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The Confluence of Local Property Tax Policy and Central Personal Income Tax Policy

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JEL: H22; H39; H77

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Abstract

Theoretical background: In public economics, there is well-established research on the fiscal efficiency of local tax sources (fiscal capacity) and the sensitivity of local authorities' tax revenues to changes in the parameters of their local tax policy (fiscal stress). However, there is a need for a critical approach to these characteristics in the conditions of the division of tax authority between central and local authorities, in particular regarding the application of a hybrid model combining the shares of local authorities in taxes that are the subject of central tax policy (personal income tax) and local tax authority over property taxation.

Purpose of the article: There are no indicators for identifying the relationship between changes in personal income taxation policy and local property taxation policy. Therefore, the theoretical goal of the article is to develop indicators for determining the willingness and ability of local authorities to compensate for the undesirable fiscal effects of the personal income taxation policy pursued by the central authorities. The research goal of the article is to evaluate the differentiation of these indicators in municipalities in Poland.

Research methods: Drawing conclusions based on the estimated basic parameters of statistics of the developed pressure and capability indicators for the population of Polish municipalities; distinguishing the subpopulations of urban municipalities, urban-rural municipalities, rural municipalities, and cities with county rights, both in the temporal and spatial dimension.

Main findings: The paper's conceptual framework enables a critical adaptation of the fiscal stress and fiscal capacity research methods to analyse the confluence of unfavourable changes in the conducted by central government personal income taxation policy and the property taxation policy controlled by local tax authorities. The proposed pressure to compensate and ability to compensate indicators were estimated for all Polish municipalities in the years 2019–2023. On their basis, their statistics were developed, allowing for the formulation of the following conclusions. The median of the index of pressure to compensate, that is the ratio of shares in personal income tax to current expenditures reduced by the amount of earmarked grants was stable in the years 2019–2022 despite numerous and profound shocks to municipal budgets triggered both by taxation reforms and exogenous events such as the COVID-19 pandemic and the war in Ukraine. The year 2023 saw a significant drop in exposure to unfavourable changes in personal income taxation. The decreased variation accompanied a decrease in the indicator in question. On the other hand, the median index of the ability to compensate for unfavourable changes in personal income taxation provided by central government, that is the median of relations between tax expenditures and revenues from property taxes, was very stable from 2019 to 2023. The activity of the local authorities in pursuit of tax policy did not exceed 20%, which can be assessed as a stable but low level of compensation capacity. The empirics show that the pressure-to-compensate indicator establishes noteworthy variances among municipalities depending on their type. The higher the level of urbanization, the higher the values of this indicator, as local revenues from personal income taxation in urbanized regions are usually higher. This presentation of results and comparison of the size of these indicators spatially make it possible to identify regions that may need special attention from policymakers when planning future tax reforms.

Introduction

The main sources of own revenues of municipalities in Poland are taxes on real estate and shares in personal income tax. The article deals with the impact of changes in personal income tax on decisions regarding real estate taxation. It is assumed that the municipal tax policy will be assessed in relation to two indicators: the ability and willingness to take action to compensate for the loss of municipal income. The first indicator will be used to examine the territorial distribution of the possibility of increasing the fiscality of real estate taxation in a given tax jurisdiction. Simultaneously, the second indicator will help us determine the level of fiscal stress (pressure) to which individual local government units will be subjected. In public economics, there is well-established research on the fiscality of local tax sources (fiscal capacity) and the sensitivity of local authorities' tax revenues to changes in the parameters of their local tax policy (fiscal stress). However, a critical approach is needed to address these characteristics of the division of tax authority between central and local authorities, in particular when a hybrid model is applied, combining the shares of local authorities in taxes that are the subject of central tax policy (personal income tax) and local tax authority over property taxation.

The paper presents a critical review of literature on the concept and methods of measuring fiscal stress and fiscal capacity. Based on this, an attempt was made to define the latest indicators that would allow us to identify the relationship between changes in personal income taxation policy and local property taxation policy. Therefore, the theoretical goal of the paper is to develop indicators for determining the

willingness and ability of local authorities to compensate for the undesirable fiscal effects of the personal income taxation policy pursued by the central authorities.

The article's research goal is to evaluate the differentiation of these indicators across municipalities in Poland. For this reason, in the empirical part the statistics of the proposed indicators will be analysed for the population of all municipalities in Poland, and their spatial and temporal differentiation will be assessed.

Literature review

As Garg et al. (2017) state, an accurate assessment of tax effort depends on an accurate estimation of fiscal capacity. The measure of tax effort is the ratio of tax revenue to fiscal (tax) capacity. While the amount of tax revenue corresponds to the value of collected tax revenue, its identification is beyond doubt, the measurement of tax capacity is much more problematic. Fiscal capacity is most often defined as the ability of a local government unit (LGU) to obtain its own revenue to finance the public services it provides. In a narrower sense, so-called tax capacity is analysed, referring exclusively to tax revenue. Among the numerous publications on this issue, attention is drawn to various approaches to measuring capacity, which is particularly visible in foreign literature.

