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Who benefited and who (if anyone) lost? An assessment of the reform of municipal revenues from personal income tax shares in Poland

Kto zyskał, a kto stracił? Bilans reformy dochodów gmin
z tytułu udziału w PIT w Polsce

Abstract

This article presents a preliminary assessment of the distributional effects of the 2025 reform of personal income tax (PIT) revenue allocation in Poland, introduced by the Act of 1 October 2024. Using historical data from 2018–2022, a simulation compares PIT revenues under the new and previous systems across four municipal types: rural, urban-rural, urban, and cities with county rights (CCRs). The results show that the reform strengthens the link between PIT revenues and local economic potential. While all municipalities gain nominally, benefits are uneven. Higher gains are associated with higher average wages, greater use of tax deductions, more non-agricultural employment, and a larger number of businesses. CCRs are most sensitive to income levels; rural municipalities the least. The study contributes to fiscal decentralization literature and offers insights for policymakers designing equitable intergovernmental fiscal systems.

Keywords: local government finance, fiscal decentralization, PIT allocation models

Streszczenie

W artykule dokonano wstępnej oceny tego, które jednostki samorządu terytorialnego (JST) zyskują, a które tracą na nowym systemie alokacji dochodów z podatku dochodowego od osób fizycznych (PIT), wprowadzonym mocą ustawy z 1 października 2024 r. o dochodach JST, oraz zidentyfikowano czynniki, które o tym przesądzą w różnych typach gmin (wiejskich, miejsko-wiejskich, miejskich oraz miastach na prawach powiatu – MNPP). Wyniki badania pokazują, że reforma zwiększa powiązanie dochodów gmin z ich potencjałem gospodarczym. Choć wszystkie JST nominalnie zyskują, to poziom korzyści różni się istotnie. Wyższe dochody uzyskują gminy z większym udziałem podatników korzystających z ulg, wyższymi wynagrodzeniami, większym zatrudnieniem poza rolnictwem i większą liczbą firm. Najbardziej wrażliwe na zróżnicowanie poziomu przeciętnych wynagrodzeń okazały się dochody z PIT w MNPP, zaś najmniej wrażliwe – w gminach wiejskich.

Słowa kluczowe: finanse samorządowe, decentralizacja fiskalna, modele alokacji PIT

JEL: H71, H77, H24

Introduction

The pursuit of effective fiscal decentralization remains a fundamental challenge in contemporary public finance, aiming to enhance the autonomy and financial independence of local government units (LGUs). A key aspect of this process concerns the allocation of revenue sources, with the Personal Income Tax (PIT) often regarded as a crucial and flexible instrument in this context. This paper analyses the factors determining the gains and losses of local government units (LGUs) in Poland resulting from the reform of the PIT allocation system, which shifted from a PIT revenue sharing model to a PIT base sharing model. In the first case, PIT revenues are shared between the central and local levels according to a percentage-based allocation formula. In the second case, the tax base (i.e., the taxable amount) is divided according to a specific percentage indicator. The study situates the Polish case within the broader theoretical framework of fiscal decentralization.

Theoretical perspectives on fiscal decentralization emphasize the efficiency gains and increased responsiveness to local needs that arise when revenue-raising powers are devolved to subnational governments. In principle, PIT allows LGUs to establish a direct fiscal link between local taxation and public service provision. However, the practical effectiveness of PIT as a local revenue source is shaped by multiple factors, including macroeconomic conditions, tax base characteristics, administrative capacity, and the broader system of intergovernmental fiscal relations. A distinctive feature of PIT in local government finance is its shared nature: only a fraction of the revenue is allocated to LGUs, while the majority remains under central government control (Korolewska, 2021).

This study focuses on the implications of Poland's new approach to PIT revenue allocation for LGUs. Between 2004 and 2024, the distribution of PIT revenues in Poland followed a tax revenue sharing model. Although PIT was formally categorized as a local own-source revenue, the system exhibited numerous structural weaknesses that undermined the predictability and equity of local public finances. Each tier of local government received a fixed share of PIT paid by individuals residing within its jurisdiction – nearly 40% for municipalities and close to 50% for cities with county rights. However, the system was marked by several fundamental flaws. First, local PIT revenues were highly dependent on central government decisions concerning the tax base. The introduction of new tax reliefs and exemptions led to reductions in local revenues, without adequate compensation mechanisms. As a result, local governments effectively lacked fiscal autonomy, as they had no authority over tax rates or policy design (Ślebocka, 2010). Second, the model reinforced the procyclical nature of local government revenues, as its reliance on historical tax data – even with a three-year weighted average – amplified sensitivity to economic fluctuations. This exclusion further limited the local tax base. The first and third shortcomings became particularly apparent after

the introduction of a comprehensive personal income tax reform in 2021, under the so-called Polish Deal.

