% to 2.19%.

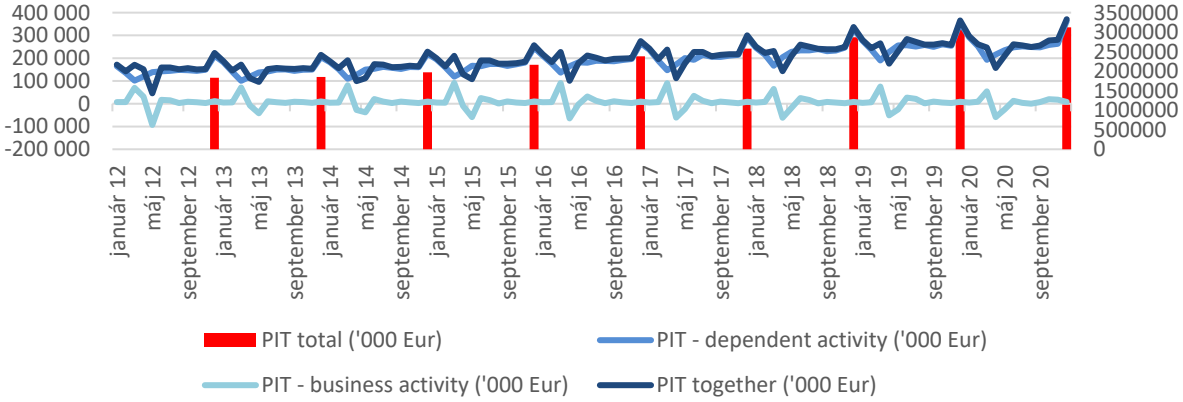


**Fig. 2.** Monthly income and total revenue on PIT 2012-2020.
**Source**: authors.

The next figure offers a closer comparison on the monthly revenue on PIT and its components in years 2019 and 2020.

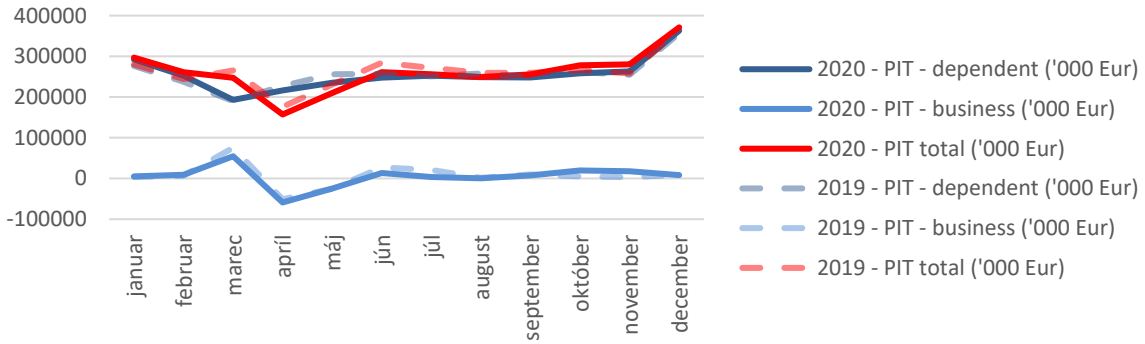


**Fig. 3.** PIT monthly revenue comparison 2019 vs. 2020.
**Source**: authors.

The growth rate of selected tax revenues of local governments from 2015 to 2019 is shown in figure 4a. As we can see, total tax revenues grew more slowly in the observed period 2015-2019 than revenues from PIT. However, local taxes and real estate taxes grew significantly slower (the development of the components of real estate taxes is shown in figure 4b). Local government revenues increased mainly due to economic growth and not through taxes and fees that fall within their competence.

If we look at how local governments have approached one of the last instruments, they have received to finance local infrastructure - the development fee, we will see a similar approach as in the case of real estate taxes.

[4] The largest share of local government revenues is the personal income tax (PIT) with an average share of 76.92% in the period of 2015-2019. Property taxes are responsible for 14. 70% of the tax income and taxes on goods and services cover 8.37% of tax revenue. Sanctions imposed in tax proceedings covers only 0.01% of average tax revenue from 2015 to 2019.