In the United States, prior to the early 1960s, attempts focused on measuring capacity at the state level, rarely distinguishing between economic and fiscal capacity. However, Landreth (1961) notes that most of these measures have relied on subjective indicators. The only objective measures that can be used to measure fiscal capacity are per capita assessed valuation and per capita income. Although the importance of the first indicator can be linked to the importance of property tax as a local revenue source, non-uniform rules of valuation call into question per capita valuation as a measure of local fiscal capacity. Landreth (1961) also raises various reservations regarding the second indicator, primarily concerning doubts as to the basis on which income should be measured; nevertheless, in certain conditions, he considers per capita income to be a better indicator of fiscal capacity than per capita assessed valuation. According to Allers and Ishemoui (2010), an individual's personal income is the appropriate measure as it determines the ability of LGU residents to pay taxes. However, per capita revenue does not reflect the diversity of existing local taxes and other revenue sources; nor does it take into account the ability of local governments to "export" taxes (Yilmaz et al., 2006, p. 3).

Macroeconomic measures such as gross regional product (GRP), which corresponds to the total value of goods and services produced in a given region, are also used to measure fiscal capacity. However, as Shah (2007) emphasizes, this is an imperfect measure because a significant part of the income may be accrued to non-residents – owners of factors of production. Moreover, as a rule, such indicators do not express LGU's ability to obtain revenue from their own sources. Another

disadvantage of this approach is the low availability of data and long delays in their publication (if they are published at all). GRP is a basis for another fiscal capacity measure – total taxable resources (TTR) (more about adjustments to be made to GRP to obtain TTR in Martinez-Vazquez & Boex, 1997, p. 12).

The Advisory Commission on Intergovernmental Relations (ACIR) developed an alternative way of measuring fiscal capacity in the early 1960s. It published a report (1962) proposing a methodology called Representative Tax System (RTS), whereby the fiscal capacity of an LGU is the amount of revenue that a given unit could collect if every potentially taxable item (without exemptions, exclusions, deductions, etc.) were taxed at the representative tax rate (obtained by dividing the nationwide yield by the nationwide base or its equivalent). The ACIR methodology, therefore, requires accurate data on all taxes taken into account to calculate fiscal capacity and precisely determine the tax base for each tax. According to the ACIR, the RTS methodology allows for the best comparison of the actual fiscal capacity of LGUs, although it was also noted that the assessment result strongly depended on the initial arrangements. As the ACIR (1962) states, “[i]n constructing a representative tax system it was necessary first to decide what taxes should be included and how the bases of these taxes should be defined” (p. 32). In 1971, the ACIR expanded the scope of its methodology by including – in addition to tax revenue – own revenue from other sources, including charges collected in connection with various governmental services or interest earnings on financial assets rents. The new methodology was called the Representative Revenue System (RRS) (ACIR, 1971). By considering disaggregated data on each type of revenue, the RTS/RRS methodology is very accurate. However, this is also its disadvantage, as it requires collecting a large amount of information. We can also mention, for example, its failure to account for the impact of changes in tax rates on local tax bases (Chervin, 2007).

Another way of measuring fiscal capacity involves regression analysis. As Bahl (1972) sums up, the fundamental difference between the RTS approach and the aggregate regression approach is that in regression no attempt is made to define specific tax bases explicitly. In the case of the RTS, the statistical objective is to explain cross-country differences in tax efficiency by relating each type of tax collection to the best available measure of the actual tax base. In the aggregate regression approach, on the other hand, we explain the same variations but with general variables (economic, demographic) that are considered to be determinants of the overall tax capacity. There are also other econometric approaches used to estimate tax capacity – some researchers employ stochastic frontier analysis (SFA) (e.g. Garg et al., 2017) or spatial panel data analysis (Kiziltan & Yireli, 2023).

Polish authors often analyse fiscal (revenue) capacity as a component of other capacities (financial, economic, socio-economic) or as a determinant of investment capacity. Although the concept of fiscal capacity appears quite often in various publications, it is rarely defined precisely. Among the few definitions referring to such a term, we find a definition of own revenue capacity developed by Lubińska et

al. (2007). They argue that own revenue capacity is the sum of revenue from shares in personal income tax and corporate income tax, as well as real estate tax, agricultural tax, forestry tax, tax on means of transport, and tax on civil law transactions. This capacity is one of the elements of the so-called stable current revenue, which is used to formulate the definition of investment capacity.

Some elements of fiscal capacity can also be used to assess the ability of local government units to incur development expenditures. In the proposal of Mackiewicz et al. (2006), own capacity is defined as the amount of LGU revenue that can be allocated to financing new development projects. In this approach, however, own capacity cannot be identified with fiscal capacity because it also requires taking into account additional values, such as current LGU expenditures or expenditures necessary to complete projects already started.

How fiscal capacity is defined largely depends on the purpose for which it is calculated. Fiscal capacity can be used to assess the degree of autonomy of LGU. It can also be the basis for building equalization mechanisms and a starting point for estimating the development capacity of an entity. It is justified to distinguish different approaches and methods of measuring this value (more in Malinowska-Misiąg, 2019).