To address these shortcomings, a new PIT distribution model was introduced in 2025. It replaced the revenue-sharing approach with a shared tax base model, in which local governments receive a fixed percentage of the PIT base (taxable income) generated by taxpayers residing within their jurisdiction. This reform aims to increase fiscal stability, enhance the financial autonomy of LGUs, and strengthen incentives for local economic development and, above all, to decouple local budgets from central government decisions on tax policy, particularly those related to PIT rates, reliefs, and exemptions.

Since this reform affects the apportionment of own-source revenues among local government units and changes the role of PIT within their revenue structure, it raises important questions about its distributional consequences and the factors that underlie them.

The main objective of this study is to identify the key factors driving variation in PIT revenues across municipalities, and to assess the expected benefits and potential risks associated with the reform. To achieve this, we conducted a simulation using historical data from 2018 to 2022. In particular, we used information on taxpayers' actual taxable income and the amounts of reliefs and exemptions actually claimed, according to their municipality of residence during this period. The current PIT distribution formula, introduced in 2025, was applied retrospectively to this dataset. The simulated results were then compared with the actual PIT revenues received by all municipalities in Poland under the allocation rules that were legally binding during that period.

This simulation provides the empirical foundation for our analysis, enabling us to assess the fiscal impact of the reform across municipalities and to explore the factors underlying observed differences in PIT revenue outcomes.

Drawing on a literature review, we explore universal patterns in local PIT revenue generation, while also accounting for country-specific factors that shape fiscal outcomes. In particular, we examine the impact of economic base, demographic trends, and tax design and tax policy rate.

The paper is structured as follows. The first section gives a brief summary of the 2025 reform of PIT revenue allocation. It sets out the reform's core design features and the legislature's main motivations. It also identifies the significant deficiencies of the previous ("old") system that the reform aims to address. The second section provides a literature review on PIT as a source of revenue for local government units, highlighting the determinants that affect the amount of revenue generated from it. The third section is devoted to the presentation of data and methods used to determine the determinants of the level of local government revenues from PIT, using Polish municipalities as an example. The last section confronts the results of the analysis with previous studies devoted to the factors shaping PIT revenues.

The study employs research methods such as a critical review of the literature and legal analysis, as well as econometric modelling using panel-data regression.

The article contributes to the theory of fiscal decentralization by demonstrating how changes in the mechanism for allocating PIT shares affect the financial autonomy of LGUs and their budgetary stability. The study provides empirical evidence on how different allocation formulas influence the distribution of revenues among local government units, which is significant for the theory of public finance and tax policy. The analysis of economic and demographic factors affecting PIT revenues enriches the understanding of the determinants of fiscal capacity disparities among LGUs, which is important for theories concerning the efficiency and equity of tax systems at the local level. By situating the Polish reform within the broader landscape of fiscal decentralization, the study offers insights for policymakers seeking to enhance the financial resilience of LGUs and optimize the design of decentralized tax systems.

Literature review – drivers of inter-municipal differences in PIT revenues

A growing body of research has examined the determinants of PIT revenues, including their role in fiscal decentralization processes and differences in fiscal capacity across subcentral government sectors in different countries. The following section focuses primarily on the factors that contribute to the variation in PIT revenues across municipalities within a single country, particularly those crucial in the context of the reform shifting from a tax revenue sharing model to a tax base sharing model, as implemented in Poland.

The literature review suggests that the main determinants of inter-municipal differences in PIT revenues result from a combination of economic and demographic conditions; geographic and structural characteristics (such as urban-rural classification); tax policy and design factors; and the allocation formula used to distribute PIT revenues between the central government and LGUs.

Economic drivers of PIT revenue variation

Differences in the local economic base significantly influence the variation in PIT revenues among LGUs. Economic activity shapes the tax base by determining income levels and employment opportunities in a given area. Municipalities with a robust economic structure, characterized by higher employment and diversified economic activity tend to exhibit a broader and more stable tax base, resulting in higher PIT revenues. This phenomenon is evident in the Polish context, where urban municipalities with more diverse and developed economies exhibit greater PIT shares due to stronger local tax bases (Olejniczak, 2017; 2016).

One of the fundamental indicators of local economic strength is Gross Domestic Product (GDP) per capita. Higher local GDP indicates greater economic activity,

leading to increased employment and higher personal incomes. The number of business entities registered within a municipality serves as an indicator of local entrepreneurial activity. Municipalities with a higher density of businesses tend to generate more employment opportunities and income, expanding their PIT base (Abugaliyev et al., 2014).