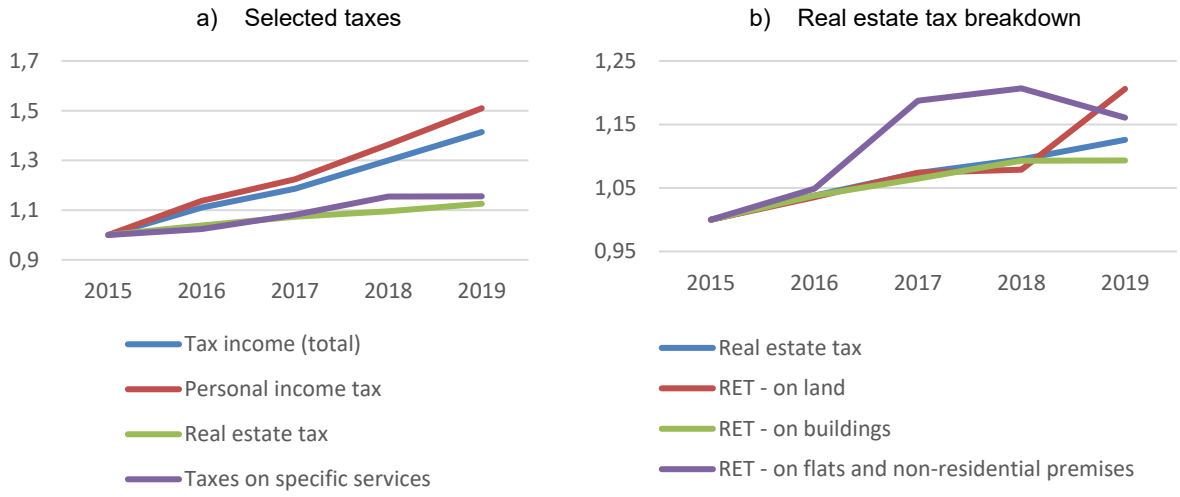


**Fig. 4.** Revenue growth rate (selected taxes).
**Source**: authors.

In 2018, 98 local governments form 2894 had a local development fee in Slovakia. The total collection of the local development fee for 2018 was 13.1 mil. EUR (i.e., paid fee to local government accounts). The number of municipalities levying this fee is gradually but very slowly increasing. Data from the budget information system show that in 2019 the development fee was collected by only 114 local governments from 2894 and the total revenue was 14.39 million Eur. For 2020, local governments budgets revenues from the development fee in the total amount of 12.56 million but only 145 municipalities. The fact that Bratislava's city districts have levied more than EUR 19 million in the three years of its existence also testifies to the fact that this fee can be considered a really good financial source.

It follows that local governments are reluctant to increase those taxes and fees that may be directly related to the originator of this decision - the political representation of the municipality - and may thus have a negative impact on the vote of the population in the next election. This can also be illustrated by the relation between the size of the municipality and the real estate tax rate. As Tomečko (2020) shows in a survey of the 100 largest municipalities in the Prešov Region, the real estate tax rate is growing along with the size of the municipality.

**Table 2.** Real estate tax rates of the 100 largest local governments of the Prešov self-governing region.

| Size category | Average tax rate (flat) in Eur | Average tax rate (house) in Eur | No. of communes | No. of communes that raised tax rate |
|---|---|---|---|---|
| 50.000 – 99.999 | 0,39 | 0,39 | 2 | 2 |
| 20.000 – 49.999 | 0,30 | 0,26 | 3 | 3 |
| 10.000 – 19.999 | 0,22 | 0,23 | 7 | 5 |
| 5.000 – 9.999 | 0,13 | 0,13 | 7 | 4 |
| 2.000 – 4.999 | 0,10 | 0,08 | 49 | 18 |
| 0 – 1.000 | 0,07 | 0,07 | 32 | 8 |
| **total** | **0,11** | **0,11** | **100** | **40** |

**Source**: Tomečko (2020).

As seen in Table 3, in the period from 2012 to 2020, actual income tax revenues were lower than budgeted in only 3 cases - in 2012, 2013 and 20205. In 2020 the difference of actual vs. budgeted revenue is -2.23% or -71.39 mil. Eur. As the PIT yield depends on the performance of the economy and other significant effects were not observed in Slovakia, we can attribute this decline to COVID-19.