If LGUs with the same fiscal capacity realize revenue in different amounts, this results from both the applied tax rates, granted reliefs and exemptions, and tax enforcement. Tax effort can, therefore, be defined as the degree of utilization of the available revenue base or, as stated in Turley and McNena (2021), the measure of how much an LGU chooses to tax a potential revenue source. Although tax effort is used to assess or describe the intensity of attempts to raise tax revenue, Chervin (2007) notes that the results should be interpreted with caution. High tax effort may be the only way to finance the obligatory expenditure needs of an LGU, or it may result from a decision to provide residents with more or higher standard services. Low tax effort in LGU with a rich tax base may simply mean that such effort is sufficient to generate the required revenue, so there is no reason to increase it. However, some studies examine the relationship between tax effort and fiscal stress (e.g. Commission on Local Government Commonwealth of Virginia, 2023; Hite & Ulbrich, 1986; Mullen, 1990).

Inherent in financial condition is a government's ability to adequately provide services to meet current and future obligations. Financial condition is sometimes defined as financial achievement and measured by cumulative changes in net assets, fund equity, or net cash flows. Some researchers discuss financial condition in the context of financial crisis and fiscal stress, where resources available to provide services are extremely limited (Wang et al., 2007, pp. 1–2). In the English-language literature, many different synonymous terms are used to describe fiscal stress, such as: “fiscal pressures”, “fiscal instability”, “fiscal strain”, “fiscal emergency”, “fiscal trouble” or “fiscal crisis” (Brien et al., 2021; Rubin & Willoughby, 2009; Stonecash & McAfee, 1981).

The issue of local fiscal stress became popular in the second half of the 1970s in the United States in the context of oil crises resulting in a drastic increase in inflation and a reduction in local tax revenues, the structure of which in most countries was not resilient enough to inflation phenomena. Issues related to local fiscal stress gained relevance again in the late 2000s and early 2010s in connection with the global economic collapse (Swianiewicz, 2011, p. 294; Wójtowicz, 2014, p. 102). Fiscal stress is fuelled by structural pressures from demography, economy, and state policy (Kim et al., 2020, pp. 173–174).

Despite the importance of the topic of local fiscal stress, no generally accepted definition of this concept has been formulated in the literature so far. This is due to the difficulties in the objective evaluation of the financial situation of LGUs. The challenge is to objectively assess the scale and effects of this phenomenon, i.e. to determine when a financial crisis threatens the implementation of basic public goods and services and undermines the long-term fiscal stability of local government budgets. Attempts to define fiscal stress take into account the different reactions of LGUs to this phenomenon and consider it in other time horizons (short and long term). At the broadest level, a state's/local fiscal condition can be defined and measured by its ability to meet public goods and services demand. A state/local unit unable to meet this demand can be deemed to be in fiscal stress (Rubin & Willoughby, 2009, p. 54).

The widespread local government fiscal stress in the 1970s and 1980s motivated a large body of research on local government fiscal stress, which we can broadly divide into two areas: local government responses to fiscal stress and the measurement of fiscal stress.

Levine's (1978) study on cutback management and his claims about the links between the causes of fiscal stress and managerial responses are groundbreaking in identifying responses to fiscal stress. The conditions and reactions to fiscal stress are varied. They are examined in the context of the environment, the structure of the economy, demography, state policy, and the characteristics of local government (Warner et al., 2021, pp. 390–392).

The second area of research has focused on developing indicators of fiscal stress. There are four groups of approaches to measuring fiscal stress (Wójtowicz, 2014, pp. 104–105):

- 1) methods emphasizing the impact of the economic potential of a local government unit on its fiscal condition – in this approach, the income potential and tax base of a given local government unit are identified and confronted with the needs – the concept of estimating the need–capacity gap;

- 2) studies comparing the financial situation of a given LGU with others, appropriately selected on the basis of comparable features – the concept of estimating relative fiscal capacity;

- 3) methods referring to the assessment of LGU creditworthiness– the approach is based on many indicators reflecting both the current and future state of LGU finances;

4) indicator methods based on the analysis of financial and budget statements using various types of financial measures – an example is the set of indicators developed by the Polish Ministry of Finance, helpful in assessing the financial situation of individual LGUs, their ability to incur liabilities and make development decisions. The most up-to-date set of indicators for assessing the financial situation of LGUs covers the years 2019–2023 (Ministerstwo Finansów, 2024).

The next logical step is to connect these two areas of research – responses and measurement – in the perception of local officials, but perception data are not widely available. Despite this objective obstacle, such studies have been undertaken in recent years, mainly focusing on U.S. local government units (Kim et al., 2020, pp. 172–200).

Research methods

The importance of examining the relationship between central government tax policy in the scope of personal income taxation and local government tax policies in the range of real estate taxation has at least two types of reasoning. First, it results from fiscal reasons; the shares of municipalities in personal income tax and revenue from real estate taxes are the most important sources of tax revenue for municipalities in Poland. Second, the inclusion of these sources of tax revenue is also dictated by the genetic nature of a municipality, determined by the law as a community of residents (population) and a separate territory (area), which results from Article 1 para. 2 of the Act on Municipal Self-Government (Journal of Laws/Dz.U. of 2025, item 1153). Therefore, it can be assumed that if we define the municipality in terms of its population and a territory it inhabits, then in the case of personal income taxation, the personal substrate is of primary importance – the number of people, but also their demographic characteristics (e.g. age structure) and economic characteristics (inhabitants employed in agriculture, industry or services). In the case of real estate taxation, the spatial substrate will be of primary importance – the municipal area and its characteristics, e.g. structure in terms of its usage – arable land, forests, buildings. Both sources of tax revenues reflect the essence of local government – the self-government community (*wspólnota samorządowa*) (= population) and space (= territory). Municipalities differ both in terms of the characteristics of the population and space. So it is interesting to establish the relationship between the fiscal efficiency of taxing personal income of the population constituting the self-government community and the fiscal efficiency of taxing real estate defining the space inhabited by this community.