Labour market conditions also play a crucial role in shaping PIT revenues across municipalities. In this context, two key indicators are the employment-to-population ratio (specifically the share of employed individuals in the working-age population) and the unemployment rate. A higher employment-to-population ratio broadens the taxable base and thus increases local PIT revenues, while a higher unemployment rate reduces individual incomes and municipal revenues (Carroll, 2005).

Income levels among local residents are another key driver of variation in PIT revenues. Higher individual incomes translate directly into higher tax revenues collected locally. Municipalities with high-paying jobs in sectors such as technology or finance typically experience higher PIT revenues compared to areas dominated by lower-wage industries (Vieira et al., 2017).

PIT revenues are inherently cyclical, as they closely follow the economic cycle. During economic expansions, employment and incomes rise, leading to higher tax collections; conversely, economic downturns result in significant drops in PIT revenues due to job losses and reduced economic activity (Alexeev & Yushkov, 2022). Furthermore, the elasticity of tax revenues to economic cycles suggests that during periods of economic growth, PIT revenues tend to rise more significantly than they decline during downturns, underscoring the importance of macroeconomic conditions (Carroll, 2005).

Demographic factors

Demographic characteristics play an important role in explaining variation in PIT revenues across municipalities. One fundamental factor is population size, as larger populations generally contribute to higher PIT revenues due to a broader tax base (Godlewska & Mackiewicz, 2023). Drew et al. (2023) explore the relationship between population growth and local government revenue, concluding that areas experiencing population increases often see corresponding growth in PIT revenues. Population growth in Indonesia has positively impacted local tax revenues, as more individuals contribute to the tax base. The size of a local government unit is also correlated with its financial condition, with larger populations often resulting in better liquidity positions and stronger revenue-generating capabilities.

The age structure of the population also has significant fiscal implications (Szymkowiak & Wyszowska, 2015). Regions with a higher proportion of working-age individuals typically generate more income tax. According to OECD data (2022), ageing populations tend to have lower labour force participation rates, which can lead to

reduced PIT revenues for local governments. This trend is particularly pronounced in developed countries. In Australia, demographic shifts towards an ageing population are expected to impact the financial assistance local governments receive, potentially leading to fiscal imbalances if not addressed through national adjustment mechanisms (Jackson, 2004).

Migration dynamics influence the distribution of PIT revenues. Positive internal migration balances – with more people moving into a municipality than leaving – can strengthen the local tax base and boost revenues (Vaturi et al., 2004). Conversely, municipalities experiencing out-migration, particularly of working-age residents, may face declining PIT receipts and deteriorating fiscal conditions.

Finally, poverty rates are another social factor with direct relevance to PIT revenues. Higher poverty levels typically imply lower taxable incomes, reducing the overall PIT contributions from a given locality (Gnangnon, 2020). Thus, efforts to reduce poverty can indirectly support stronger local government finances by expanding the effective tax base.

Geographic and structural characteristics

Geographic location and structural characteristics of local government units (LGUs) are important determinants of variation in PIT revenues across municipalities. Regions with favourable geographic conditions report better financial performance (Beramendi & Rogers, 2021).

Structural attributes, particularly the administrative type of LGUs (rural, urban municipalities and large cities), also significantly shape local revenue potential. Warner and Pratt (2005) focus on spatial diversity in local government revenue efforts, noting disparities in revenue generation between urban and rural municipalities. They observe that larger cities typically experience greater economic activity, leading to enhanced tax revenue opportunities, including PIT. Liptáková and Rigová (2021) discuss the financial strategies of Slovak municipalities and emphasize that urban municipalities, with their diverse economies, typically possess greater financial capacity for local development through taxes compared to their rural counterparts. Large cities and economically prosperous urban regions generally benefit from higher income levels, better job opportunities, and greater economic activity, all of which strengthen their PIT revenue base (Pacicco et al., 2024). Conversely, rural areas often face challenges related to lower average incomes resulting in weaker revenue generation. Smaller municipalities often lose potential tax income as residents commute to urban centres for work, concentrating PIT revenues in wealthier areas (Cerqueti et al., 2015). The labour market in large cities is significantly more diversified, whereas rural areas are characterized by greater homogeneity (Kryńska, 2017).

Standar and Kozera (2019) discuss the role of local finance in addressing socioeconomic inequalities in Polish rural areas. Their findings indicate significant differences in local fiscal capacity between urban and rural municipalities. They suggest that rural municipalities generally exhibit

lower sensitivity to income fluctuations compared to urban areas, which can adjust more quickly to shifts in revenue streams. Urban municipalities typically have a broader range of revenue sources, making them more adaptable.