As mentioned above, in August 2020, local governments were offered a credit facility of 200 million Eur to bridge the expected negative impacts of COVID-19 on PIT. Finally, under this framework, "aid" was approved and paid to 1727 local governments in the total amount of 151.92 mil. EUR, which is more than double the actual revenue shortfall. If we take into account the fact that this is an interest-free loan, which could be converted into a subsidy, we get a result of +80.53 mil. EUR for local governments.

[5] The decrease in 2013 was due to changes in levies (increase of maximum assessment bases and imposition of a tax liability also on revenues from agreements), which reduced the tax base and this had a greater impact on revenues from this tax than the abolition of flat tax and the introduction of tax progression (introduction of a second tax rate)

**Table 3.** Difference between the budgeted and the actual PIT yield 2012-2020.

| year | PIT (budgeted; '000 Eur) | PIT (actual; '000 Eur) | difference ('000 Eur) | difference (%) |
|---|---|---|---|---|
| 2012 | 1 912 994 | 1 833 324 | -79 670 | -4,16% |
| 2013 | 1 914 800 | 1 851 766 | -63 034 | -3,29% |
| 2014 | 1 942 258 | 1 971 289 | 29 031 | 1,49% |
| 2015 | 2 089 755 | 2 162 092 | 72 337 | 3,46% |
| 2016 | 2 263 315 | 2 379 460 | 116 145 | 5,13% |
| 2017 | 2 522 360 | 2 577 662 | 55 302 | 2,19% |
| 2018 | 2 749 321 | 2 870 730 | 121 409 | 4,42% |
| 2019 | 3 093 537 | 3 160 090 | 66 553 | 2,15% |
| 2020 | 3 194 591 | 3 123 203 | -71 388 | -2,23% |

**Source**: authors.

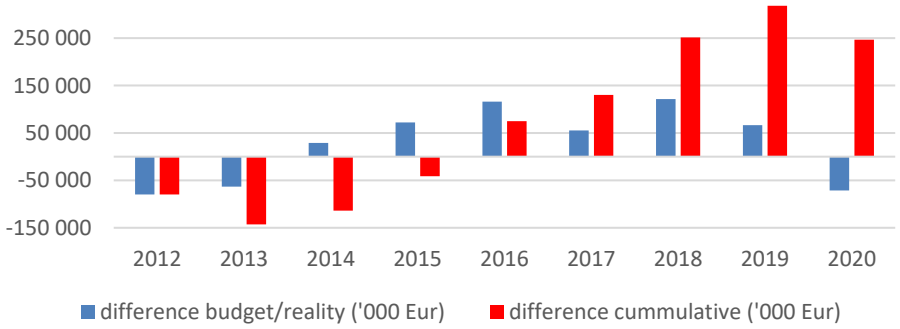


**Fig. 5.** Evolution of the difference between the budgeted and the actual PIT yield.
**Source**: authors.

In total, however, as shown on the Figure 5 PIT revenues for the period under review were by 246.68 mil. EUR higher than budgeted. If we take into account only the results of the last two years - before COVID-19 2019 and COVID-19 2020, the negative balance is 4.8 mil. EUR (higher yield than budgeted in 2019 and lower yield than budgeted in 2020) from the total budgeted PIT yield of 3.19 billion. Eur, resp. 6.28 billion EUR for the years 2019 and 2020.

## Income tax concentration

First, we calculated H (the HHI) for each local government. Due to missing data on tax income, 6 local governments (Holice, Dolný Štál, Dolné Saliby, Horné Saliby, Veľký Grob and Veľké Ripňany) were removed from the dataset, which decreased the total number of observations to 2914 local governments. As we can see, the lowest value of HHI is 0.18 and the highest 1. As can be seen in Table 4, the first percentile reaches the value of 0.36 and we can therefore say that almost all municipalities in Slovakia have concentrated tax revenues.