Research on the relationship between personal income taxation and property taxation requires a twofold approach, resulting from the differentiation of powers in shaping tax policy. Thus, even though municipalities do not have any possibilities in the area of shaping personal income taxation policy, their financial situation (budget balance) depends on the efficiency of taxation of the local tax base in the personal

income tax. It follows that changes undertaken by the central government in the field of personal income tax, with respect to shaping the tax base and the applied tax rate, will affect the level of revenues of municipal budgets to a varying extent. On the other hand, municipalities have far-reaching powers to shape their property taxation policy, in particular the tax base (tax exemptions) and tax rates (reducing rates in relation to maximum rates) in relation to all three taxes on real estate: property tax, agricultural tax, and forestry tax. Therefore, changes in personal income taxation, which are a manifestation of the tax authority of the central government and are independent of the local government's tax authority, would influence local authorities' decisions within the scope of their tax authority. So the fiscal balance of local government authorities will remain a derivative of the conjunction of the pressure and ability of local government units to compensate for fiscally unfavourable changes in personal income taxation in property taxation.

The hybrid model of tax authority division adopted in the Polish public finance system is expressed in a composition of two canonical models (Walasik, 2007): the model of share in central taxes (tax inclusion) and the model of tax source separation (tax disjunction). The fiscal policy of local government authorities takes place in an environment where central government can induce fiscal stress, with various possibilities of limiting the fiscally undesirable effects of this stress. The discussed indicators of fiscal stress and fiscal capacity, despite their cognitive, application and explanatory potential, require, however, due to the aim of developing them, their appropriate adjustment to the specificity of the Polish local finance system. Regarding fiscal stress, it was considered that for the purposes of the research it is necessary to identify the fiscal significance of local revenues from the local government's share in the personal income tax by linking them to the needs of financing local government expenditures. The indicator in question was considered an identifier of the pressure to compensate, while the indicator used to identify the ability to compensate was linked to the possibilities of local government response by the burden of the local tax base. The link between fiscal decisions of municipalities concerning the utilization of the local tax base and their willingness and ability to compensate for instability caused by the central government's fiscal decisions can be compared with the considerations of Wolman (1983). The following patterns of reactions of local authorities in conditions of fiscal stress were indicated: a) the mobilisation of available financial reserves by local authorities; b) demanding assistance from the central government; c) increasing budget revenues by increasing fees and local tax rates; d) reducing local public expenditure. Thus, the willingness-to-compensate indicator should incorporate information on the demand for support from the government in the form of subsidies for the implementation of tasks and the reduction of local public expenditure. In contrast, the ability-to-compensate indicator should consider both the release of available financial reserves, particularly by increasing tax revenues. In another context proposed by Overmans and Noordegraaf (2014), the willingness-to-compensate indicator should capture activities related to declines

and cutbacks, whereas the ability-to-compensate indicator should reflect activities related to retrenchment, respectively.

To study these connections, two indicators will be introduced to determine for individual local government units, respectively, the pressure and ability to compensate for unfavourable changes in personal income taxation through the use of property taxation. Reliance of fiscal balance on the personal income tax policy will remain dependent on the significance of revenues from the share in personal income tax in financing the tasks implemented by individual local government units. Therefore, the ratio of revenues from the share in personal income tax for a given i th local government unit $PITRev(i)$ to current expenditure $CExp(i)$ reduced by the amount of earmarked subsidies $EarSub(i)$ was established as the measure of the pressure to compensate $PrTR(i)$:

$$PrTR(i) = PITRev(i) / (CExp(i) - EarSub(i)) \quad (1)$$

Current expenditures $CExp$ are the only ones included for the following reasons. First, they are usually recurring and less volatile in the short term. Conversely, capital expenditures are often one-time, which can blur the assessment of fiscal stability when included. It is also not uncommon for them to be funded by external funds specifically earmarked for this purpose. Second, incurring debt to cover municipal current expenditures is prohibited by law in Poland. For this reason, (shared) taxes seem to be the key source of financing current expenditures. Hence, indicator (1) provides statistics on the degree to which the financing of the implementation of the own tasks of local government unit depends on the central government personal income tax policy. It enables an understanding of changes in this indicator as follows, the higher its level, the greater the willingness of a given local government unit to undertake actions to compensate for the undesirable fiscal consequences of changes in the taxation of personal income. In an extreme case, if a given municipality fails to gain any revenue from its share in personal income tax ($PITRev(i) = 0$), then the measure of willingness to compensate will be zero; in the case of municipalities in which revenues from the share in personal income tax grows faster than current expenditure not financed by earmarked subsidies, the indicator will tend to increase. In other words, if in two municipalities characterized by the same level of current expenditure $CExp(k) = CExp(m)$, in one of them the revenue from the share in personal income tax is higher than in the other $PITRev(k) > PITRev(m)$, then it should be expected that in the case of the municipality m the willingness to compensate will be lower than in the case of the municipality k , in which fiscal balance depends to a greater extent on the fiscal efficiency of the taxation of personal income of its residents.