Gospodarowicz and Chmieleński (2012) analyse territorial cohesion among Polish municipalities and find that urban areas, particularly those with county rights, demonstrate different economic dynamics compared to rural areas. They suggest that larger cities and urban municipalities respond more strongly to economic changes, including variations in personal income.

Tax policy and PIT system design

The tax policy framework and the design of the Personal Income Tax (PIT) system constitute another important set of factors influencing variation in local government revenues.

The degree of progressivity in the PIT system has complex implications for local revenue generation. While progressive tax systems aim to achieve greater income equality among taxpayers, they can also introduce challenges for revenue collection. Higher progressivity may discourage income generation, increase tax avoidance strategies, or shift taxable income to lower brackets, thereby reducing overall revenue.

Local politicians may engage in strategic tax policy adjustments, particularly during election periods, to favour certain income groups, leading to distortions in fiscal policy and reduced revenue stability (Giommoni, 2019).

Another critical design feature affecting PIT revenues is the structure and availability of tax deductions, allowances (e.g., basic tax-free amounts), or other forms of tax relief. Deductions reduce the taxable income base and can thereby lower total PIT collections. While deductions can alleviate tax burdens for individuals, they may also weaken the overall progressivity of the system (Young et al., 1999). Their impact on local revenues can be particularly pronounced in jurisdictions with lower income levels or higher poverty rates, where residents are more likely to depend on available deductions (Hatfield, 2013).

The design of PIT systems also interacts with fiscal equalization mechanisms. Highly progressive tax systems can exacerbate income segregation among regions, potentially requiring equalization schemes to maintain a balanced distribution of tax burdens and revenues (Kuhlmey, 2017). Without such mechanisms, wealthier jurisdictions could further strengthen their fiscal position at the expense of poorer areas.

Allocation mechanisms and distribution models for PIT revenues

The mechanisms used to allocate PIT revenues between central and local governments are a key determinant of the fiscal efficiency of PIT at the local level. These mechanisms determine not only the amount of PIT revenue that

local government units (LGUs) receive but also the efficiency of resource use.

A fundamental distinction in PIT assignment concerns revenue sharing versus tax base sharing. In revenue sharing systems, local PIT revenues are determined by a fixed percentage of centrally collected income tax, regardless of where the income is earned or what tax preferences are applied. While this model offers a predictable and administratively simple source of funding, it also creates a disconnect between local economic conditions and local PIT revenues. Because revenues are calculated and distributed at the central level, local governments have no direct influence over the size of the tax base or the effects of national tax policies. As a result, the fiscal efficiency of PIT at the local level is constrained: local PIT revenues do not reflect actual local income generation or the fiscal effort of the municipality. This limits the potential for PIT to act as an incentive for local economic development. In practice, revenue sharing functions more like an intergovernmental transfer than a true local tax instrument, reducing local fiscal autonomy and weakening accountability (GAO, 1980).

By contrast, the tax base sharing model – as introduced in Poland in 2025 – links local PIT revenues directly to the taxable income generated by residents within a municipality. Under this approach, LGUs receive a fixed share of the local PIT base, which improves the alignment between local tax revenues and local economic performance. This design disconnects municipal budgets from centrally driven changes in PIT rates, exemptions, or thresholds, thereby increasing the predictability, transparency, and fiscal efficiency of PIT revenues at the local level. While base sharing still requires central administration of the tax system, it provides stronger incentives for local development and better reflects local fiscal capacity.

Despite these benefits, base sharing still requires central oversight of the tax base and does not eliminate regional fiscal disparities. Jurisdictions with weaker economies and lower income levels may still receive less PIT revenue, raising questions about the need for complementary fiscal equalization mechanisms. Local surtaxes are used in some countries, such as Italy, to expand LGU revenue autonomy. The introduction of local surtaxes on national PIT has modestly improved the redistributive potential of the system and allowed municipalities to tailor tax policy to local conditions. However, such decentralization may also increase the overall tax burden without reducing national tax rates, leading to concerns about taxpayer equity and fiscal competition.

Data and methods

The aim of this study is to identify the determinants that influence changes in PIT revenues for LGUs in Poland resulting from the 2025 reform of the PIT distribution system.

Since the actual fiscal effects of the 2025 reform of PIT revenue allocation between the central government and LGUs in Poland will only become observable in future

budget years, we carried out a simulation for earlier periods (2018–2022) under a counterfactual scenario in which the new rules were already in effect.

Under the system in force until the end of 2024, municipalities received 39.34% of PIT collected from individuals residing in their jurisdiction, and counties received 10.25% of PIT from residents within their area. Cities with county rights were entitled to both shares. The total amount allocated to a given LGU was determined proportionally, based on the share of PIT revenue collected from taxpayers residing in that LGU relative to the total PIT revenue collected nationwide. Starting in 2025, these allocation rules were revised. The new system replaced the previous model with fixed percentage shares applied to a local tax base. Specifically, municipalities now receive 7.0%, and cities with county rights receive 8.6% of the PIT base attributable to taxpayers in their jurisdiction.