**Table 4.** Statistical description of the HHI tax concentration index.

| HHI | | | | |
|---|---|---|---|---|
| | Percentiles | Smallest | | |
| 1% | .3632974 | .1869673 | | |
| 5% | .4698996 | .2156442 | | |
| 10% | .5343493 | .2199743 | Obs | 2,914 |
| 25% | .6469448 | .2460497 | Sum of Wgt. | 2,914 |
| 50% | .7504852 | | Mean | .7296486 |
| 75% | .8363559 | Largest | Std. Dev. | .136391 |
| 90% | .8820658 | 1 | | |
| 95% | .9081861 | 1 | Variance | .0186025 |
| 99% | .9739385 | 1 | Skewness | -.6857713 |
| | | 1 | Kurtosis | 3.103421 |

**Source**: authors.

Table 5 lists the 10 local governments with the least concentrated tax revenues (lowest HHI value). As we can see, all municipalities have less than 1.000 inhabitants, while only 2 of them have more than 500 inhabitants. The main reason for the low concentration is the low population and the resulting low income from the share of personal income tax and the proximity of a tourist attraction or other source of tax revenue (nuclear power plant, hotels or other accommodation facilities), which may not be high in absolute numbers, but compared to share taxes (personal income tax), the revenue may be similarly high or higher. E.g., in Donovaly, the income from real estate tax is almost 5 times higher than the income from personal income tax. In the case of accommodation tax, the yield is more than 2 times higher compared to personal income tax.

**Table 5.** Top 10 local governments with lowest tax income concentration.

| Rank | Name | HHI | Population | District | Region | Main factor for other income |
|---|---|---|---|---|---|---|
| 1 | Donovaly | 0,18696731 | 255 | Banská Bystrica | Banskobystrický | Tourism (ski) |
| 2 | Bystrá | 0,21564423 | 181 | Brezno | Banskobystrický | Tourism (ski) |
| 3 | Vyšná Boca | 0,2199743 | 101 | Liptovský Mikuláš | Žilinský | Tourism (ski) |
| 4 | Bešeňová | 0,24604966 | 773 | Ružomberok | Žilinský | Tourism (spa/wellness) |
| 5 | Jarabá | 0,26260662 | 41 | Brezno | Banskobystrický | Tourism (ski) |
| 6 | Ratkovce | 0,28221785 | 345 | Hlohovec | Trnavský | Nuclear power plat |
| 7 | Čičmany | 0,2894112 | 123 | Žilina | Žilinský | Tourism |
| 8 | Kvakovce | 0,30067642 | 426 | Vranov nad Topľou | Prešovský | Tourism (Domaša water dam) |
| 9 | Nižná Boca | 0,31548947 | 163 | Liptovský Mikuláš | Žilinský | Tourism (ski) |
| 10 | Horná Lehota | 0,31550337 | 602 | Brezno | Banskobystrický | Tourism (ski) |

**Source**: authors.

### Model 1 - The effect of size on the concentration of tax revenues

The first model examines the relationship between the size of the municipality and the concentration of tax revenues (H1). As we can see in the table 6 below, the size of a municipality (expressed by size category) explains only 10.95% of the variance of the tax concentration index and is statistically significant for municipalities up to size category 8 (5 to 10 thousand inhabitants).

**Table 6.** Model 1 regression results.

| Source | SS | df | MS | Number of obs = 2,914 |
|---|---|---|---|---|
| | | | | F(11, 2902) = 32.45 |
| Model | 5.93453269 | 11 | .539502971 | Prob > F = 0.0000 |
| Residual | 48.2545428 | 2,902 | .01662803 | R-squared = 0.1095 |
| | | | | Adj R-squared = 0.1061 |
| Total | 54.1890755 | 2,913 | .018602498 | Root MSE = .12895 |

| hhi<br>size_cat | Coef. | Std. Err. | t | P>\|t\| | [95% Conf. | Interval] |
|---|---|---|---|---|---|---|
| 2 | .0815308 | .0077004 | 10.59 | 0.000 | .066432 | .0966296 |
| 3 | .1159428 | .0073053 | 15.87 | 0.000 | .1016187 | .1302669 |
| 4 | .111999 | .0077768 | 14.40 | 0.000 | .0967503 | .1272476 |
| 5 | .1209042 | .0108356 | 11.16 | 0.000 | .0996578 | .1421505 |
| 6 | .1318557 | .0158128 | 8.34 | 0.000 | .1008501 | .1628612 |
| 7 | .0486454 | .0211413 | 2.30 | 0.021 | .0071919 | .090099 |
| 8 | .0874731 | .0164997 | 5.30 | 0.000 | .0551207 | .1198255 |
| 9 | .026373 | .0225021 | 1.17 | 0.241 | -.0177487 | .0704946 |
| 10 | .0352694 | .0204439 | 1.73 | 0.085 | -.0048167 | .0753555 |
| 11 | -.0594373 | .0433453 | -1.37 | 0.170 | -.144428 | .0255533 |
| 12 | -.073745 | .0746588 | -0.99 | 0.323 | -.2201346 | .0726445 |
| _cons | .6465035 | .0055907 | 115.64 | 0.000 | .6355414 | .6574656 |