The measure of the ability to compensate $AbTR(i)$ will be the ratio of the fiscal reserve from real estate taxation in a given municipality $FiscRes(i)$ to the revenues from real estate taxation $REstTax(i)$ generated in a given i th municipality.

$$AbTR(i) = FiscRes(i) / REstTax(i) \quad (2)$$

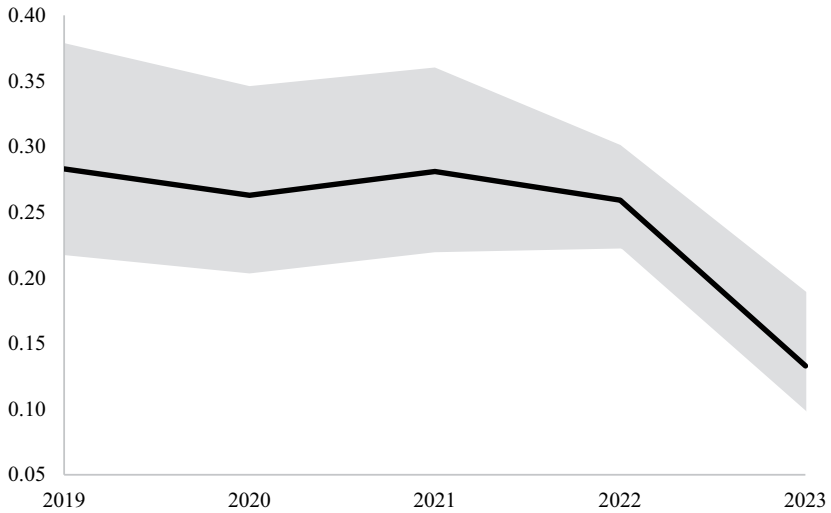
The revenue from property taxation $REstTax(i)$ is understood as the aggregate revenue from three taxes, i.e. property, agricultural and forestry, while the fiscal reserve $FiscRes(i)$ is determined by the amount of reduced revenues from these taxes, resulting from the reduction of tax rates in relation to the statutory maximum rates and the other than statutory tax exemptions. Fiscal reserve taken into account in (2) is parallel to the concept of tax expenditures and shows the same figures but in the interpretation of the limit of the possible fiscal reaction of local governments. So, the more restrictive the property taxation policy, the smaller the fiscal reserve. Consequently, the greater the scope of tax preferences applied in a given municipality, the greater the capacity of this municipality to compensate for unfavourable changes in the taxation of personal income by introducing a more restrictive property taxation policy.

Results

Our empirical study covers all Polish municipalities in the years 2019–2023. In addition to the analysis of the whole sample, we investigate the vulnerability to personal income tax reforms and the ability to compensate for personal income tax reforms within the following subgroups: rural municipalities, urban-rural municipalities, urban municipalities, and cities with county rights. The spatial context is also taken into consideration.

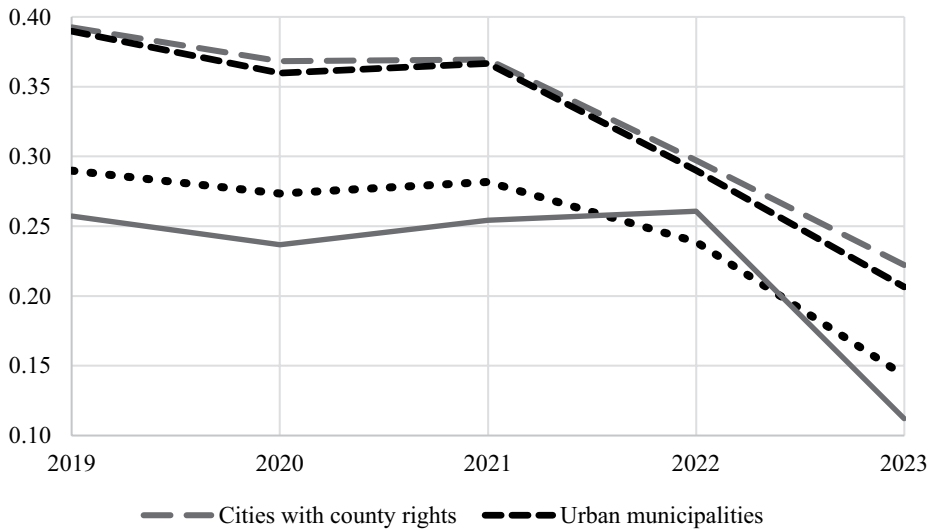
Figure 1 shows that the median ratio of shares in personal income tax to current expenditures decreased by earmarked grants was stable in the years 2019–2022 despite numerous and profound shocks to municipal budgets triggered both by taxation reforms and events such as pandemic and war in Ukraine. The year 2023 saw a significant drop in the exposure to unfavourable changes in personal income taxation. The decrease in indicator (1) was accompanied by the decrease of its variation.

Figure 1. Median and interquartile variation of the exposure to unfavorable changes in personal income tax (pressure-to-compensate indicator) in 2019–2023



Source: own elaboration based on the Ministry of Finance database.