Using detailed data from the Polish Ministry of Finance, including executed (realized) taxable income figures for PIT payers by LGU, we estimated what the PIT revenues of all municipalities in Poland would have been in 2018–2022 if the 2025 allocation rules had already been in place. These simulated values were then compared with the actual PIT revenues received by municipalities under the previous rules in the same years.

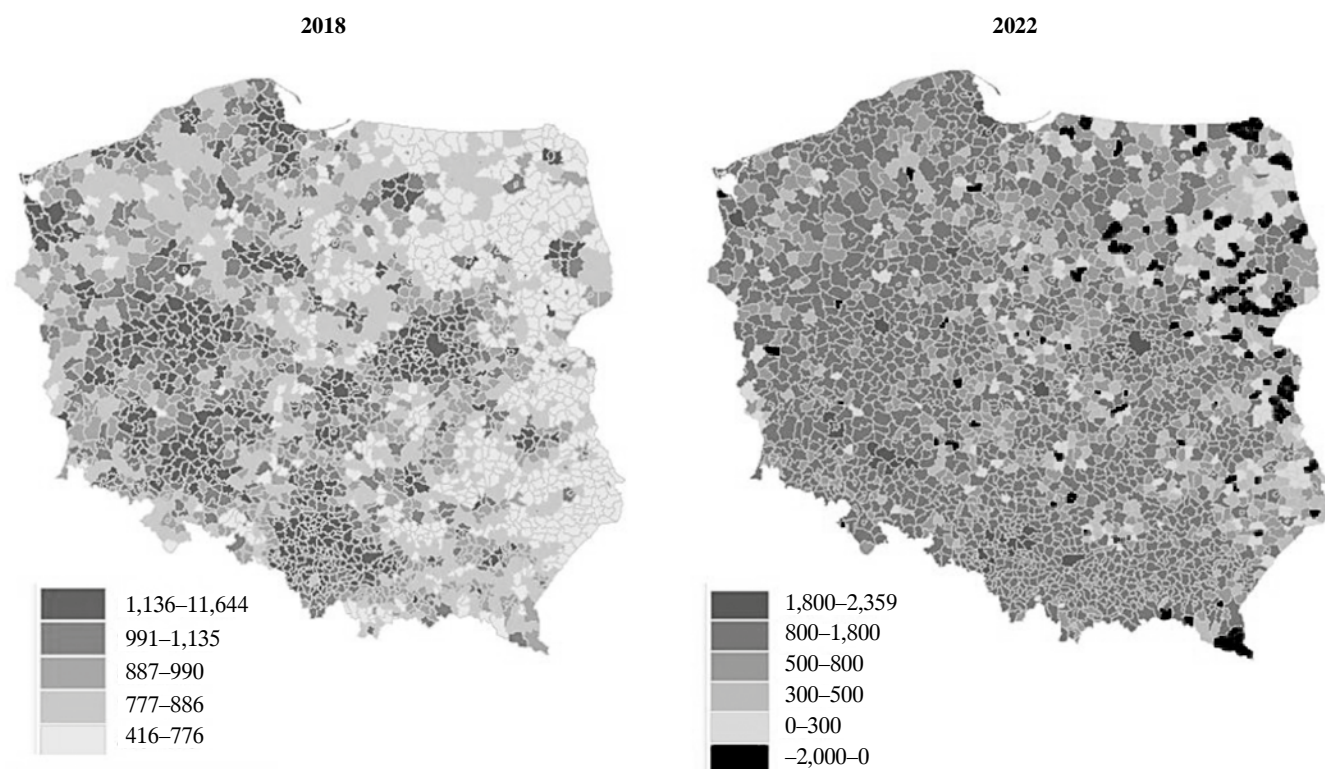
This simulation forms the basis for our empirical analysis of the expected effects of the reform. It allows us to examine which factors drive gains or losses in PIT revenues for different LGUs under the new system.

The dependent variable (ΔPIT) is defined as the difference between the hypothetical PIT revenues for each LGU under the new rules and the actual PIT revenues received under the old model in the corresponding year. This approach enables an empirical assessment of the key factors that explain changes in PIT revenues. Figure 1 shows the spatial variation of this variable.

Table 1 presents descriptive statistics for the per capita differences in PIT revenues (ΔPIT) across the years of the study period, disaggregated by four categories of municipalities in Poland: rural, urban-rural, urban, and cities with county rights.