**Source**: authors.

The tax concentration is growing at a significant rate up to size category 6 (3-4 thousand inhabitants), in municipalities with 4-5 thousand inhabitants the increase is more moderate and then grows again. From category 9 (10-20 thousand inhabitants), the effect of size on the concentration of tax revenues ceases to be statistically

significant.

### Model 2 - The effect of geographical location on the concentration of tax revenues

The second model examines the change in the concentration of tax revenues from the perspective of regions (H2). Compared to the previous model, this one explains 16.79% variance of the tax concentration index and is statistically significant for all regions of Slovakia. As we can see in Table 7, the lowest concentration of tax revenues have local governments in the Bratislava region. The value of the index (coefficient) increases with the distance from Bratislava. The lowest increases are in the Nitra and Trnava regions, while the highest is in the Prešov region. The result of the Trenčín region is surprising, which is one hundred higher than that of the Banská Bystrica region.

**Table 7.** Model 2 regression results.

| Source | SS | df | MS | Number of obs = 2,914 |
|---|---|---|---|---|
| | | | | F(7, 2906) = 83.75 |
| Model | 9.09672855 | 7 | 1.29953265 | Prob > F = 0.0000 |
| Residual | 45.092347 | 2,906 | .015516981 | R-squared = 0.1679 |
| | | | | Adj R-squared = 0.1659 |
| Total | 54.1890755 | 2,913 | .018602498 | Root MSE = .12457 |

| hhi region | Coef. | Std. Err. | t | P>\|t\| | [95% Conf. | Interval] |
|---|---|---|---|---|---|---|
| Trnavský | .0458293 | .0154254 | 2.97 | 0.003 | .0155835 | .0760751 |
| Trenčiansky | .1282261 | .0151912 | 8.44 | 0.000 | .0984394 | .1580127 |
| Nitriansky | .0588253 | .0147836 | 3.98 | 0.000 | .0298378 | .0878128 |
| Žilinský | .160171 | .0149535 | 10.71 | 0.000 | .1308504 | .1894916 |
| Banskobystrický | .1184422 | .0142996 | 8.28 | 0.000 | .0904038 | .1464805 |
| Prešovský | .1954578 | .0140624 | 13.90 | 0.000 | .1678844 | .2230312 |
| Košický | .174701 | .0144199 | 12.12 | 0.000 | .1464267 | .2029754 |
| _cons | .5962086 | .0132041 | 45.15 | 0.000 | .5703182 | .6220989 |

**Source**: authors.

### Model 3 - The effect of geographical location and size on the concentration of tax revenues

In the third model, we have combined the size (H1) and spatial aspects (H2). The result (see Table 8) is an increase in the value of R2 to 0.35, an increase in the number of statistically significant observations in the case of size categories to the first 10 out of a total of 12, and in most cases an increase in the values of coefficients (comparison of model coefficients is in the Figure 6 below).

**Table 8.** Model 3 regression results.

| Source | SS | df | MS | Number of obs = 2,914 |
|---|---|---|---|---|
| | | | | F(18, 2895) = 85.34 |
| Model | 18.7859496 | 18 | 1.04366387 | Prob > F = 0.0000 |
| Residual | 35.4031259 | 2,895 | .012229059 | R-squared = 0.3467 |
| | | | | Adj R-squared = 0.3426 |
| Total | 54.1890755 | 2,913 | .018602498 | Root MSE = .11059 |