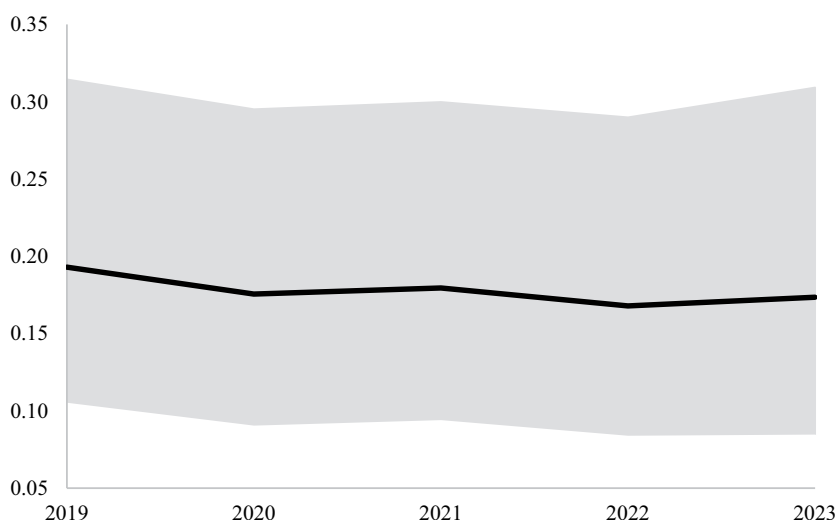
Figure 2. Vulnerability to unfavourable personal income tax reforms (pressure-to-compensate indicator) by the type of municipality in 2019–2023



Source: own elaboration based on the Ministry of Finance database.

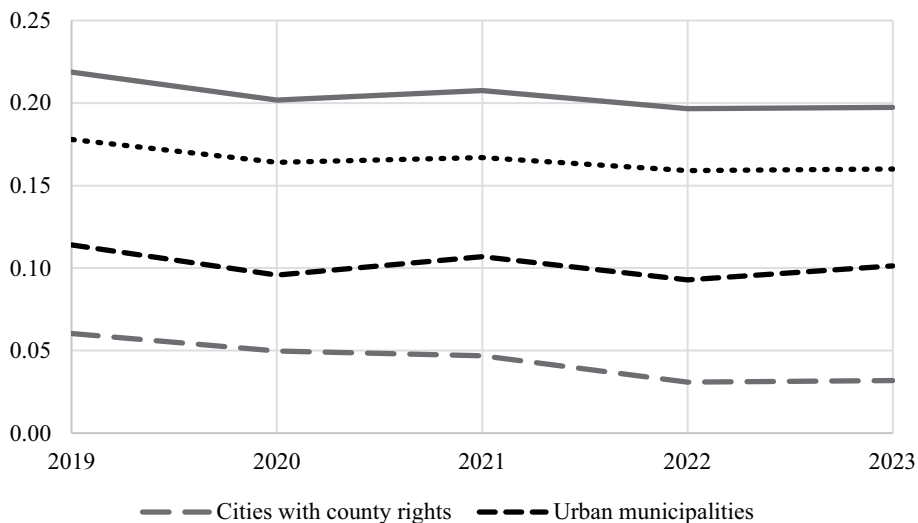
Vulnerability to unfavourable personal income tax reforms is found to vary considerably across types of municipalities (see Figure 2). One can identify municipalities more (i.e. cities with county rights and urban municipalities) and less (i.e. rural municipalities and urban-rural municipalities) reliant on revenues from personal income tax. Except for rural municipalities, there was a drop in indicator of the pressure to compensate already in 2022. Rural municipalities followed the general trend only in 2023.

Figure 3. Median and interquartile variability of fiscal effects of municipality tax power (ability-to-compensate indicator) in 2019–2023



Source: own elaboration based on the Ministry of Finance database.

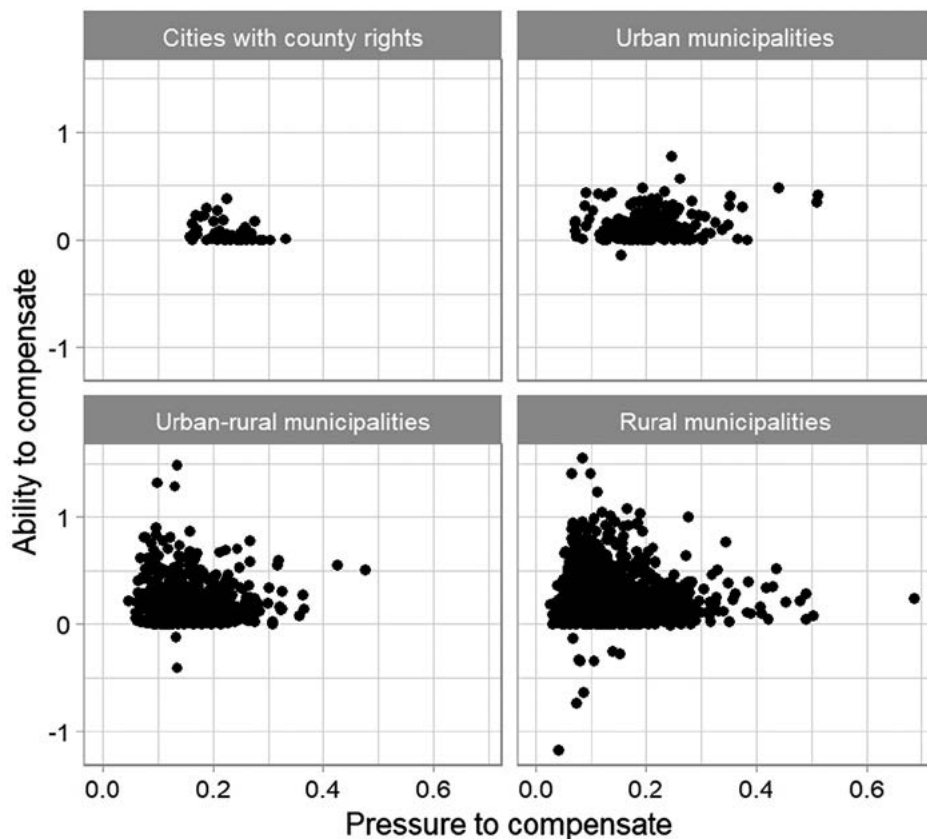
The other indicator used in the study is primarily used to illustrate the scale of use of the competences of municipalities in the field of shaping revenues from taxes on the real property owned (see Figure 3). The median of relations between tax expenditures and revenues from property taxes was very stable over time in 2019–2023. The activity of the local authorities in pursuit of tax policy did not exceed 20%, which can be assessed as a stable but low level of compensation capacity.