The descriptive statistics indicate that the impact of the PIT revenue reform on different categories of municipalities in Poland was not uniform. First, on average, cities with county rights emerged as the primary beneficiaries of the reform, while rural municipalities experienced the smallest relative gains. Second, rural municipalities also exhibited the greatest variation. This group includes both municipalities with only marginal increases in PIT revenues and those that registered substantial gains. Third, the results suggest that some municipalities may receive lower PIT revenues under the new framework compared to the amounts distributed under the previous system ($\Delta\text{PIT} < 0$). This applies to municipalities whose residents made limited use of tax deductions and allowances. Fourth, the simulation results appear to be sensitive to changes in the PIT system itself, as evidenced by the discrepancies between the results for 2022 and those for earlier years.

Figure 1

Spatial differentiation of changes in PIT revenue by municipality in Poland (Δ PIT, per capita PLN)

Source: own calculations.

Table 1

Descriptive statistics: per capita differences in PIT revenues for municipalities under the new versus the old distribution rules (Δ PIT)

Year	Mean	Median	SD	Min	Max	N	N (Δ PIT < 0)
Rural							
2018	927.00	892.00	258.64	416.37	4,880.94	1,547.00	0
2019	990.46	947.88	689.52	334.62	26,452.05	1,537.00	0
2020	1,055.40	1,019.35	883.70	–3,219.15	34,291.51	1,533.00	1
2021	1,231.72	1,183.75	1,646.87	612.40	64,888.01	1,523.00	0
2022	716.41	748.70	476.73	–1,238.16	2,359.29	1,513.00	112
Urban-rural							
2018	977.16	945.19	202.26	525.03	2,014.08	628.00	0
2019	1,027.81	1,008.32	195.49	554.94	1,983.15	638.00	0
2020	1,103.94	1,091.26	179.70	428.99	1,758.69	642.00	0
2021	1,270.89	1,255.85	193.33	661.11	2,014.32	652.00	0
2022	1,045.42	1,061.95	352.23	–747.27	1,999.76	662.00	5
Urban							
2018	1,070.11	1,046.44	157.98	676.48	1,704.57	236.00	0
2019	1,154.74	1,123.42	164.98	682.21	1,866.31	236.00	0

Table 1 – cont.

Year	Mean	Median	SD	Min	Max	N	N ($\Delta\text{PIT} < 0$)
2020	1,266.19	1,254.97	145.82	754.74	1,767.25	236.00	0
2021	1,424.32	1,430.06	153.47	807.31	1,831.24	236.00	0
2022	1,255.58	1,335.84	418.39	-1,789.93	1,954.52	236.00	5
Cities with county rights							
2018	1,480.62	1,327.57	1,280.74	850.28	11,644.85	66.00	0
2019	1,418.60	1,407.76	163.97	893.42	1,821.35	66.00	0
2020	1,580.36	1,592.97	147.75	991.97	1,916.73	66.00	0
2021	1,732.88	1,757.35	166.73	1,073.12	2,031.45	66.00	0
2022	1,696.23	1,692.77	263.50	922.31	2,233.69	66.00	0

Source: own calculations.

The divergent outcomes across municipality types prompted the development of four separate model specifications, each corresponding to a distinct category of municipalities in Poland.

Each specification employed the same set of explanatory variables. The key variables included the value of income deductions (Inc_Ded) and the value of tax deductions (Tax_Ded), which capture the extent to which local governments benefit from taxpayer preferences under the new system. The explanatory variables used in the model are categorized and described as follows:

1) economic drivers of PIT revenue variation: median salary (Med_Sal) – local income levels and earning potential; share of the non-agricultural labour force in the total labour force (Non-agri) – the structure of employment, particularly in sectors typically subject to standard PIT rules; employment as a percentage of the working-age population (Emp_rate) – labour force participation and local economic activity; and number of registered business entities (Firms_No) – a proxy for entrepreneurship and economic dynamism;

2) demographic factors: total population (Pop_total);

3) geographic and structural characteristics: although not represented by a separate variable in the regression models, this category is indirectly reflected by differences in municipality types (rural, urban-rural, urban, and cities with county rights), for which separate model specifications were estimated;

4) tax policy and PIT system design: the value of income deductions (Inc_Ded) – the total amount of deductible income claimed by taxpayers, which reduces the PIT base, and value of tax deductions (Tax_Ded) – deductions from the PIT liability itself, directly reducing the amount of tax paid;

5) allocation mechanisms and distribution models for PIT revenues: it constitutes the central identification strategy in the study and underpins the simulation design.

The variables used to build the models are summarized in Table 2.