| hhi region | Coef. | Std. Err. | t | P>\|t\| | [95% Conf. | Interval] |
|---|---|---|---|---|---|---|
| Trnavský | .0440823 | .0139558 | 3.16 | 0.002 | .0167181 | .0714465 |
| Trenčiansky | .1461418 | .0138101 | 10.58 | 0.000 | .1190632 | .1732205 |
| Nitriansky | .069699 | .0134542 | 5.18 | 0.000 | .0433182 | .0960798 |
| Žilinský | .1788656 | .0135583 | 13.19 | 0.000 | .1522808 | .2054505 |
| Banskobystrický | .1673005 | .0132102 | 12.66 | 0.000 | .1413981 | .1932029 |
| Prešovský | .24403 | .0130009 | 18.77 | 0.000 | .218538 | .269522 |
| Košický | .1990364 | .0131733 | 15.11 | 0.000 | .1732065 | .2248664 |
| size_cat | | | | | | |
| 2 | .1042354 | .0066769 | 15.61 | 0.000 | .0911434 | .1173274 |
| 3 | .1486798 | .0064221 | 23.15 | 0.000 | .1360875 | .1612721 |
| 4 | .1618832 | .0069497 | 23.29 | 0.000 | .1482564 | .17551 |
| 5 | .180997 | .0095524 | 18.95 | 0.000 | .1622668 | .1997272 |
| 6 | .1825471 | .0137543 | 13.27 | 0.000 | .1555779 | .2095163 |

| | | | | | | |
|---|---|---|---|---|---|---|
| 7 | .1053576 | .0183054 | 5.76 | 0.000 | .0694646 | .1412506 |
| 8 | .1443288 | .01438 | 10.04 | 0.000 | .1161327 | .1725248 |
| 9 | .0831211 | .0194151 | 4.28 | 0.000 | .0450523 | .1211899 |
| 10 | .1041756 | .0178019 | 5.85 | 0.000 | .06927 | .1390812 |
| 11 | -.0067953 | .0372443 | -0.18 | 0.855 | -.0798232 | .0662326 |
| 12 | .0539977 | .0645911 | 0.84 | 0.403 | -.0726515 | .1806469 |
| _cons | .4524154 | .0132988 | 34.02 | 0.000 | .4263392 | .4784915 |

**Source**: authors.

The lowest concentration of tax revenues is, from statistical point of view, by local governments of the first size category in the Bratislava Region. As in the previous two models, the concentration of taxes increases with the size of the municipality and the distance from Bratislava. Even now, the concentration of tax revenues is growing up to the size category 6 (3-4 thousand inhabitants), when the trend is reversed and decreases in this case up to size category 10, which are municipalities with a size of 20-50 thousand inhabitants. In the next size category, it ceases to be statistically significant. The relation between the growth of the concentration of tax revenues of municipalities together with the distance from Bratislava was also confirmed. Compared to the previous model, the position of the Banská Bystrica and Trenčín regions has changed.

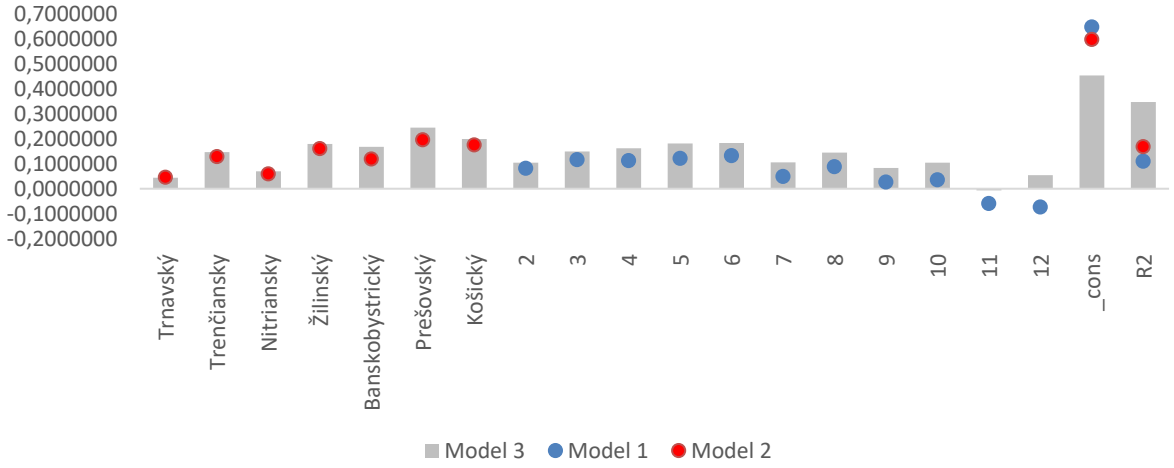


**Fig. 6.** Comparison of model coefficients.
**Source**: authors.

## Discussion and conclusion

The aim of our paper was to examine the impact of the COVID-19 pandemic in 2020 on local government tax revenues.