Figure 4. Level of ability-to-compensate indicator by type of municipality in 2019–2023

Source: own elaboration based on the Ministry of Finance database.

The tax policy of municipalities shows a significant diversity in each municipality type (see Figure 4). Some regularities are visible though. In urban municipalities, the effects of the tax power are far less important than in rural ones. In cities with county status, the ratio has been below 5% in recent years. The highest level of the indicator has been recorded in rural municipalities (approx. 20% in recent years). Rural municipalities are therefore characterised by a higher compensation capacity than urban ones. Figure 5 presents a comparison of the pressure-to-compensate indicator with the ability-to-compensate indicator.

Figure 5. Comparison of pressure-to-compensate indicator with ability-to-compensate indicator, divided by type of municipality. Data for 2023, excluding three outliers with negative values of pressure-to-compensate indicator

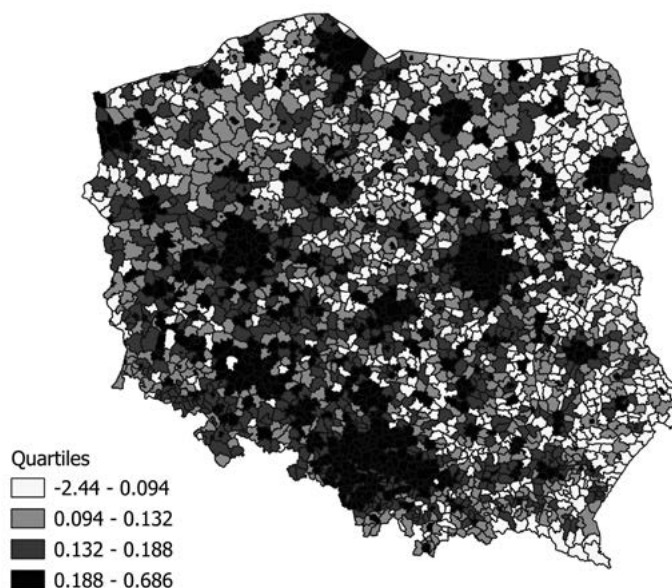


Source: own elaboration based on the Ministry of Finance database.

The values of the pressure-to-compensate indicator are, on average, lower in rural municipalities (0.13) and urban-rural municipalities (0.15) than in urban municipalities (0.21) and cities with county rights (0.22). The corresponding monotonic relationship can also be observed in the values of each of the quartiles (first, median, and third). The greatest dispersion of values can be observed for rural and urban-rural municipalities, with the concentration of values being closer to zero. In turn, the ability to compensate indicator values has the opposite direction regarding the type of municipalities. On average, the lowest values are noted for cities with county rights (0.06) and urban municipalities (0.13), and significantly higher for urban-rural municipalities (0.21) and rural municipalities (0.25). A similar direction of growth is noted for the minimum and maximum values and each of the quartiles, with the

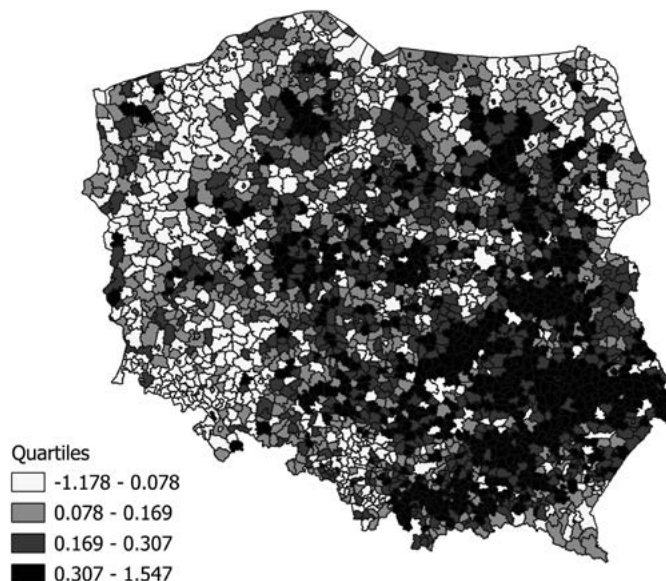
medians significantly lower than the average: 0.03 for cities with county rights, 0.10 for urban municipalities, 0.16 for urban-rural municipalities and 0.20 for rural municipalities, respectively. This is also reflected in the spatial arrangement of the values of both indicators (Figures 6 and 7).