In addition to the variables adopted for the modelling, the use of other data reflecting the determinants of income potential related to personal income tax was considered. Variables relating to the volume of commuting (circular migration), the type of unit (number of agricultural holdings or their area as a proportion of the total area of the municipalities), gross domestic product or some other figure of a similar nature were considered. Data in this area is not available and therefore could not be used for the analysis.

To assess multicollinearity among the explanatory variables for each dependent variable, the variance inflation factor (VIF) was calculated. The VIF values for all variables are well below the commonly accepted threshold of 10, indicating that multicollinearity does not pose a concern in any of the model specifications.

Different estimators were employed based on the characteristics of the panel data. The results of the Breusch-Pagan Lagrangian Multiplier test for panel effects reveal significant unobserved heterogeneity across units. The Hausman test was conducted to determine whether individual effects (specific to each municipality) are correlated with the explanatory variables. The test did not reveal statistically significant differences between the fixed effects and random effects estimators, indicating no correlation between individual effects and the regressors. Therefore, the random effects (RE) model was chosen as the more efficient specification. The municipalities are treated as a random sample from a broader population of local government units, and the goal is to identify general mechanisms rather than focus on specific entities. The RE model also allows for the inclusion of time-invariant explanatory variables, which are theoretically relevant but would be eliminated under a fixed effects approach. The Modified Wald test for groupwise heteroskedasticity confirmed the

Table 2
Variables characteristics

No	Variable names	Acronym	Unit	Data source
Explained variable				
1	Difference in PIT revenue per capita (new and old method of calculation)	Δ _PIT	PLN	Own calculations based on data MF* and LDB**
Explanatory variables				
2	Value of deductions from PIT income per taxpayer	Inc_Ded	PLN	MF
3	Value of PIT deductions per taxpayer	Tax_Ded	PLN	MF
4	Median salary	Med_Sal	PLN	Own estimates based on data SP
5	Share of non-agricultural labour force in total labour force	Non-agri	%	LDB, data from official statistics
6	Employment as a percentage of the working-age population	Emp_rate	%	LDB
7	Number of registered business entities per 1,000 working-age population	Firms_No	No.	LDB
8	Population	Pop_total	No.	LDB

*Ministry of Finance, **Local Data Bank (Statistics Poland).

Sources: own elaboration.

presence of heteroskedasticity in all model specifications. Additionally, the Wooldridge test for autocorrelation in panel data provided evidence of first-order serial correlation in each model.

Given the presence of heteroskedasticity and first-order autocorrelation in all model specifications, the use of cluster-robust standard errors was necessary to obtain consistent estimates. This approach accounts for arbitrary heteroskedasticity and serial correlation within panels, thereby enhancing the reliability of statistical inference (Wooldridge, 2010; Cameron & Miller, 2015).

Results and discussion

Table 3 presents the estimation results for five model specifications: four disaggregated by municipal type – rural, urban-rural, urban, and cities with county rights – and one encompassing all municipalities combined. It is not surprising that tax deductions claimed by residents emerge as a statistically significant variable across all municipal types. Moreover, the estimates suggest a positive relationship between the size of these deductions and the changes in municipal PIT revenues following the reform. As expected, municipalities whose residents more frequently benefit from tax deductions have become net beneficiaries of the reform. This supports the findings of Hatfield (2013), who highlight the high sensitivity of PIT revenues to applied deductions. This effect is especially pronounced in rural municipalities and cities with county rights, while it is somewhat weaker in urban-rural and urban municipalities.

While the variable capturing deductions from tax is statistically significant across all municipality types, the results for the variable representing deductions from income are less consistent. Statistically significant results appear only in rural and urban-rural municipalities. In these cases, the level of income deductions is also positively related to the changes in PIT revenues. The observed differences in outcomes between the tax deduction variable and the income deduction variable can be attributed to the broader variety of income deduction mechanisms. This suggests that aggregate deduction amounts may not be sufficient to fully assess the reform's impact. A more granular analysis of the structure of deductions utilized by taxpayers within specific municipalities would be required, although the available data do not allow for such detailed investigation.

More robust conclusions can be drawn from the analysis of the relationship between residents' income levels and the effects of the reform. First, across all LGU types, this relationship is positive and statistically significant, suggesting that municipalities with higher-income residents have benefited more from the reform. Second, the sensitivity to changes in income levels varies across municipality types. Cities with county rights exhibit the highest sensitivity, whereas rural municipalities demonstrate the lowest. These findings support the reform's central premise: local PIT revenues should be more closely linked to taxpayers' income levels than to the specific mechanics of tax calculations. This is consistent with observations from other countries, which indicate that base sharing provides stronger incentives for local development, better reflects local fiscal capacity, and reinforces the fiscal link between