In 2020, the local governments in Slovakia were lucky in terms of the impact of the COVID-19 pandemic on budget revenues. As we showed in section COVID-19 and its impact on local government tax revenues the COVID-19 impact on local government tax revenue is in 2020 minimal. The impact of COVID-19 on tax revenue of Slovak local governments is -2.23% or - 71.39 mil. Eur. Taking the interest-free loan into account (a possible subsidy) we get a result of +80.53 mil. EUR. If we add to this the generous previous years, which were marked by economic growth, local governments are not at risk in the short term. Such a result is the opposite of what was expected in the first half of 2020 (see Nemec and Špaček 2020) and in the summer of 2020 when Slovak local governments called for help. However, if there were a significant drop in the labour market, the reserves available to local governments today may not be sufficient.

Other findings resulting from the analysis of the concentration of tax revenues are not so positive. We found that the dependence of local governments on the yield of PIT grows together with their size to a population of 3-4 thousand inhabitants and then decreases again. This change could be due to the size of tax revenues (as the population grows, so does the volume of the share of PIT, which reduces the contribution of other taxes to budget revenue) and the level of other taxes and fees. We have shown that the level of the real estate tax rate is growing along with the size of the municipality and thus also the "anonymity" of elected representatives. The larger the self-government, the weaker the direct contacts with elected representatives, which establishes the premise of impartial governance and decision-making, and thus the decision on the level of taxes is in a larger self-government a more professional than a personal issue. We can see similar behaviour of local governments with the development fee, when the vast majority of municipalities still did not count on the income from this fee in 2020. These results thus follow the findings on the low efficiency of small municipalities (Swianiewicz 2010, Černěnko 2017) and extend them to the area of local taxes and fees.

The second finding from the analysis of the concentration of tax revenues is that the concentration of tax revenues is growing away from Bratislava and thus local governments, which are in regions with a worse economic situation, are more dependent on PIT revenue. This finding is all the more serious given that today PIT is redistributed in a solidarity way - and thus municipalities receive a share of the tax for the average taxpayer. Another risk factor is the fact that most municipalities have more permanent residents than the number of people actually living in the municipality and this disparity is growing from Bratislava. Once the redistribution of PIT revenues would take into account either the actual tax revenue from the resident or the dynamics of population movements, the impact on the municipal budget would be strongest in these smaller municipalities in economically less developed regions.

Combining the results of our two research questions, we come to a sad conclusion. The high concentration of local government tax revenues on PITs makes them vulnerable to economic fluctuations. The only possible alternative to get out of this dependence, without any harm on small local governments, is to strengthen revenues from other taxes and fees, e.g. real estate tax or development fee. Here, however, we encounter considerable reluctance on the part of local government representatives. The measures proposed for England by Ahrens and Ferry (2020) are largely applicable to the conditions of Slovakia. However, in the case of cross-country equalization and connection to the local economy, due to significant regional differences, we recommend their gradual introduction.

Nevertheless, the current setting of local government tax revenues in combination with their structure (high number of small local governments) is not sustainable in the long run. The fragmented administrative structure limits the possibilities of using a different tax mix. Ultimately, we add another to the series of arguments for structural reform.

Further research should be focused on two issues. The first concerns the impact of the COVID-19 pandemic on local government budgets. After an initial analysis of the revenue side of the budget, provided by this paper, it would be appropriate to focus on changes in the expenditure part of local government budgets. We assume that the pandemic has significantly changed the structure of local government expenditures. On the one hand, we expect an increase in expenditures caused by anti-pandemic measures, on the other hand, a reduction in costs associated with the operation of infrastructure, schools, cinemas, etc. which could free up funds for investment in this capital (reconstruction, or construction of new infrastructure). The second issue is research focused on the structure of local government revenues. In this case, it would be appropriate to supplement the concentration analysis with other factors such as equipment of the territory (institutions, amenities), size of the budget or wealth in the region / district.

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