Figure 6. Spatial distribution of pressure-to-compensate indicator in 2023



Source: own elaboration based on the Ministry of Finance database.

The pressure-to-compensate indicator demonstrates significant differences among municipalities depending on their type (urban, urban-rural, rural, and cities with county rights) regarding their budget dependence on personal income tax. South-western Poland is highly urbanized with larger towns and stronger economic centres such as Poznań, Wrocław, and Katowice. This area is dominated by cities with county rights, urban municipalities, and urban-rural municipalities, which may explain higher values of the indicator, as revenue from personal income tax in urbanized regions is usually higher. Municipalities with considerable economic activity are more populous, and a higher number of taxpayers earning relatively higher incomes compared to rural municipalities translates into greater revenues from shares in personal income tax. Figure 6 shows that the urbanized areas of southwestern Poland and the vicinity of urban agglomerations are characterized by higher values of the pressure to compensate indicator, suggesting greater exposure to the negative effects of changes in personal income tax at the central level.

Figure 7. Spatial distribution of ability-to-compensate indicator in 2023

Source: own elaboration based on the Ministry of Finance database.

An opposite trend can be observed on the map presenting the quartile analysis for the ability-to-compensate indicator (Figure 7). Municipalities with higher values of the fiscal pressure (stress) indicator simultaneously show a low level of the indicator representing their ability to compensate. As Wyszowska and Wyszowski (2021) pointed out, cities with county rights and urban municipalities use tax expenditures to a limited extent. This results from the desire to achieve increased revenues necessary to carry out a growing number of tasks. It may also be due to the belief of the authorities of the units that there is no need to apply preferences. Mayors believe that their units are the most attractive for residents and business entities (Wyszowska & Wyszowski, 2021). This means, however, that in a situation of falling revenue from shares in personal income tax, such units cannot compensate for this loss with their revenue, as they already mostly apply the maximum rates in property taxes and do not grant reliefs or exemptions, or they do so only to a very limited extent. The low level of the ability-to-compensate indicator is characteristic of western Poland, which has been considered more economically developed for years. Meanwhile, the highest level of the ability-to-compensate indicator is recorded by municipalities in eastern Poland, which is characterized by a lower population density and a lower degree of industrialization, with predominant agriculture and fewer large enterprises. This would mean that these municipalities generate relatively lower revenues from shares in personal income tax and at the same time actively pursue a tax policy in terms

of shaping their revenues by applying lower than maximum rates as well as tax reliefs and exemptions, thereby limiting resources for public services. Decisions to introduce tax preferences made in a given unit could respond to what is happening in neighbouring units. Therefore, the use of tax expenditures probably results from the desire to maintain and increase political capital, which is best explained by the concept of yardstick competition. Rural and urban-rural municipalities usually have smaller budgets, and when setting local tax rates or applying other tax preferences, they primarily strive to meet the expectations of residents (Felis & Gołębiowski, 2021; Motek, 2024).

Discussion and conclusions

The conceptual framework of the paper enables a critical adaptation of the fiscal stress and fiscal capacity research methods to the analysis of the combination of unfavourable changes in the conducted by central government personal income taxation policy and the property taxation policy controlled by local tax authorities. The proposed pressure to compensate and ability to compensate indicators were estimated for all Polish municipalities in the years 2019–2023. On their basis, their statistics were developed, allowing for the formulation of the following conclusions. The median of the index of the pressure to compensate, that is, the ratio of shares in personal income tax to current expenditures subtracted by earmarked grants, was stable in the years 2019–2022 despite numerous and profound shocks to municipal budgets triggered both by taxation reforms and exogenous events such as the COVID-19 pandemic and the Russian war on Ukraine. In 2023, we saw a significant drop in unfavourable changes in personal income taxation. The decrease in the indicator in question was accompanied by its decreased variation. On the other hand, the median index of the ability to compensate for unfavourable changes in personal income taxation introduced by the central government – the median of relations between tax expenditures and revenue from property taxes – was very stable in 2019–2023. The activity of the local authorities in pursuit of tax policy did not exceed 20%, which can be assessed as a stable but low level of compensation capacity.

The empirics shows that the pressure-to-compensate indicator establishes the noteworthy variances among municipalities depending on their type. The higher level of urbanization the higher values of this indicator, as local revenue from personal income taxation in urbanized regions is usually higher. Our research enables the identification that the highest level of the indicator of the ability to compensate was documented in rural municipalities. It follows that rural municipalities are attributed to the higher compensation capacity than urban municipalities. This presentation of results and comparison of the size of these indicators spatially allows for identifying regions that may need special attention from policymakers when planning future tax reforms. Areas with high sensitivity and low stability may need strategies

to mitigate the effects of adverse changes in personal income taxation. The conclusions from these analyses can also lay the groundwork for future research, which will hopefully analyse the causes and effects of spatial differences in municipalities' resilience to changes in personal income tax, as well as the identification of best practices in coping with fiscal challenges.

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