Table 3

Random effects models; dependent variable – difference in PIT revenues for LGUs calculated under the new versus the old rules (Δ PIT) per capita

Variable	Rural (1)	Urban-Rural (2)	Urban (3)	Cities (4)	All (5)
Inc_Ded	0.0288*** (0.0079)	0.0419*** (0.0068)	0.0091 (0.0056)	−0.0434 (0.0468)	0.0198*** (0.0047)
Tax_Ded	0.9809*** (0.0997)	0.7907*** (0.1565)	0.6647*** (0.1490)	0.5227*** (0.1712)	1.0370*** (0.0977)
Med_Sal	0.1785*** (0.0198)	0.2383*** (0.0304)	0.2899*** (0.0257)	0.3231*** (0.0629)	0.2575*** (0.0217)
Non-agri	10.1963*** (0.7055)	4.8887*** (0.9675)	39.9911*** (11.6823)	46.1321** (21.7816)	10.4607*** (0.6687)
Emp_rate	0.1454*** (0.0322)	0.0595*** (0.0223)	0.8149*** (0.2402)	−4.8808 (5.4906)	0.1566*** (0.0247)
Firms_No	2.1079*** (0.2631)	1.4324*** (0.2174)	−0.0242 (0.0872)	0.7707 (1.5084)	1.3527*** (0.3168)
Pop_total	0.0129*** (0.0035)	0.0045*** (0.0010)	0.0009 (0.0006)	−0.0001 (0.0002)	0.0005 (0.0003)
Constant	−1,319.9248*** (106.5457)	−856.9202*** (138.4949)	−4,191.4555*** (1,094.2877)	−4,430.9040* (2,434.0136)	−1,464.0446*** (92.5133)
r^2	0.0777	0.5524	0.4211	0.0822	0.0997
Wald χ^2	1,037.7006	1,118.4708	463.3688	163.5474	1,043.6349
N	7,617	3,220	1,180	330	12,347

Note: standard errors in parentheses: * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$.

Source: own elaboration.

residents and their local governments. At the same time, the variation observed between rural municipalities and other LGU types confirms that fiscal sensitivity differs across municipal categories. This aligns with the observations of Gospodarowicz and Chmieliński (2012), who argue that larger cities and urban municipalities exhibit a more pronounced response to economic changes.

Undoubtedly, local labour market characteristics and the structure of local entrepreneurship are factors that influence PIT revenues. Accordingly, variables such as employment levels, the share of non-agricultural employment, and the number of registered businesses within each LGU are correlated with changes in PIT revenues triggered by the reform. Where these variables are statistically significant (mainly in rural areas), it suggests that LGUs with a more stable non-agricultural labour market were more likely to benefit from the reform. In the case of cities with county rights, none of the labour market control variables included in the model proved to be statistically significant. This result confirms the greater labour market dynamism and heterogeneity in large urban centres (Kryńska, 2017).

Conclusions

The research findings may serve as a basis for recommendations to policymakers aimed at optimizing tax revenue-sharing systems, which is relevant to public policy and public financial management theory. As expected, the PIT distribution reform is likely to benefit those local government units with a large number of PIT-paying residents – particularly those with high incomes, including wage earners. By contrast, units whose residents fall largely outside the PIT system – such as rural municipalities predominantly reliant on agricultural tax – are expected to be worse off. These municipalities have not experienced a meaningful increase in PIT revenues for two main reasons. First, their residents often do not generate PIT-taxable income. Second, as a result, they have not been able to benefit from PIT-related deductions and exemptions.

Overall, the core objectives of Poland's PIT allocation reform appear to be achieved in principle. Estimates based on historical data and the new PIT distribution model suggest that the vast majority of LGUs would receive

increased revenues from this tax. However, it should be emphasized that cities with county rights and urban municipalities have benefited the most in terms of PIT revenue gains. This reflects the structural determinants that drive PIT revenue levels. Nevertheless, this does not necessarily mean that these units achieved the largest overall revenue increases within the new local government financing system introduced in Poland. This study did not assess how the reform may affect revenues from the general subsidy – another key source of LGU revenue. This is because higher PIT revenues may reduce LGUs' eligibility for intergovernmental transfer revenues. This issue requires separate and dedicated analysis.

While this article does not analyse the impact of the reform on disparities in personal income tax (PIT) revenues among local government units (LGUs) directly, the authors' separate studies suggest that the new allocation mechanism, particularly the decoupling of revenues from tax reliefs, significantly reduces the gap between LGUs with the highest and lowest per capita PIT revenues. This could encourage income convergence and promote more balanced territorial development by strengthening the investment capacity of previously underfunded LGUs. However, the extent of these effects will also depend on non-tax factors, such as labour-market development and entrepreneurship.

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